Queen Anne's Revenge

Conservation Laboratory Report, July 2008

UAB Conservation Laboratory, Greenville
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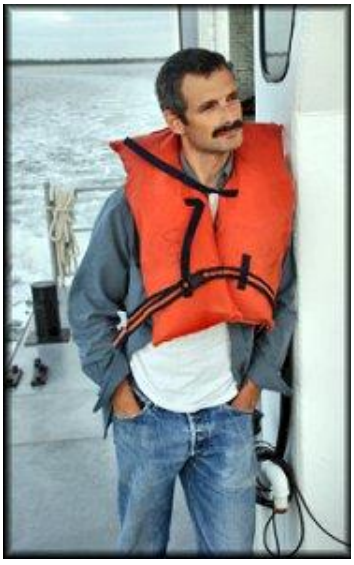
It has been some time since our last conservation report, September 2006! In the fall of 2006 the main focus and direction of the *QAR* project changed when we initiated full-scale artifact recovery. Archaeologists have been excavating from the south of the site (or stern of the original ship) towards the north (bow) systematically in 5'x 5' units. With a 6 week field season in 2006 and a 12 week field season in 2007, we have added approximately 3,300 *QAR* numbers to our database which includes about 1400 concretions, 40 ceramic sherds, 130 glass shards, 120 copper alloy objects, thousands of lead shot and ballast stones and many other artifacts. Due to this increased workload conservation reports were temporarily suspended. However, as we attend conferences and people visit the lab, we have had many inquiries into why we have not posted any conservation updates. These many requests have prompted us to bring the public up-to-date with the *QAR* Lab. We have so much to report in our update so let's start with the people who have been making the difference!



QAR Staff & ECU Graduate Students

Franklin H. Price was initially a volunteer at the *QAR* lab in February 2004 when he was an ECU Maritime Studies Program student. Franklin was hired onto the *QAR* team during the 2006 field season as a field technician with responsibilities that included excavating/recovering artifacts and helping with all tasks that involved artifacts after recovery. During any down time from diving, Franklin always found a moment to pan for artifacts from the sluice sediment. Franklin was very thorough and diligent during the field season and the project was fortunate to be able to carry over his position working in the lab into the spring of 2007. Franklin took the lead of what we now call 'Micro Archaeology' (explained below), as well as helping with cannon cleaning and any other tasks that required additional help. Franklin was hired for the 2007 field season and the project was again able to have him continue his work in the lab until May, perfecting the techniques of recovering some of the smallest artifacts, cleaning cannon and generally

helping out with overall tasks. Franklin has been instrumental in the micro excavations of the sluice sediment, and plans to write a professional article detailing his processes and findings.

ECU Coastal Resource Management PhD student Valerie Grussing started in September 2005 and worked with us through 2006. In the spring of 2007 Valerie got an internship at the Warren-Lasche Conservation Lab in Charleston, SC that houses the Civil War submarine *CSS Hundley*. Valerie joined the *QAR* lab team again in September 2007 and she continued her work until May. Valerie has helped with many different tasks around the lab from data entry, post excavation processing, and air scribing, to inventorying artifacts in x-rays, however her most outstanding talent is artifact illustration. Valerie has a brilliant artistic ability to draw artifacts and we are very lucky to have such a gifted individual working at our lab producing such quality illustrations. Valerie has also participated in field excavations where she used her drawing skills for mapping artifacts underwater on site.

Myron Rolston started volunteering at the lab in November 2005 and when money was available to hire a conservation technician, Myron was our first choice. Myron has been working with us from September-May from 2006-2008. One of Myron's primary tasks was taking the lead on processing the approximately 200,000 lead shot that have been recovered during the last two field seasons. Besides being very knowledgeable, Myron is a huge help around the lab with various tasks, especially if you have a project that requires fabricating something. Myron's help was essential in completing the bore cleaning of Cannon 2 (explained below).

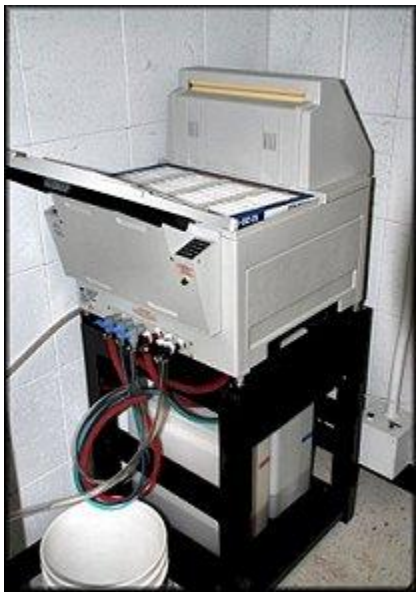
Adria Focht recently obtained her Masters in Anthropology from ECU, which brought an end to two excellent years as a graduate assistant at the *QAR* lab. Adria started in the fall of 2006 and worked through May 2008. Adria was actively involved in the post excavation processing of artifacts recovered from both fall 2006 & 2007 field seasons. One of Adria's projects during her first year was working on the epoxy cast cask hoops, making them ready for museum display by treating the iron remaining on the epoxy cast, grinding down the extra epoxy and filling in with paint where needed. Adria has spent countless hours entering data on the newly recovered artifacts but one of the biggest contributions Adria made to the lab was through her research on some of our textiles. Working with ECU professor of textiles, Dr. Runying Chen, Adria used an independent

study class to investigate the *QAR* textiles as well as explore different conservation processes used to treat waterlogged textiles. Adria is preparing a poster about her work and we hope to post her report as an artifact bulletin. Adria will truly be missed and we wish her the best of luck in all her endeavors.

Jonathan Schleier, first year ECU Anthropology student, began working at the lab in September 2007. Jonathan's first tasks involved post excavation processing of artifacts, making sure they were stored properly and inventoried. Jonathan spent countless hours conducting data entry and has also been learning about cannon cleaning and the tedious processing techniques of sluice sediment. He has also had a hand in monitoring the desalination of the 2007 clinker, bone and glass.

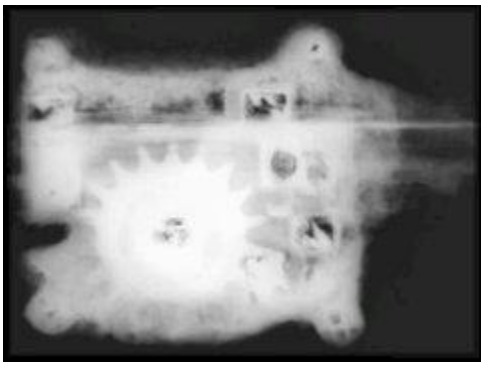
Elizabeth (Lyz) Wylie, a first year ECU Maritime student, volunteered one day a week this spring under the direction of Franklin Price. Lyz helped Franklin with the sediment processing by separating the different material into weighing dishes and providing weights and counts. We would like to thank Lyz for her time at the *QAR* lab.

We hope to see our technicians, graduate assistants and volunteers return to our team in the fall.



QAR Lab X-Ray System

In our November/December 2005 and January/February 2006 conservation reports we explained the importance of x-radiography to the conservation process of the *QAR* artifacts. We are pleased to report that we have purchased an industrial radiography system, the Comet XRS-225/22, which has the capability of 225 Kv and 30mA (at lower Kvs). During the past year we have been working to facilitate this vision of an x-ray system in our own lab. Our system was purchased with the 2006-2007 budget and arrived in crates in late May/June 2007, but before it could be installed the space had to be equipped for the source. The wall mount was on backorder, which delayed the installation a few months and then the fall field season began in late August. The x-ray system installation was complete by October 2007; however, this did not mean that the film processor was fully operational. A part for the film processor was on backorder and once it arrived the holidays were upon us. We eventually were able to



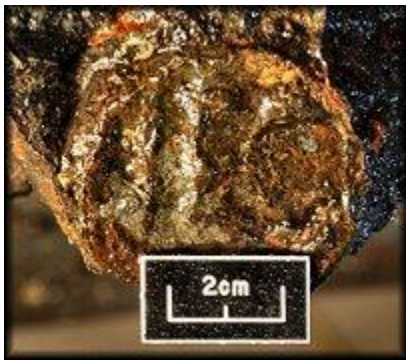
coordinate the film processor installation in February 2008. Since the x-ray system and film processor have been installed, conservators have been learning the new equipment, working through minor issues, ordering radiation equipment and safety signs, determining radiation safety areas and lead sheet needed for radiation shielding, writing Standard Operating Procedures and Emergency Procedures and completing the necessary paperwork to comply with federal, state and ECU radiation protection standards.

In our 2005 end of the year report we explained the many avenues explored for a radiation source, from hospitals to the Marine Corp Explosive Ordinance Disposal (EOD) and the NC Museum of Art (NCMA). In all of these instances we had to pack up artifacts and transport them to the particular place. This June was the first chance conservators had to x-ray artifacts in the convenience of our own lab. It was an immense relief not to have to pack up the artifacts, film and recording sleeves; the artifacts only traveled a few hundred feet from the warehouse. As conservators continue to x-ray the many concretions we will report on our findings.

The *QAR* lab would again like to thank all the organizations and people that have given us radiographic assistance. They generously donated their time and allowed us access to their resources, which enabled us to determine the need for purchasing our own system. A very special thank you to the NCMA, for allowing us to bring our dirty, sandy, shell shedding artifacts into their clean art conservation lab.

Cannon Update

As a result of the two recent field excavations we now have 25 cannon identified on site and have recovered 11. Four cannon are in museums and you can follow their conservation timeline in our last conservation report; Cannon **4, 19** & **21** can be seen at the North Carolina Maritime Museum in Beaufort and Cannon **3** is on display at the Museum of Albemarle in Elizabeth City. In our last report on 'Bertha', Cannon **22** was only half cleaned but the cannon has since been freed of ballast stones and is now undergoing electrolytic reduction. Cannon **22** is the same size and shape as Cannon **19**.



Cannon **19** has been identified as a Swedish gun and possesses the marks 'IEC' on the right trunnion and '713' on the left trunnion. Archaeologists' research found that the 'IEC' is the maker's mark for Jesper Ehrencreutz, Swedish cannon founder from 1690-1722 and the '713' stands for the 1713 date of manufacture. Cannon **22** revealed the same 'IEC' maker's marks except these marks are on the left trunnion, the right trunnion has yet to reveal any discernible markings. Cannon **19** had a wooden tampionin the

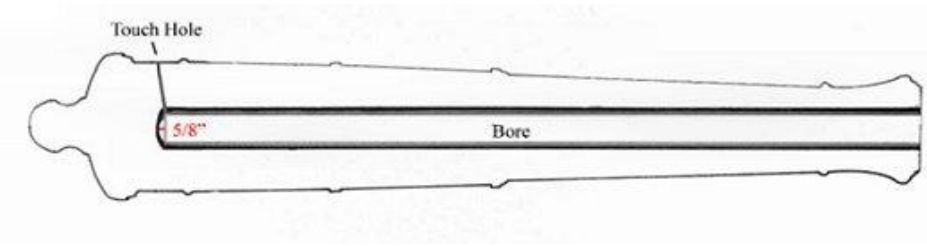
muzzle so the bore did not have to be cleaned and it was loaded with 3 wads, one cannon shot and 3 bolts. As of yet, Cannon **22** does not seem to have a tampion so it will continue to undergo electrolysis until we get a chance to clean out the bore.

In July/August 2005 we reported on removing some concretion from the bore of Cannon **2** to fit an anode into the bore. Cannon **2** was not loaded and after many backbreaking attempts to clean out the bore manually with augers, levers and the strength of 4 individuals, we have finally cleaned the last 40"of the 71" long bore and the gun is now in it's last days of electrolysis. The remaining concretion inside the bore was cleaned out with a core drill. All of the *QAR* cannon that have been examined have had bores that were consistent throughout the cannon rounding to a concave surface at the back.

To facilitate drilling out the remaining concretion within the bore of Cannon **2**, we obtained the diameter at the muzzle opening and 9 inches into the bore measuring four different directions, vertically, horizontally and diagonally. The bore's diameter seemed to be 3.8"-4.0", so we ordered a 3.75" core bit. Before any drilling took place we had to make sure the bore was level. We built a leveling apparatus that sat on top of the gun. A round wooden cut out with a dowel rod in the center was used to mark the center of the bore. A square box was placed around the cascabel button and string was strung diagonally from each corner, indicating the center of the button. An adjustable board that extended beyond the length of the cannon was placed on top of the cannon with 2 dowel rods extending down on each end that were fixed at exactly the same length. A laser line level was used to align the dowel rods on each end of the board with the center of the muzzle and center of the button. Once the rods were in line with the center of the button and muzzle, the gun was then leveled. A level was placed on top of the board, on top of the cannon and the height of the muzzle was adjusted until the board was level. A level board indicated a level bore.

A horizontal core drill was rented from Kore Kut and Mr. John McClain showed us how to use the equipment. As the core drill advances water is pumped into the core to reduce friction and some of what is removed is flushed out to give you an idea of what you are drilling into. The core drill was set up level with the bore of the gun and we started slowly advancing the bit

down the bore often taking it out to monitor progress. The core bit worked very well until we reached the trunnion area. When we took the bit out to assess the bore, the bit had made a small groove all the way around the bore. This groove indicated that the bore was smaller than 3.75". It was suggested that the bore tapered to 3.5", but did the bore taper or was it always 3.5"? We were only able to measure 9" into the bore, the front end of the bore is easily accessible and could have has been worn away while cleaning out concretion previously with augers. These factors contributed to our original measurements, which were inaccurate. A 3.5" bore suggests that the cannon was a 6-pounder. Luckily John had a bit that was 3.5" and we successfully continued boring out the remaining concretion, we can now say the bore of Cannon 2 is clean. Conservators also managed to clean the concretion out of the touchhole. Overall the operation was very successful and conservators will build on this experience for the other concreted cannon bores.

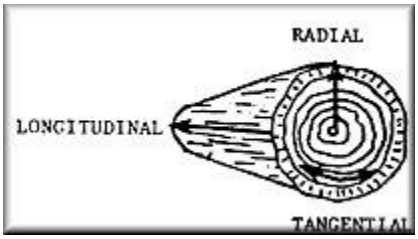


Ray Baldree from ECU Plumbing brought over a 'see snake', (July/August 2005) so we could have a closer look at the back of the bore. We put the camera on a board which had a ruler taped to it and placed a rod through the touchhole. With the ruler positioned at the back of the bore, we made a mark on the ruler with the rod through the touchhole. We were able to measure how far the end of the touchhole was from the back of the bore, which was 5/8".The 'see snake' also confirmed that the back of the bore comes to a rounded concave surface.

In the March/April 2006 conservation report we posted photographs of Cannon **24**. Since then, the cannon was drawn and those illustrations along with additional photographs have been used to keep track of all of the artifacts removed from the cannon surface. Large masses of concretion were removed as well as more recognizable artifacts such as a lead sounding weight, rope, pipe stems, and a gunflint. Most of the artifacts have been removed and the entire bottom surface of the gun is clean with about 45% of concretion left to clean off the cannon. Soon Cannon **24** will be clean and undergoing the next stage of its treatment in electrolysis. Cannon **25**'s story was posted in the Summer 2007 Queens Report and we are happy to report that it is undergoing electrolytic treatment at this time. Cannon **5**, **15** & the most recently recovered **16** are in wet storage waiting to be cleaned. Cannon **5** & **16** need to be drawn and photographed before cleaning can begin.

Wood Expert, Lee Newsom visits QAR Lab

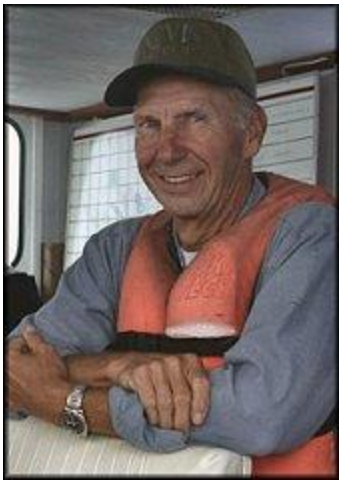
On May 29th & 30th, Dr. Lee Newsom traveled from Pennsylvania State University to visit the *QAR* lab and examine some of the wood artifacts she had not yet seen. The importance of researching wood species identification is explained in our August 2004 report and our wood conservation plan is detailed in the March 2004 report. Dr. Newsom was given a chance to see most of the wood artifacts recovered in the recent excavations. As she started looking for good pieces to sample she explained what would provide her the most diagnostic information, a relatively solid piece of wood without iron staining with radial, tangential, and longitudinal surfaces in which to take samples. Most of the wood survives in concretion allowing iron to penetrate into the wood, which is not ideal for species identification. As Dr. Newsom sampled an object, she gave us a brief explanation about the different attributes she was looking for under the microscope. When Dr. Newsom managed to not have a fascinated audience, she took samples of 16 wood artifacts including the sternpost, large wood fragments, wood staves, a wood button and the decorative handle. She will take the samples back to her lab for further in-depth analysis. Dr. Newsom discussed future plans to come back with some of her students to help with the large volume of wood artifacts.



'Micro Archaeology' of Sluice Sediment

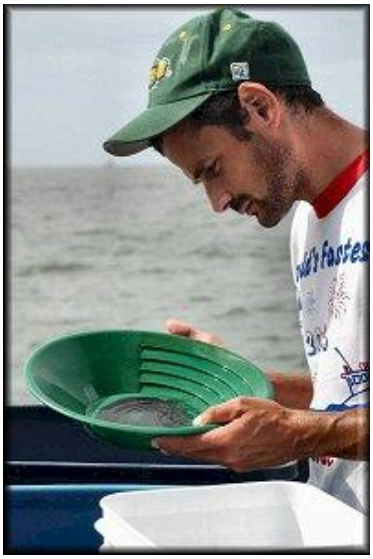
In these reports we often focus on the largest and heaviest artifacts such as the cannon but amongst the sediment that surrounds those large artifacts are many small artifacts that you can't even see when on site. During field excavations every 5'x 5' unit is dredged with a 3" hose that leads to the deck of the research vessel and the sediment passes through a sluice box. The sluice box is a very important device to underwater archaeologists because in dark water or 'blackout' conditions archaeologists are not able to see and pick up every single tiny artifact. From what has been found within the sediment, no one would be able to see these small artifacts amongst all the shell, sand and marine debris anyway. Archaeologists rely heavily on the sluice box and it is a key tool in deciding where the boundaries of the site are. The sluice box is manufactured by Keene Engineering and is identical to sluice boxes used for gold prospecting. A ribbed carpet lines the bottom of the sluice box, baffles are locked

down on top of the carpet and a screen is placed at the beginning of the baffles where sediment enters the box. As sediment passes over the screen and baffles, the large debris such as shells tumble over them and fall over the side while the heavy metals such as gold (gold dust) and lead (lead shot) fall into the carpet and baffles. Once every unit is determined to be finished, the sluice box is cleaned out. This consists of turning off the dredge, removing the screen, raising the baffles and pulling the carpet and sediment into a Rubbermaid container. The carpet and sluice box are rinsed free of sediment and the sediment containing some of the smallest artifacts is collected into 5 gallon buckets. Every unit excavated at the site goes through this process.



So what happens to these 5 gallon buckets of sediment? In the beginning, we had one geologist, Dr. Jim Craig, who volunteered his time going through the sediment one bucket at a time, panning artifacts from the sediment with his gold pan. Artifacts he found include gold dust, lead shot and one glass bead. During the 2006 fall field excavations, it became important to know what we were finding in the sediment, because even though we did not find any concretions within a unit there was still potential that a unit could contain lead shot or gold dust. How much gold or lead shot a unit contained helped determine how far we extended our excavation units.

Dr. Craig came out early in the season to help with processing some of the sluice sediment on site. He brought extra pans for archaeologists to use and demonstrated his techniques to obtain the smallest artifacts recovered from the site. This activity continued throughout the field season, as divers had time topside they would pan for gold. Artifacts recovered in the sluice box like lead shot, copper alloy objects such as buckles, tacks, or weights were separated out and place into bags within the sediment buckets.



Franklin Price's former experience as a prospector and his meticulous nature were perfect for the job of processing sluice sediment. If Franklin was not diving, which he almost always was, he panned sediment. His diligence of processing sediment was beneficial to archaeologists during excavations. Franklin continued working on processing the sediment in the lab spring of 2007 where he had a microscope at hand to help decipher what exactly it was that we were collecting in the sluice box. Franklin began microscopically analyzing all the geological evidence and pulled out artifacts such as gold dust, lead shot, tiny lead fragments, lead tacks, glass bead fragments, glass shards, copper wire, copper alloy straight pins and surprisingly mercury. With the help of Dr. Craig, he made a type collection for the reference of things found naturally on the site that are not artifact related. Dr. Craig and Franklin processed a large amount of the sediment before the next expedition but were unable to finish it all.

Franklin joined the field expedition again in fall 2007 and took lead of processing the sluice sediment on site and on down diving days. Larger artifacts were separated out and the sediment was panned to a point of assessing the average amount of gold within the unit, but leaving the fine detail work to do in the lab under controlled conditions. Franklin continued his analysis of the artifacts from sediment in the lab once the fall field season ended refining and improving his techniques by adding microscopic images of the tiniest artifacts recovered from sediment. We call Franklin's work 'Micro Archaeology' as he is always at the microscope with the look of 'discovery' in his eyes. All the sediment from 2006 has been fully processed and only 12 units remain from the 2007 field season, that's impressive considering we have dug the majority of 179 units in just 2 years.

The small artifacts are proving to provide important information and investigators are working on deciphering some of these mysteries. In addition to greatly expanding the collection of ordnance in the form of lead shot (now totaling about 225,000 individual pieces), the team has recovered a substantial number of tiny gold grains and both complete and fragmented glass beads.

The tiny pieces of gold, about 4,500 in number, total in weight just at 12 grams. Most pieces are un-worked gold grains or dust, and less than 0.1 inches in length. Four pieces, however, appear to be fragments of scrapped jewelry. One piece(QAR1143.009) has geometric decoration on one side and was made by casting. Another piece (QAR1315.007) appears to be made from twisted pieces of fine wire. Examination of the gold grains and dust under a binocular bench microscope reveals that their morphologies are typical of placer gold recovered from rivers or streams by panning. Whether from Africa, South America or elsewhere is not possible to determine by appearance (Craig et al 2001). If similar pieces to the worked pieces have been found on other archaeological sites or shipwrecks it may be possible to get clues to the origin of the gold on the Beaufort Inlet wreck. The fragments of gold ornament were found in November 2006 and are still to be identified.

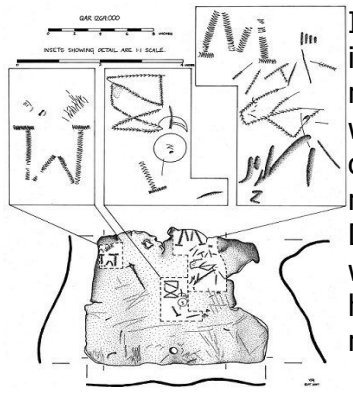
Several hundred glass beads have been recovered, some in sediment but others are still `hidden' in concretions; their presence revealed only in x-radiographs of the concretions such

as QAR1266.000 . Yellow is the predominant color of beads found in sediment during the 2007 field season, although other colors include blue and white. To date, five beads have been removed from concretion and cleaned. Examination and study of these five beads is already giving intriguing and valuable information that is reported by Linda Carnes-McNaughton and Susan Myers in a *QAR* Technical Bulletin. Researchers will continue to study the newly recovered glass beads from sediment and will report on any findings.

Marks on Lead Cannon Aprons:

Whenever marks, such as letters or numbers, are revealed as artifacts are cleaned, the *QAR* team holds its breath - perhaps these marks will be the ones to finally confirm the identity of the wreck. Sometimes it is obvious what the marks are, such as maker's marks found on pewter plates, but as often as not, new marks prove to be additional mysteries - such as those recently revealed on lead cannon aprons. Fourteen cannon apron have been recovered from the site and six were found under Cannon 12.

A cannon apron's function is to keep a cannon touchhole dry when it is not in use. In November of 2006, a lead cannon apron, *QAR*1269.000, was discovered in Unit #76 under Cannon 16. Upon cleaning it was discovered that various distinct markings were inscribed onto the surface. These markings resemble the following: "X", "X/", and an "M" or "W". We thought that these marks were an anomaly and occurred only on this lead apron, but this thought was amended in 2007.



In August of 2007, another lead apron *QAR*1391.000 was recovered in Unit #104, just north of Unit #76. When the surface was cleaned, more marks were discovered. Not as many as on *QAR*1269.000, but we found similar marks made with the same wiggle cut tool action as on *QAR*1269.000 and resembling either an "M" or "W". These markings raised some interesting questions. What do they represent? Do they represent initials? Were these inscribed marks important or were they just doodles? The question is still unanswered, but hopefully future evidence will lead us to understand what these mysterious markings represent.

UNCW Captain Helps QAR Conservators with a Photo Stand

Capt. Gerry Compeau of UNCW is no stranger to the *QAR* project. As captain of the R/V Seahawk he provided essential support to state archaeologists during the early years of field operations. Conservators were faced with a new challenge when the large wooden sternpost of the ship was recovered in November 2007, we needed a way to easily photograph it. The size of the

sternpost, approximately 7' x 8' makes it difficult to use the photo stand previously used to photograph cannon. *QAR* site videographer Rick Allen of Nautilus Productions suggested seeking the help of Gerry, who has always had the reputation of being a problem solver. We contacted Gerry and he did not hesitate to lend a hand. In fact he had just built a photo stand for underwater use at UNCW and implemented the same idea for our photo stand. Gerry spent a day of his time to build us a photo stand that would extend to12' wide and 8' high out of speed rail connectors, marine grade aluminum and casters. The photo stand provides a way to move a camera in the X, Y & Z planes to create an image mosaic of a large artifact. The device will make photographing the sternpost as well as the cannon much easier for conservators. In our next conservation report we will hopefully be able to show the results of the photo stand and have a mosaic image of the recently recovered sternpost. A special thank you goes out to Gerry Compeau!!

Lab Visitors

In October 2005, we hosted our first Open Day, an event in which members of the public are allowed to come to the lab, see artifacts undergoing the conservation process and have a chance to talk to archaeologists/conservators about current work on the project. On April 26th, 2008 the *QAR* lab held the second Open Day and the event was very successful with almost 600 in attendance. We have had many individuals stop by the lab during business hours wanting personal tours but we would like it made known that the lab is not normally open to the public. However, we would like to announce that the *QAR* Lab plans to make the Open Day event an annual spring occurrence in light of the interest from the public. We will announce the next Open Day on our website so keep checking!

Occasionally, we do give educational/professional group tours of the lab facility. Elaine Forman, adviser of Homeschoolers Unfolding History, a chapter of Tar Heel Junior Historians from Johnston County & Smithfield arranged a tour for approximately 40 home school students on June 20th. Students ranging from 4th to 12th grade accompanied by their parents/teachers were given

an introduction and a brief history of the project and how the conservation lab was established. As conservators guided them around students learned about the different conservation processes artifacts from an underwater environment must undergo to be made ready for eventual public display at the museum. The young students were very inquisitive and we hope they learned a lot about underwater archaeology and artifact conservation.

June 20th we also had a visit from a few conservators of the *USS Monitor* Project based at the Mariner's Museum in Newport News, VA. David Krop, Monitor Conservation Project Manager (Former *QAR* Graduate Assistant, August 2003-May 2004), Eric Nordgren, Monitor Senior Conservator (Former *QAR* Assistant Conservator, September 2003-April 2006), Erin Secord, Monitor Conservator, & Charlotte Simpson, *Monitor* Conservation Technician arrived for a tour of the facility just after lunch. We had a wonderful afternoon of touring them around the lab and comparing conservation notes.

Eric and Dave were amazed to see how much we had grown. We are fortunate to be able to consult with the *Monitor* conservators because they are dealing with some of the same conservation issues as the *QAR* lab.