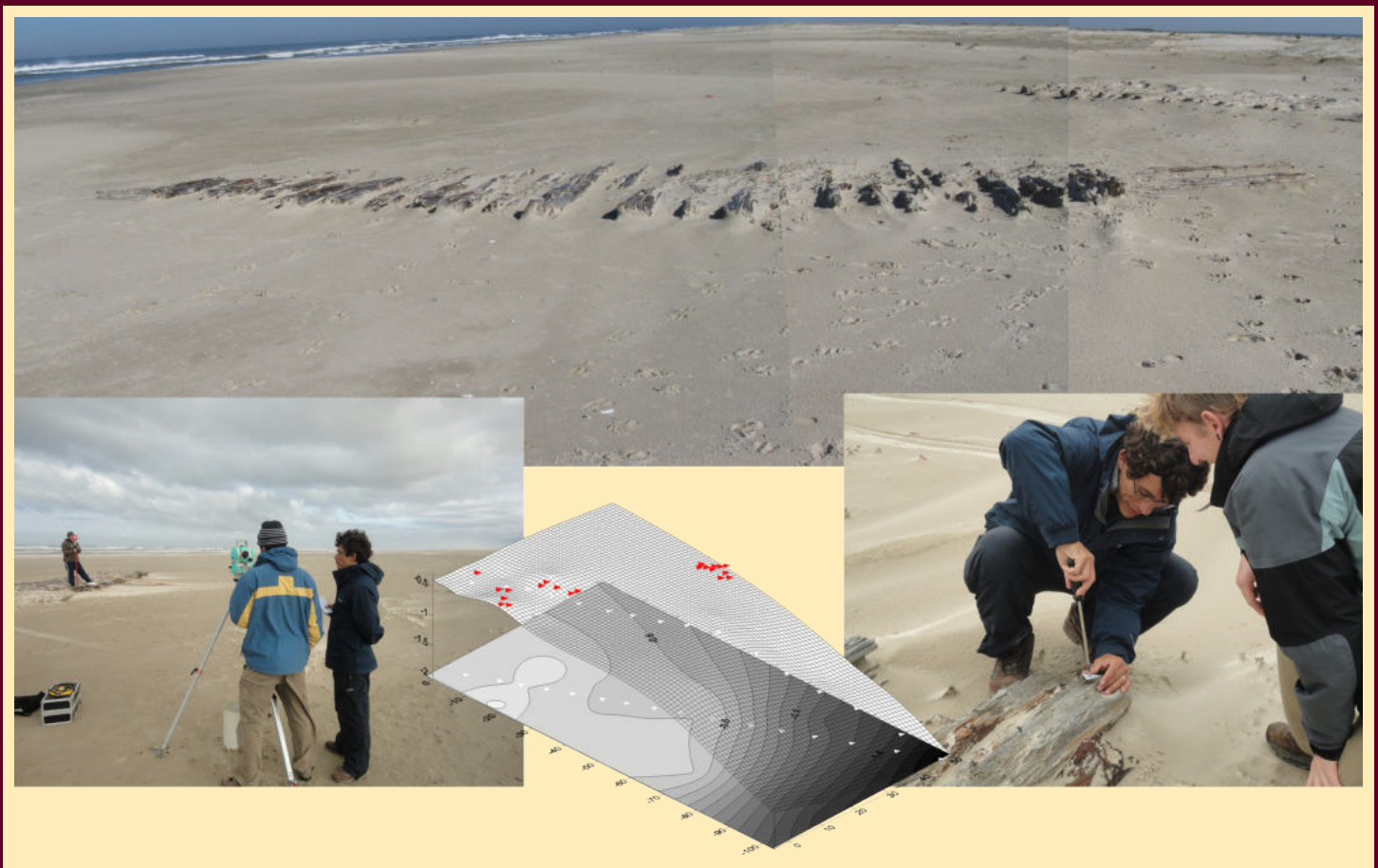




CENTER FOR MARITIME ARCHAEOLOGY & CONSERVATION • NAUTICAL ARCHAEOLOGY PROGRAM

NEWS & REPORTS



VOLUME 3, NUMBER 2



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Visit our website to download a **full color edition** and learn more about our team and our research, <http://nautarch.tamu.edu/>.

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On the Back Cover: Rodrigo Torres recording the ceiling planking of *Warwick* in Bermuda. See article on page 11.

From the Director - Kevin Crisman

Welcome to the Fall, 2011 edition of the *CMAC News & Reports*. I believe it is customary in these sorts of introductions for the director to start by saying what a productive year we've enjoyed. This is entirely true, thanks to the enthusiasm, hard work and perseverance of CMAC's associated students, staff, faculty, and research colleagues. If you don't believe me, take a look through this issue (and the Spring, 2011 edition of the *News & Reports*) for summaries of some of the maritime archaeological research and conservation projects that CMAC has co-sponsored in 2011 around North America and around the world. In the following pages you can read of field and laboratory studies on shipwrecks ancient and modern, from the coast of southern Brazil, to the islands of Nevis and Bermuda, to the coast of Spain and the inland waters of Italy, to the Conservation Research Lab at Texas A&M University. The temporal and global range of CMAC-sponsored scholarship is entirely in keeping with seafaring's ubiquity in the span of human existence.

The kind of work described here costs money, and it will be no surprise to any of our readers to learn that research at CMAC and Texas A&M has run into the same financial constraints that have recently beset universities, governments and non-profits in the U.S. and in other countries. The general belt-tightening has added new challenges to our work. On the plus side, nautical archaeology here has always operated under the philosophy that every dollar should be stretched to its full capacity and somewhat beyond. Since the Nautical Program's founding in 1976, faculty and students here prided themselves on running major operations on a comparative shoestring.

This kind of austerity invariably requires some amount of personal sacrifice on the part of project directors and participants, and our students, in particular, are accustomed to truly earning their achievements and promotion to the ranks of professional maritime archaeologists.

With that said, I warmly encourage any readers who feel charitable urges, are looking for organizations that make their donations count, and who like the kind of exciting work we are doing, to remember the Center for Maritime Archaeology and Conservation. We cheerfully accept donations for either specific projects or for general support of equipment and research. If you are interested supporting our research and students, please feel free to contact me at the following address:

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NAP Alumni Association

The NAP is developing an Alumni Association for all interested former attendees of the program. We envision creating an online home where members can easily update their contact information, provide a curriculum vitae, homepage URL, or links to popular social networking tools. Registrants will be able to choose what information they share and with whom. The goal is to create a professional network that can connect archaeologists already working in the field, provide students and new graduates a segue into internships, jobs, or other opportunities that may become available, and provide a common forum for relevant announcements from the program. We anticipate a Spring or Summer 2012 launch date for the website. To ensure you are on the mailing list and receive the announcement, please send your e-mail address to nautical_librarian@tamu.edu with the subject: ALUMNI.

Faculty Profile: Filipe Vieira de Castro

Filipe Vieira de Castro was born in Portugal, a country with a long maritime history. He spent long summer holidays at Baleal, an old fishermen's village full of stories of wreckers and smugglers, whose coast was littered with shipwreck sites. In spite of his lifelong passion for archaeology, he ended up studying civil engineering, "there were no professional archaeologists in Portugal until the late 1970s."

Castro earned his civil engineering degree from the Technical University of Lisbon in 1984, followed by a post-graduation in restoration of old buildings and monuments from Lisbon's Fine Arts School (1986), and a MBA in international management from Lisbon's Catholic University (1993). After working as a civil engineer for ten years, in 1995 he decided to change his career. Castro became a manager that led the team responsible for creating the Portuguese central agency for nautical and underwater archaeology.

After completing this job, he came to Texas A&M University with a grant from the Portuguese ministry of culture to study nautical archaeology. He completed his Ph.D. in 2001, writing his dissertation on the reconstruction of a Portuguese Indiaman lost on the mouth of the Tagus River on its return voyage from India in 1606. Castro was then invited to stay one more year at Texas A&M, as an assistant professor. "One thing led to another..." he says, and today he is a professor in the Nautical Archaeology Program, where he holds the Frederick R. Mayer II Fellowship and directs the J. Richard Steffy Ship Reconstruction Laboratory (ShipLAB).

Benefiting from his engineering background, Castro works with the Departments of Computer Science and Visualization

Sciences at Texas A&M University, and the Center for Marine Technology and Engineering at the Technical University of Lisbon, developing computational tools and research models. "Computers are formidable tools that can help us treat large amounts of data and test our hypothesis in ways that were unthinkable a few decades ago, and the technological developments in this field are astonishingly fast and tremendously promising."

Computers have yet another attraction for Castro, "they are an amazing tool to promote the importance of the world's underwater cultural heritage, difficult to defend because it is invisible to most people." Castro struggled against treasure hunting for three decades. He welcomes the internet as an effective educational tool through computer games and simulations.

Passionate about what he does, in the last decade Castro has taught eight different courses and is adding another – Peoples and Cultures of the World – for the Spring 2012 semester. He has chaired more than thirty graduate committees, published three books and more than forty papers. His main research interests are Iberian seafaring in the 15th and

16th centuries, and the history of wooden shipbuilding. Most of his fieldwork was conducted in Portugal, where he was involved in the excavation and reconstruction of the Cais do Sodré shipwreck dated to the beginning of the 16th century, the Arade 1 shipwreck dated to the third quarter of the 16th century, and the Pepper Wreck dated to 1606. He has also conducted field work in Panama, Puerto Rico, and Italy.



S.O.S. - Help Support our Nautical Library, Research, and Student Education

CMAC maintains its own in-house, program-specific library that complements Texas A&M University's wonderful library. This invaluable collection of books, periodicals, and rare manuscript reproductions represents a concentration of seafaring history and nautical archaeology materials that significantly aids in our research mission. We have a goal to ultimately endow the library to cover the costs of professional journal subscriptions, growing the collection, library-related technology, and a graduate student librarian. If you would like to support this effort, please contact our librarian by email: nautical_librarian@tamu.edu.

Another way to make a meaningful contribution is to purchase a book from a wish list we maintain (it doesn't need to be new!). The book will be added to the library with your name added to the inside cover. Enter the URL below and look for "Nautical Archaeology Librarian" in the 'Find Someone's List' search box.

<http://www.amazon.com/registry/wishlist/>

Gutto! Chikyubin

Japanese television aired last July a 30 minute episode of a show about Japanese travelers living abroad, which featured NAP student Kotaro Yamafune's life in the United States and... his project in Italy! Over the course of two weeks, a television crew recorded the lives of the 2011 Anaxum Project team from early morning breakfast to the late evening briefings. The result was a success in Japan and CMAC has been contacted by other television producers for similar projects.

During the summer of 2011, a joint team from ProMare, Texas A&M University, and Udine University excavated a Roman boat dating to the 1st century CE, and surveyed other points of potential interest in the region (see "The Stella 1 Shipwreck" article on page 17).



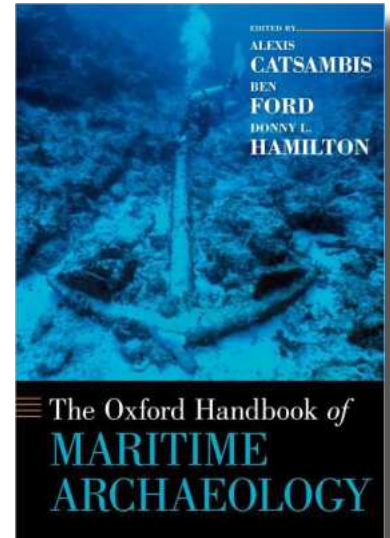
New Publications

The Oxford Handbook of Maritime Archaeology

Edited by Alexis Catsambis, Ben Ford, Donny L. Hamilton.
Oxford University Press, 1240 pages.
ISBN13: 978-0195375176
ISBN10: 0195375173

This comprehensive survey, with chapters from nearly fifty scholars, covers a wide range of topics within the discipline. The book has four main themes: the research process, ships and shipwrecks, maritime and nautical culture, and issues of preservation and management.

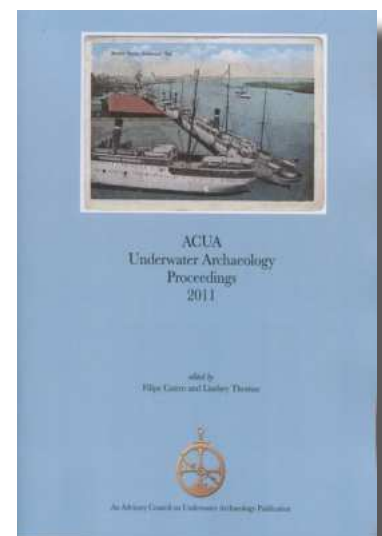
Alexis Catsambis is an Underwater Archaeologist with the Naval History & Heritage Command, Ben Ford is an Assistant Professor of Anthropology at Indiana University of Pennsylvania, and Donny L. Hamilton is a Professor in the Nautical Archaeology Program at Texas A&M University.



ACUA Underwater Archaeology Proceedings 2011

Edited by Filipe Castro and Lindsey Thomas.
An Advisory Council on Underwater Archaeology Publication, 201 pages.
ISBN13: 978-1427649768

This is the 2011 ACUA Underwater Archaeology Proceedings from the Society for Historical Archaeology's 44th Annual Conference on Historical and Underwater Archaeology, held in Austin, Texas. The underwater proceedings have been a hallmark of this annual conference for over 40 years. They provide a record of the development of underwater archaeology as a profession and include research from across North America and around the world. This year's edition presents underwater archaeological research extending from Louisiana to Ireland, and from Mexico to Saipan.



The Shore Stranded Shipwrecks of Southern Brazil: 2011 Season

Rodrigo de Oliveira Torres

Nautical Archaeology Program, Texas A&M University

The 19th century was a fascinating historical period for the nations situated along the margins of the Atlantic rim. New political conditions and the liberalization of seaborne commerce early in that century provided opportunities for Brazilian port cities to exploit Atlantic trading networks. By this time, the Atlantic Ocean was already a well-established commercial and cultural venue, where merchant vessels from various parts of the world intertwined goods, peoples, and ideas, along with the development of modern economies. In southern Brazil, the small port city of Rio Grande flourished as an important commercial center of Atlantic South America (fig. 1).

Along the southernmost coast of Brazil, an extensive and scarcely populated sandy shore over 600 km long, is home



Figure 1: Urban waterfront of the port of Rio Grande, Brazil, c. 1865.

to stranded ships representing various seafaring periods in the southwestern Atlantic (fig. 2). Preliminary investigations suggest a greater occurrence of maritime accidents in the last 200 years, especially in the 19th century, due to the greater numbers of merchant sailing vessels engaged in newly opened trading routes between Europe, North America, Southern Brazil and River Plate provinces.

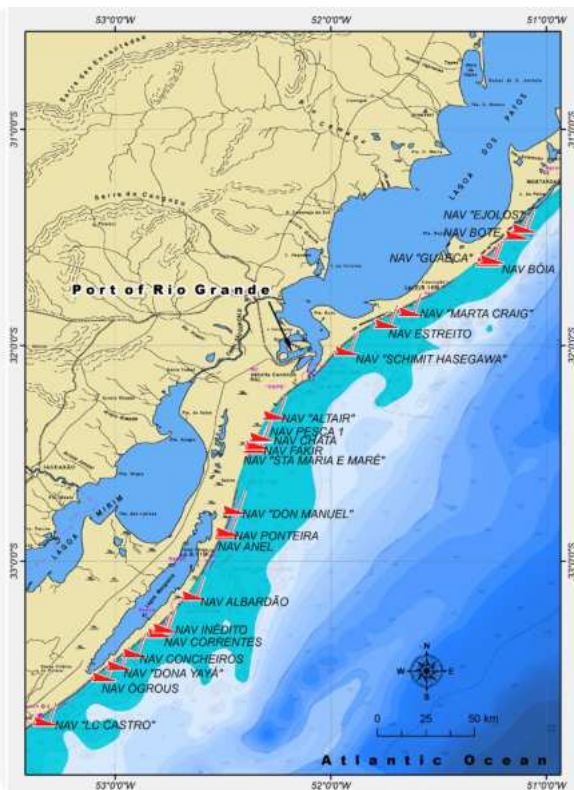


Figure 2: Map showing the identified shipwreck sites in the southern coast of Brazil.

This research is a comparative study of four of these wreck sites as part of my doctoral studies of Atlantic seafaring technology and its effects in the emergent port city of Rio Grande, Brazil. The studied shipwrecks are partially buried in the wet and dry portions of the beach. Profile observations in these areas reveal alternations of cyclical (seasonal) and non-cyclical (meteorological) events of natural flooding that bury and expose wrecks (fig. 3). The results produce significant implications for preservation conditions, as well as for the interpretation of the archaeological data. In this context, I returned to the field in July 2011 with a team of archaeologists and geomorphologists from the Federal University of Rio Grande in Brazil. Our purpose was to establish an experiment in site formation processes designed to provide a baseline study for long-term monitoring of the archaeological remains in relation to environmental variability in these exceptionally



Figure 3: Some of the monitored shipwrecks sites, showing the diversity in types and depositional environments.

dynamic wreck sites.

We chose a pilot site and installed benchmarks in a convenient position near a wreck. Hull features were tagged with five permanent control points each and surveyed with the aid of a digital topographic instrument (Total Station). Precision surveys will be conducted every two months by students of

the Archaeology Laboratory of the Federal University of Rio Grande to provide a three-dimensional model of the terrain, so that the relative position of wreck features and their horizontal and vertical displacements can be compared with future surveys (fig. 4).

Moreover, during the 2011 season we travelled almost

500 km along the shoreline to document other wreck sites, and record complementary measurements, images and assess their preservation status. Previously unmapped wreck features were identified and registered into our database. However, the overall preservation of wrecks in this province warrants concern. We were unable to relocate one of the already known sites. Observations indicate that it was dismantled by local fishermen or passersby.

Since the beginning of this research in 2001, degradation of the monitored sites is visible due to environmental and human factors of destruction. Among the human influences: deliberate vandalism or reuse of timbers for fire and hut building, extensive cattle grazing over the dunes, and traffic of vehicles during all seasons. Among the environmental effects the most noticeable is the net erosional pattern upon the beach profile which has been recorded all along the southern Brazilian seashore, attributed to a rising sea level and increasing climatic changes.

Future research will focus on gathering data for the interpretation of architectural details and ship reconstructions. Controlled excavations will be considered to investigate possible in-depth archaeological levels. For 2012, in particular, another field season is being planned for hull recording and wood sampling of a possible wooden, merchant schooner from Prussia, lost in 1868, sailing to the port of Rio Grande with a cargo of coal from Cardiff, Wales.

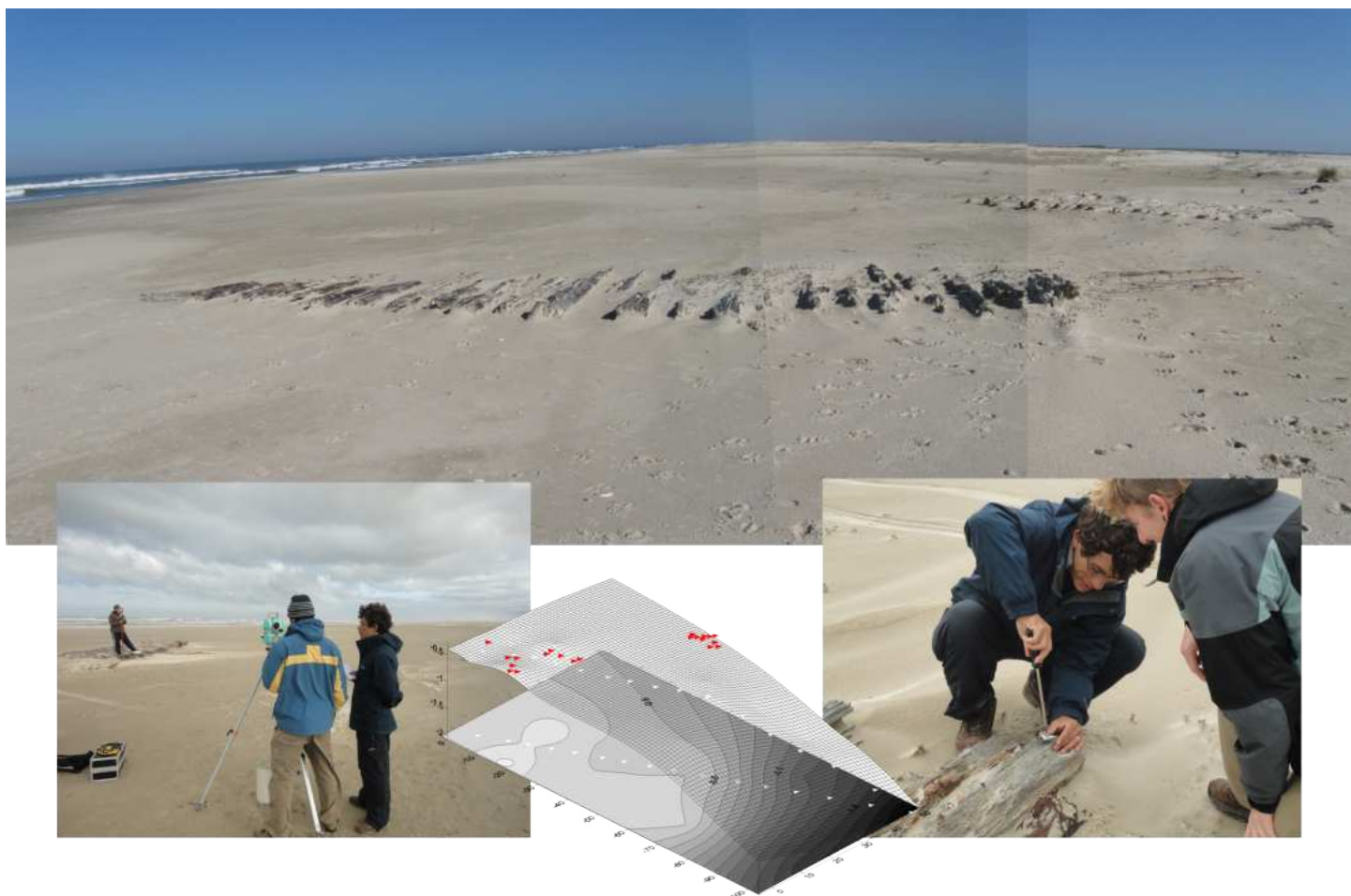


Figure 4: Installation of control points and precision survey done during the 2011 field working season.

Acknowledgments

I would like to especially thank Professors Filipe Castro and Kevin Crisman of the Nautical Archaeology Program (Texas A&M University), the Institute of Nautical Archaeology (INA – Texas A&M University), the Brazilian Agency for Improvement of Higher Education (CAPES – Ministry of Education), and the Fulbright Commission. I am also grateful to my colleges from the Archaeology Laboratory (LEPAN) and the Laboratory of Coastal Morphodynamics of the Federal University of Rio Grande, Brazil, for the logistic support during the working season.

HMS *Solebay* Shipwreck: An 18th-Century British Frigate in Nevis, West Indies

Justin Parkoff

Nautical Archaeology Program, Texas A&M University

Chris Cartellone

Nautical Archaeology Program, Texas A&M University

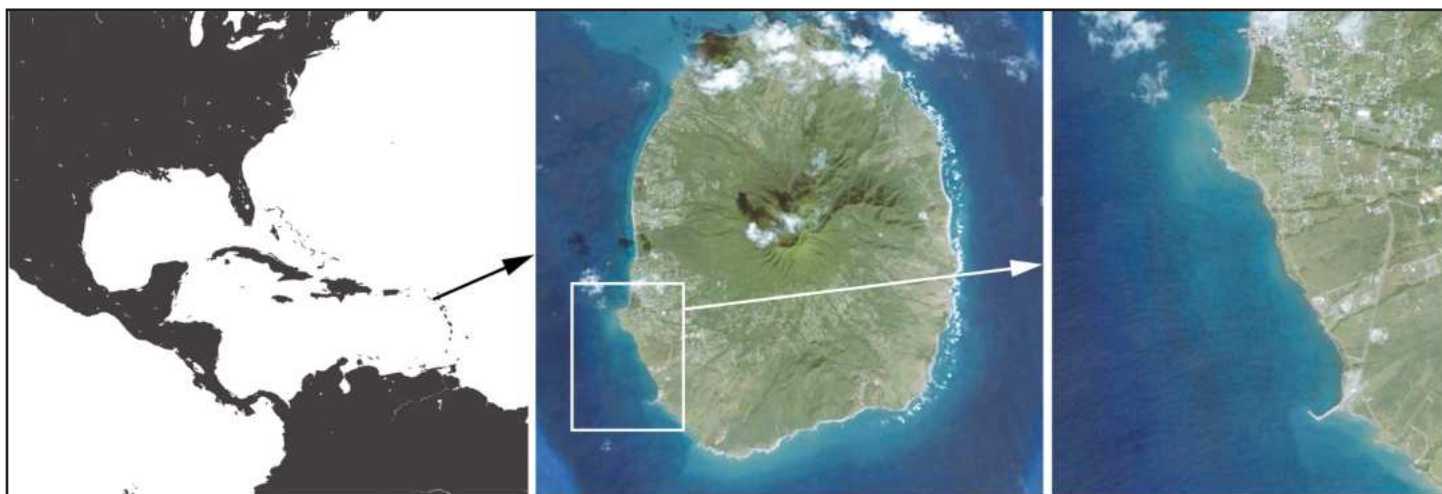


Figure 1: General location of site; specific position withheld to protect from looting (Google Earth).

Located in the Lesser Antilles of the Eastern Caribbean, the Island of Nevis is a beautiful sight to behold (fig. 1). From the beaches, thick jungle gradually slopes up toward the island's center, where the cloud shrouded volcano of Nevis Peak majestically dominates the landscape. Even more impressive, the crystal blue waters of the Caribbean expand out on all sides to a never ending horizon. At times, it becomes difficult to determine this water from the sky itself, giving the illusion that Nevis is floating at the center of a glass globe. Despite the intense tranquility of this scene, the location once played host to an impressive battle between the French and British Empires. Known as the Battle of Frigate Bay in 1782, this engagement resulted from France's continued efforts to seize British sugar islands near the end of the American Revolutionary War. Although both sides sustained losses, the British fleet emerged victorious, and the French retreated from the island.

One of the British losses involved HMS *Solebay*, a Mermaid-class, sixth-rate frigate in the Royal Navy. During the battle, *Solebay* served as a repeater vessel to pass signals from the flagship to the fleet. As *Solebay* ran closer to shore for greater visibility to the fleet, *Solebay* ran aground near Fort Charles off of Nevis' leeward coast. As an easy target, French warships pounded her with cannon fire before the captain decided to scuttle the vessel to prevent capture. After safely evacuating his crew, Captain Charles Holmes Everitt set fire to *Solebay*,

which upon reaching her powder stores, exploded and violently destroyed the ship.

In present day, one might find difficulty imagining that this quiet island once saw such conflict. Even Fort Charles is hardly distinguishable from the rest of the coast line. Now a low lying crumbling ruin, very little remains of the fort's past architecture to indicate that this site once held a bastion of British colonial power. However underneath these waters, the signs of a battle are more evident. Scattered across the seabed, a massive debris field marks the probable resting place of *Solebay*.

The sandy and rocky bottom that once trapped *Solebay* scattered much of her remains from years of continuous hurricanes. Although the site remained mostly forgotten, renewed interest in the island's colonial past led members of the Nevis Historical and Conservation Society (NHCS) to search for the vessel. In 2010, they successfully located a debris field, but could not confirm if the material came from *Solebay*. Adding to this difficulty, the site lies near Charlestown, the protectee of the former fortress. With ships passing through these waters since colonial history into present day, the debris could have come from any number of shipwrecks.

In the summer of 2011, a new expedition led by Texas A&M University graduate student Chris Cartellone--in the Department of Anthropology's Nautical Archaeology Program (NAP), with collaboration from multiple institutions, investigated the remains with hopes to confirm the identity as

Solebay. In doing the field work, the team respected Royal Navy sovereignty rights for lost warships, and UNESCO guidelines protecting underwater cultural heritage, which St. Kitts and Nevis ratified in 2009.

To help delineate the wreck site, Cartellone and fellow Texas A&M graduate student Justin Parkoff conducted a remote sensing survey by towing a magnetometer behind the island's police boat--a valuable resource generously offered by the Nevis Air and Sea Ports Authority. They systematically surveyed a half-kilometer area that covered an approximate triangle leading from a submerged anchor offshore between Fort Charles and a radio tower on the island. The team divided the search area into thirty-six boat lanes at fifteen meter spacing. The magnetometer detects disruptions in the Earth's magnetic field caused by ferrous materials. The locations of submerged magnetic anomalies were tagged with GPS tracking data that helped direct the archaeologists to potential areas of interest. This marked the second attempt using towed survey equipment of data collection on the site; the former previously attempted by the NHCS members over a smaller area. After acquiring new data, the team established that while the debris field extended outside the original site, the discovering team correctly located the main concentration of artifacts.

Confident of the site's perimeters, the team started the second phase of the project--mapping artifacts within the triangle to establish their position and relationship to the greater area. Efforts initially concentrated on the sole anchor, before moving to other large artifacts consisting of four large cannon, two small carronades, and eight massive rectangular ballast blocks (figs. 2 and 3). Once mapped, these larger artifacts served as easily recognizable features. Due to the site's large area, the team connected these artifacts with a web of nylon cave lines that helped guide divers to their designated search areas.

Using the features as datum points, separate teams comprised



Figure 2: Lillian Azevedo and Jim Hewlett recording anchor (Paul Diamond).



Figure 3: Chris Cartellone and Justin Parkoff observing carronade (Paul Diamond).

of two divers each systematically conducted thirty meter circle searches to map out smaller artifacts. One diver held the zero end of a measuring tape reel at the datum point while his or her dive partner circled around them with the reel end, increasing search circumferences in five-meter increments. Upon discovering artifacts, the divers recorded the distance and compass bearing from the datum point.

Although the visibility underwater remained clear, strong currents made this data collection difficult. High energy surges often unexpectedly developed and pulled divers back and forth from their desired target. Just when a diver comfortably placed their measuring tape on the artifact, the current would pull them away before getting an accurate reading. In the first few days of recording, the scene was amusing to watch as divers shook their heads and swayed frustrated across their targets. In time, the teams combated this difficulty by developing clever ways of anchoring themselves at a moments notice as well as timing their measurements with the moving surge. Some divers proclaimed that judging this timing felt as if they were playing a game of wits against an unseen competitor.

Upon completing each day's work, the team compiled the field notes and added them to the main site map. Slowly but surely, a picture of the overall site developed. Yet despite repeated searches, divers never located any wood remains or a concentrated ballast pile. Subject to the warm Caribbean waters, teredo worms and other marine life likely long since destroyed the frigate's timbers. The hard rocky bottom leaves minimal opportunity for buried remains, with few sandy pockets.

The minimal amount of ballast or other large cannons remains puzzling. While the initial blast as well as hurricanes scattered smaller artifacts, due to the heavy nature of the ballast, there is an unlikely probability that these larger artifacts were dispersed in the same manner. Even if *Solebay's* explosion destroyed the

superstructure, the hull and larger components within would have been blown downward into a concentrated area. The lack of these artifacts perhaps indicates human salvage behavior after the wrecking. Diver-held metal detectors suggests that the remaining ballast was comprised of solid pig iron. While this fact might imply that salvors retrieved the main ballast pile and some cannon for the iron, it unfortunately does not explain why others were left behind. The captain's court martial detail a scenario in which the crew jettisoned their guns overboard in an effort to become ungrounded, prior to the captain's order to set the ship afire--possibly resulting in a more scattered debris pattern. Additionally, the lack of a centralized wreck site might indicate that the ship did not initially sink after her explosion and perhaps drifted while burning to an undetermined area outside of the survey zone.

As archaeologists question *Solebay's* final moments, the artifacts help portray the last events before the crew abandoned ship. The anchor's surviving head and shank oriented north and northeast towards Fort Charles and rested at the edge of the debris field. The crew likely dropped the anchor during the battle as they drifted towards the shore or after they grounded as an attempt to winch themselves free. As described, the scattered cannon represented the crew's attempt to lighten the ship's load from the bottom. Hopefully, as the newly collected data from both the magnetometer and underwater survey are correlated, questions regarding *Solebay's* final resting place will be answered and will reveal more information about the last moments prior to her

destruction. Even the smallest of clues may help recreate some of these events.

As part of this effort, the team recovered small diagnostic artifacts to undergo conservation at the Texas A&M Conservation Research Laboratory. Already these artifacts are revealing clues that support the vessel's identity (fig. 4). In removing marine concretion from a copper artifact, graduate student and conservator Brennan Bajdek discovered a broad arrow engraved into the artifact's surface. As a key symbol of the British Royal Navy, this clue helped narrow the vessel's identity to a non-merchant vessel and in all likelihood *Solebay* herself. Several other artifacts that will undergo study after conservation include a musket trigger guard, musket balls, copper sheathing, lead, copper fasteners, and a possible gudgeon. These artifacts will be studied and upon completion returned to the Nevis Historical and Conservation Society for display in their museum.

On the last dive of the last day in the field, the team visited a site of a wreck purported to be HMS *Drake*, a 16-gun schooner lost in 1804 off Nevis. They recorded one large anchor, and observed thin copper metal, possible sheathing, and encrusted artifacts. Documenting *Solebay* is the first effort to study the nautical archaeology of Nevis through exploring lost shipwrecks. The team hopes to return in the future and continue a broad, comprehensive, remote sensing survey to discover and document other vessels. In the meantime, the team will complete the conservation of *Solebay's* artifacts, and interpretation of all materials including site plan and archival research along with finishing a findings report. The future of nautical archaeology in Nevis appears promising.



Figure 4: Brennan Bajdek conserving lead (Chris Cartellone).

Acknowledgments

Chris Cartellone owes a great debt of gratitude to generous support from a collaborative group of institutions and people: Professor Donny Hamilton with the Texas A&M University Center for Maritime Archaeology and Conservation, the Institute of Nautical Archaeology, Justin Parkoff and the staff of Texas A&M University Department of Anthropology, Professor James Hewlett and his students with Finger Lakes Community College in New York, Professor Marco Meniketti and his students with San Jose State University in California, David Small with the University of Bristol, Lillian Azevedo with the University of Southampton, Adnams Southwold for generous financial support, the many folks with the Nevis Historical and Conservation Society, Paul Diamond with the Nevis Maritime Archaeology Group, Cameron Gill and the Brimstone Hill Society, Ellis Chaderton and his divers with Scuba Safaris, Spencer Hanley and his officers with the Nevis Air and Sea Ports Authority, Envision Mapping, T. Kurt Knoerl and the Museum of Underwater Archaeology, and Jim Jobling and Brennan Bajdek at the CMAC Conservation Research Laboratory.

The Warwick Project: Report from the 2011 Season

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Nautical Archaeology Program, Texas A&M University

Katie Custer Bojakowski

Nautical Archaeology Program, Texas A&M University

Michael Gilbert

Nautical Archaeology Program, Texas A&M University

Douglas Inglis

Nautical Archaeology Program, Texas A&M University

Between June 4 and July 22, 2011, a team from the Nautical Archaeology Program (NAP) successfully completed the second season of excavation of the early 17th-century English galleon *Warwick*. As a collaborative effort, the project included the National Museum of Bermuda (NMB), the Center for Maritime Archaeology and Conservation (CMAC), the Institute of Nautical Archaeology (INA), the University of Southampton, and the Global Exploration and Oceanographic Society (G-EOS).

During the 2011 field season, the team uncovered and recorded a previously unexcavated section which roughly corresponded to the *Warwick*'s midship (fig. 1). This section was deeply covered with a thick layer of sand and silt mixed

with ballast. Even with multiple diving teams in the water, local volunteers and two dredges constantly running, it took more than two weeks to move the majority of the rock pile. The top layer of the ballast was composed of large, irregularly-shaped blocks identified as dolerite, which was quarried in the area of Newcastle, England (Peacock). The bottom layer included rounded river shingle. When the ship sank, the heavy dolerite shifted over the free-flowing pebbles and slumped against the starboard side of the hull. The shingle ballast was mixed with river-worn fragments of ancient Roman Pottery known as *terra sigillata* (fig. 2). This is typical of ballast dredged from English rivers and has been seen on other wrecks in Bermuda.

Mixed with the ballast, we found hundreds of other artifacts. A concentration of barrels staves, hoop fragments, intact withies

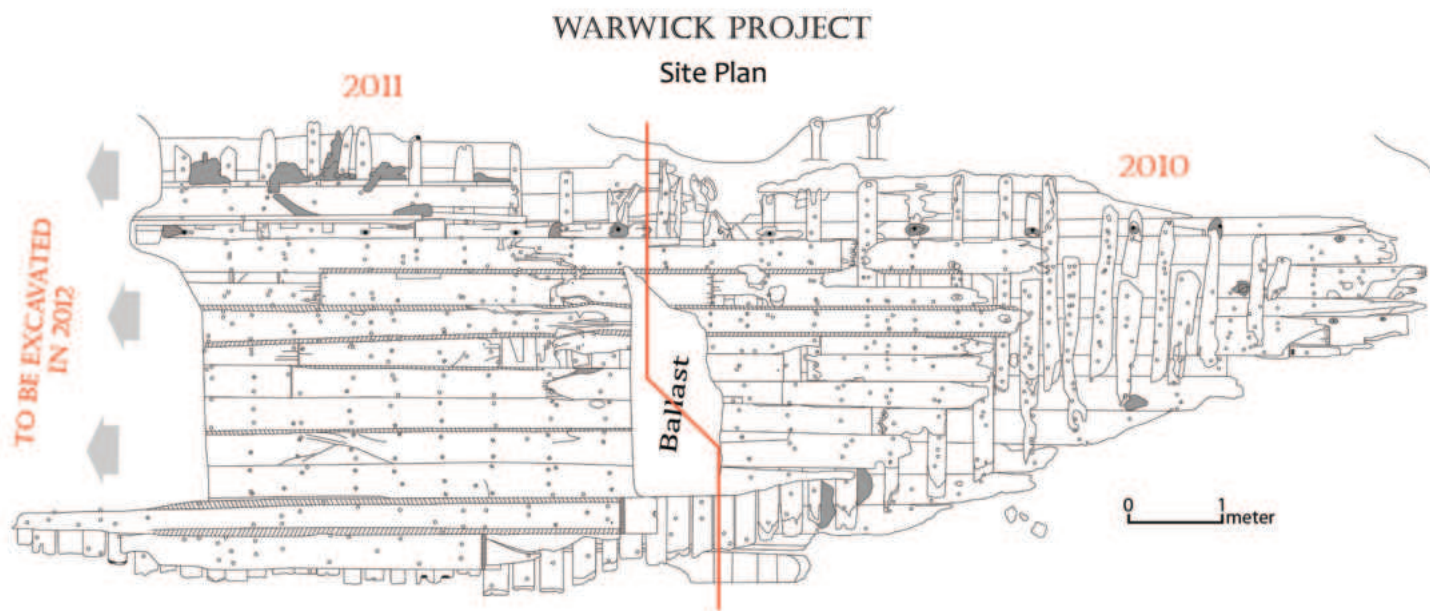


Figure 1: Site Plan.

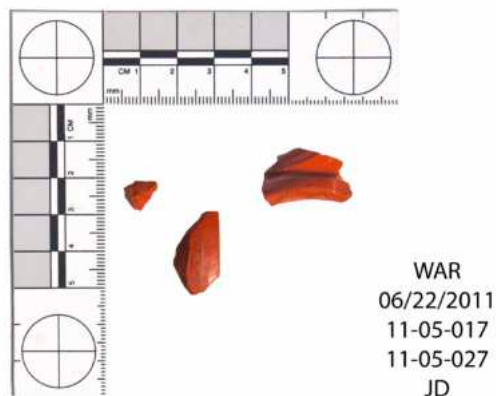


Figure 2: Examples of Roman red slipware terra sigillata found mixed with shingle ballast.

and include ceiling, framing, knees, beams, the waterway, spirketting and deck planning (fig. 3).

Once the hull was uncovered, we were joined by Dr. Kevin Crisman from Texas A&M University, Dr. Jon Adams from the University of Southampton, and Dr. Kroum Batchvarov from the University of Connecticut. Dr. Crisman oversaw direct hull recording, Dr. Adams focused on mapping the hull curvatures using DSM and Dr. Batchvarov used techniques pioneered at the Vasa Museum to map *Warwick's* framing without removing the ceiling planking (fig. 4).

Similarly to what was discovered during the 2010 season, the ceiling followed an alternating pattern with the stringers which



Figure 3: Preserved spirketting.

and cow bones is probably the crushed remains of an oak provision barrel once packed with salted beef. We recovered fragmentary pottery, personal items, a comb and even an intact clay pipe from the cloying sediments that lined the ceiling planking.

Beneath the ballast and clay, the ship's timbers were beautifully preserved. Even the chamfers of the stingers were still crisp and defined. The wood looked almost new, and after 400 years the carpenter's marks were still visible. The hull remains are extensive,



Figure 4: Dr. Batchvarov and Susana Vallejos investigate the framing.

were noticeably more robust and chamfered along both edges (fig. 5). Of the four stringers, the uppermost one also functioned as a shelf clamp on which the lodging knees, large cross-beams, and smaller half-beams or ledges were placed.

The visible framing included the floor timber's wrongheads, first futtocks, and third futtocks, while the second futtocks were covered by the ceiling. With the exception of the two frames horizontally fastened with treenails, the overlapping of the framing timbers was rather loose. The timbers were regular in cross-sections and nicely squared off. They were also fastened directly to the outer planking with treenails, which were tightly spaced with two to four per each futtock-plank intersection.

Looking at the position of the shelf clamp, knees and beams, we determined that the arrangement

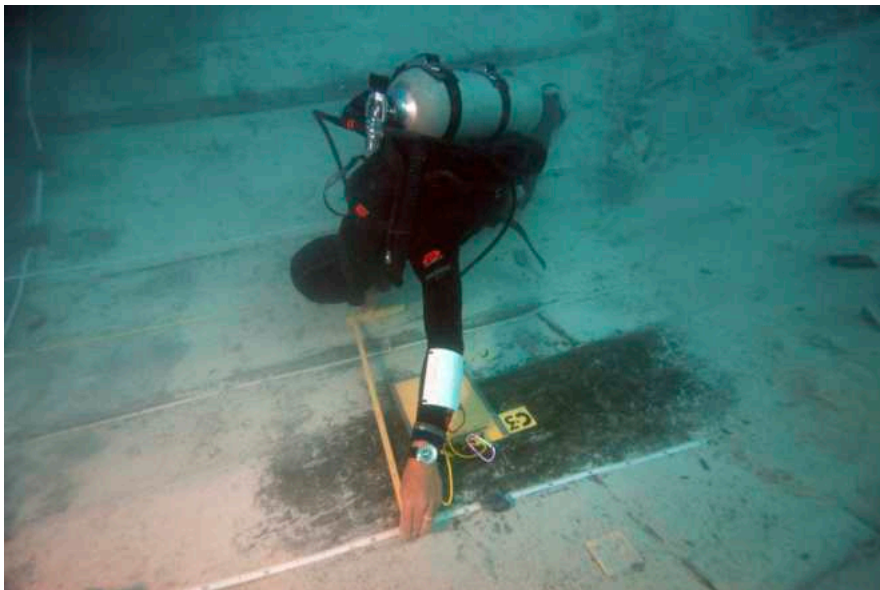


Figure 5: Rodrigo Torres recording the ceiling.

produced a sturdy support for the first or orlop deck that most likely could have functioned as the gundeck. The deck arrangement was composed of thick L-shaped waterway fastened to the hull with treenails and iron bolts and covered with deck planking. Directly above the waterway, there was spirketting finished with filler board, while above that the third futtocks and external planks still continued for about two strakes.

At deck level, we found an arsenal of ordinance: concreted cannon balls, spike shot, bar shot, and beautifully preserved expanding bar shot. One of our Bermudian teammates, Captain James Davidson, conducted a close survey off the stern with a metal detector, revealing concretions of lead shot as well as seven lead powder-holder caps (fig. 6). These curious looking caps were originally associated with wooden powder flasks which carried the exact amount of black powder for a single musket shot. Since a soldier would normally carry twelve of them on his bandolier, they were referred to as the twelve “apostles.” Other interesting objects included stamped merchant weights in three increments, ball padlock, and a partial pommel or grip of a sword.

We also found fragments of Warwick’s standing rigging. With a video camera rolling, divers excavated and recovered an intact chainplate. There is evidence of two more chainplates still in situ, attached to the hull. When coupled with the partial block recovered last year, and three-hole and six-hole deadeyes recovered in previous years, we have essential evidence of how the ship was rigged. As the season drew to a close, we located and raised both a pintle and a gudgeon that had been buried in the reefs alongside Warwick’s stern. Once analyzed, they may provide important clues about the size of the rudder and the design of the stern.

The crown jewel of the project was an artifact found during the 2010 season of excavation. Resembling a common wooden ruler or scale, the preliminary research suggested that the artifact might be a Gunter Scale, a navigational instrument of the early 17th century. However, new research and detail analysis conducted during 2011 indicate that the artifact is one of the earliest examples of a “Plain Scale” (fig. 7)

The Plain Scale is described in detail by John Aspley in 1624 in his book *Speculum Nauticum* (Aspley 1977). It was used for constructing and measuring “course triangles” on paper with dividers. The plain scale is described as a ruler, usually with three parallel lines on the front face. The top line is called the line of rhumbs, the middle line is the line of Chords (numbered 0-90 for the 90 degrees in a quadrant), and the bottom line is the “Scale of equal leagues.” This last line was used to facilitate calculations of distance a ship had sailed on a given course. The line of rhumbs

and line of chords terminate at the same place because there are only 8 rhumb lines in a quadrant of a circle.

According to Aspley, two other lines were placed on the back of the scale, which he called “the first and second lines of Longitudes.” Aspley provides a figure showing the front of the plain scale, but not a figure of the back. This is important because during the 2011 season, lines which had been previously obscured became visible. The purpose of the lines on the back face of the scale is not exactly known. The seven visible vertical lines extending from right to left are spaced incrementally apart suggesting they could represent the miles



Figure 6: Example of a lead powder-holder cap.



Figure 7: Navigational instrument known as Plain Scale.

of longitude scale in raising one degree of latitude. This new research into the Plain Scale marks a significant contribution to the Warwick Project.

In addition to excavation, the 2011 season was also an excellent opportunity for public outreach. Students from the Bermuda Institute of Ocean Sciences (BIOS) visited the project. It was a great chance to get young Bermudians excited about maritime archaeology and local history. Bringing science and history together, older students worked alongside BIOS researchers to take sediment cores from around and beneath the shipwreck. They will hopefully provide us with important information about site formation and the local environment 400 years ago.

Jason Paterniti, founder of the G-EOS, maintained a project blog and shot daily video of the excavation, crew, and recovered artifacts (all available online at the website: YouTube). Local Bermudian journalist and producer Robert Zuill recorded a short documentary about the Warwick. We also had an exciting photo opportunity with project supporter Mr. Ross Perot--he was kind enough to give us a tour of the historical landmarks around Castle Harbor in his high-powered speed boat (fig. 8)!



Figure 8: The Warwick team, left to right (starting from the top): Douglas Inglis, Jason Paterniti, Maureen Merrigan, Michael Gilbert, Dr. Jon Adams, Capt. James Davidson, Leah Crisman, Dr. Kevin Crisman, Dr. Kroum Batchvarov, Susana Vallejos, Piotr Bojakowski. Not in the photograph: Dr. Katie Custer Bojakowski, Danny Scott, and Samila Ferreira.

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Finisterre Project: Shipwrecks from Death's Coast

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Cape Finisterre is located in the north-west coast of the Iberian Peninsula, cornering one of the most important maritime routes of the world. The maritime trade routes between the north and south of Europe, along this coast, have always been an option to the longer and more dangerous land routes. In the same way, the major trade routes between the north of Europe and the rest of the world had to pass along this coast. This coast is known in Spain as "Death's Coast" (*Costa de la Muerte*). Its name conveys the large numbers of deaths from the numerous shipwrecks in this area.

Formed during the last glaciation, several deep valleys define this sharp coastline. Rising sea levels at the end of the glacial period flooded the valleys and this process created deep and protected bays, as well as dangerous reefs formed by the tops of the mountains that are now submerged. Its location in the North Atlantic, together with winter storms, dangerous currents, and dense fog have contributed to the large number of shipwrecks in this part of the Galicia region.

Underwater heritage management along the coast involves locating and identifying numerous shipwrecks and historical ports in the archaeological record. Since 2007, the Regional Government of Galicia has been carrying out the Underwater Heritage Chart of Galicia. This initiative has identified more than 700 shipwrecks in archives and other written sources. Moreover, circa 350 archaeological finds and historical ports have been recorded.

One of the most important naval events that happened in this area was the 1596 Armada of more than 100 vessels. This fleet's mission was to transport an expeditionary army to Ireland to support the insurrection of Irish patriots against the English invasion. On 28 October, a storm blew some 25 ships



Figure 1: Lead ingot with marks.

against the coast with a loss of about 2500 men, ending the expedition.

Names and characteristics of the main wrecked ships are known. Due to the discovery and looting of one of these ships, in 2007 the Heritage Division of Galicia Government supported a preliminary archaeological assessment of *Punta Restelos* shipwreck, one of the 1596 Armada vessels. This preliminary research was carried by the underwater archaeologist Miguel San Claudio and his CRM firm Archeonauta S.L. The initial archaeological assessment

permitted the recovery of some artifacts at risk of disappearing.

Then a geophysical, underwater archaeological survey of a large portion of this area was conducted to locate and provide information about the numerous shipwrecks of the area. Six more shipwrecks of the 1596 Armada were located, along with many more shipwrecks of later historical periods. All of the wrecks meet the UNESCO Underwater Cultural Heritage criteria for protection. These newly discovered shipwrecks were all mapped. At the same time, a research survey was completed by fishermen and divers to locate other wrecks.

During 2011, the shipwrecks located in previous seasons were recorded. In addition, new possible wreck locations provided by locals were also surveyed. Two of these additions are steamers sunk at the end of the 19th century that lay at 50-meters depth. Moreover, some new remote sensing survey targets have also been investigated. The main effort of archaeology was concentrated on *Punta Restelos* shipwreck and the French corvette *Bayonnaise*, scuttled by its own crew in 1803 at Langosteira Beach (Finisterre).

At *Punta Restelos*, archaeologists recorded numerous wooden structures as well as artifacts that belonged to its crew and the troops on board (fig. 1). The shipwreck is partially



Figure 3: Syringe.



Figure 4: Bronze cannon and pewter dish.



Figure 5: Gun carriage wheel.

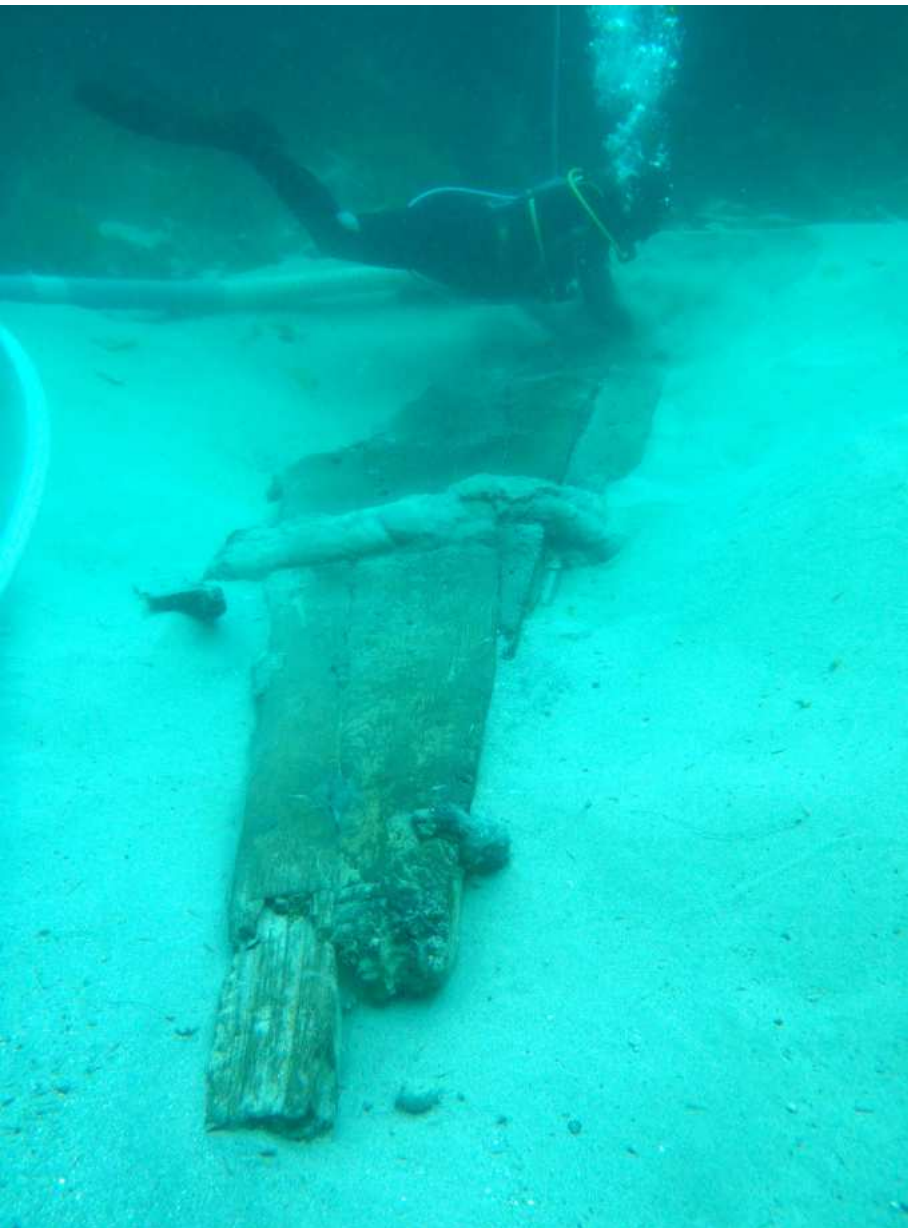


Figure 2: Wooden feature, “rudder.”

buried in sand while other parts lie on rocks. Vessel timbers exist under the sand with some still assembled. Between the wooden remains recorded, there are at least two planks among other pieces. The archaeologists observed an assembled wooden structure composed of several pieces with an approximated length of three meters. It was tentatively identified as a rudder, although this hypothesis still needs confirmation (fig. 2).

Pewter plates have been recorded along with three medical syringes of two different types (fig. 3). Two large ones possibly used to administer enemas, and a smaller one possibly used for the treatment of sexual diseases. These objects are made of a copper alloy, and the large ones have a central wooden rod. They are currently being conserved.

Included in the numerous weaponry located in this shipwreck, various cannons of wrought iron were also recorded, particularly a bombard. Moreover, a bronze cannon for stone shot was also located and mapped (fig. 4). Another type of recorded weaponry was composed of swords and muskets. Most of these artifacts were left on the bottom since there was no risk to their integrity (fig. 5).

In 2011, new possible shipwreck locations provided by local fishermen and divers, allowed the directors of the project, Miguel San Claudio, Jose Luis Casaban and Filipe Castro, to propose new survey campaigns for the future with the support of the CMAC, INA, Texas A&M, and the Heritage Division of Galicia Government.

The Stella 1 Shipwreck, Udine, Italy

Luigi Fozzati

Soprintendenza per i Beni Archeologici del Friuli Venezia Giulia

Massimo Capulli

Università degli studi di Udine

Filipe Castro

Center for Maritime Archaeology & Conservation, Texas A&M University



Figure 1: Localization (Google Earth).

In 1981 the remains of a small Roman boat, dated to the first quarter of the first century A.D. were found on the Stella River, at Palazzolo dello Stella, about 600 meters from the Piazza del Porto of the village of Precenicco, Udine, Italy (fig. 1). Contract archaeologists—IDA s.n.c.—under the scientific direction of Dott.ssa Serena Vitri from the Soprintendenza per i Beni Archeologici del Friuli-Venezia Giulia, inspected and recorded the wreck in 1998 and 1999. Arch. Giuseppe Franca and Dott.ssa Francesca Bressan directed the fieldwork. They observed a portion of the cargo spilled over an area to at least 30 m upstream of the site. In 1998 the team concentrated its efforts on the cargo inside the vessel. It consisted mainly of roof tiles, both *embrici* and *coppi*, which were stacked vertically on the flat bottom of the barge. In 1999, a second archaeological field season was conducted for two weeks aimed at recording the hull remains (Vitri et al. 1999 and Vitri et al. 2003).

In 2011, a joint team from the Universities of Udine and Texas A&M reopened the site to record the hull remains in detail. During six weeks a team composed of Massimo Capulli,

Lucrezia Maria Federico, Massimo Lob, and Daniel Lacumin, from the University of Udine, Ayse Atauz, Peter Holt, Dante Bartoli, and Lindsey Thomas, from ProMare, and Filipe Castro, Kelby Rose, and Kotaro Yamafune, from INA / Texas A&M University, recorded the Stella 1 shipwreck and a submerged wooden structure found nearby, inspected a collapsed Roman bridge over the River Stella, and surveyed a portion of the river in search for more archaeological sites (fig. 2).

The team removed the geotextil protection from the Stella 1 shipwreck and found the hull structure perfectly preserved. They then removed the sediment protecting the hull remains and recorded the site in stages. They removed the ceiling planking and opened trenches along two sides of the vessel to assess the stratigraphy and try to understand the site formation process.

The hull remains lie on the left margin of the river, almost perfectly oriented North-South, forming an angle of approximately 45 degrees with the axis of the river (fig. 3). The hull bottom is slightly inclined towards the center of the



Figure 2: The team at work (Photo: Massimo Capulli).

river and tilted to upstream, lying at a depth between 4.6 and 5.6 m. It rests on a layer of sand of variable thickness (about 5 to 10 cm around the shipwreck) with large timber fragments mixed with twigs and leaves. This sand and organic layer covers a thicker layer (about 25 to 30 cm) of brown or grey silt, with a heavy concentration of twigs and leaves – also found underneath the boat's ceiling planking – which in turn stands on a thick and heavily compacted layer of grey clay that exfoliates along thin horizontal layers. Underneath there is a layer of highly compacted sand without much apparent organic material.

A large amount of animal bones was found on site, all cut in small sections, from 15 to 25 cm. Amphora remains were found on the site as well, although diagnostic parts, such as collars and handles were absent, as mentioned above. The accessibility of the site, which has been visited by sport divers for many decades, may explain this fact.

The Stella 1 boat was a flat-bottomed barge, a little over 2.00 m wide and its length unknown. The depth-in-hold is also unknown, but the *embrici* stacked over the ceiling planking were about 60 cm tall. It is possible that the sides of the Stella 1 boat stood about 70 or 80 cm high, making an angle around 75 degrees from the vertical and thus requiring a draft of around 25 cm when loaded with *embrici*. Neither the bow nor stern of this boat were preserved, although the curve of the bottom on the west extremity of the hull suggests the proximity of one of the ends. It was built with laced planks, following a traditional construction method in the region, which does not require the use of dowels to edge-fasten the planks together. This provides resistance to sheer efforts, as in the Greek tradition of the Pre-Classical and Classical periods.

As mentioned earlier, a submerged wooden structure was found near the shipwreck, possibly the bottom of a containment barrier that was once part of the margins of the Stella River. This has since eroded and been dragged to the center of the river. It was composed of two layers of planks, the inner one fastened with mortise and tenon joints, and the outer one more difficult to interpret in this preliminary stage of our research.

The Stella 1 Project is the most important project in a long-

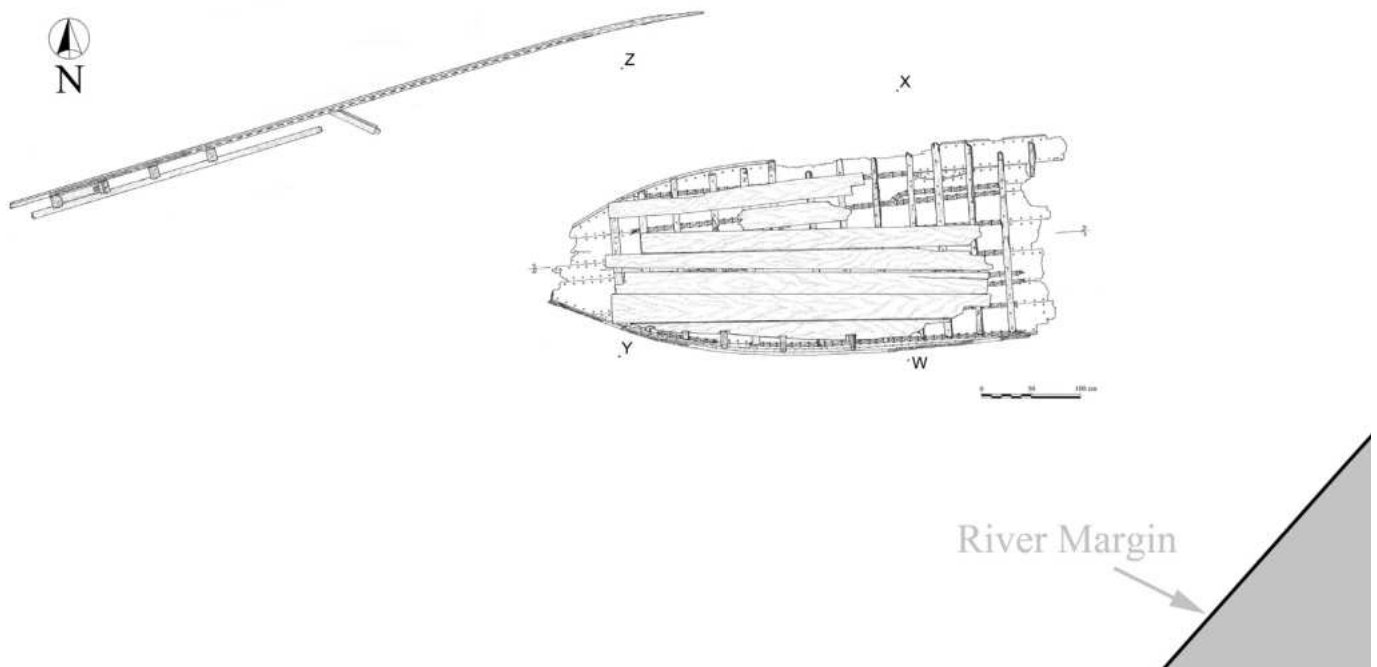


Figure 3: Site Plan (Drawing: Filipe Castro and Kotaro Yamafune).

term cooperative plan between the Universities of Udine and Texas A&M, the Institute of Nautical Archaeology, and the Soprintendenza per I Beni Archeologici del Friuli-Venezia Giulia. During the intense six weeks of work a number of other sites were visited and inspected, and other possible projects analyzed and evaluated. The Friuli Venezia Giulia is an immensely rich archaeological region with tremendous possibilities for projects of all sizes. The cooperation between the Universities of Udine and Texas A&M promises to create numerous opportunities for both fieldwork and theoretical projects (fig. 4).

As we are completing the archaeological report, a virtual model is already being developed by Kotaro Yamafune and a wooden model is in preparation. This research will study the recorded lacing solution and analyze the hull's structural remains to determine the range of loads that this vessel could support.

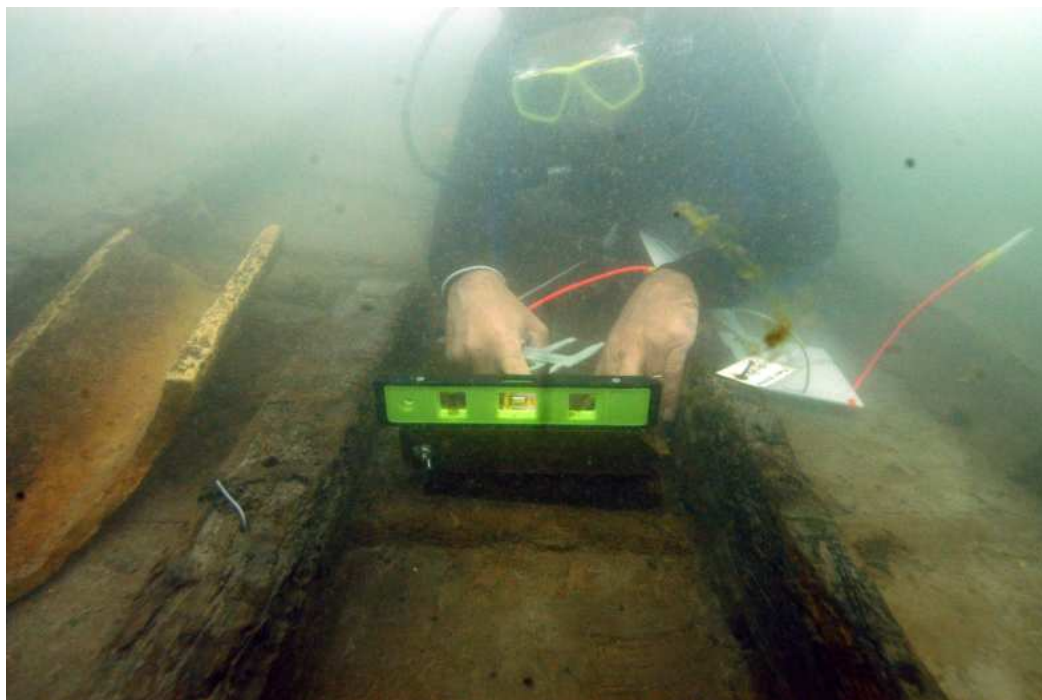


Figure 4: Diving on the site (Photo: Massimo Capulli).

Acknowledgments

The research was sponsored by ProMare Foundation, Texas A&M University Center for Maritime Archaeology and Conservation (CMAC), the Soprintendenza per i Beni Archeologici del Friuli Venezia Giulia, Texas A&M Alumni Peter and Nancy Amaral, and Mario and Giovanna De Candido (Marina Stella). It was part of a larger project of cooperation between the Universities of Udine and Texas A&M, the Institute of Nautical Archaeology, and the Soprintendenza per I Beni Archeologici del Friuli-Venezia Giulia.

The authors would like to thank ProMare, without whom this project would have never been possible, CMAC, Peter and Nancy Amaral, Mario and Giovanna De Candido (Marina Stella), and the staff of the Bar Ai Cinquecento, for both their patience and generosity.

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The Arch Cape Carronades: From USS *Shark* to Texas A&M University

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In the wake of the USS *Shark*'s loss in the mouth of the treacherous Columbia River, officers and men of the twelve-gun schooner explored the beaches from Point Adams southward for any articles of the wreck that could be salvaged, but "they seldom found a spar or plank from her which the Indians had not already visited and robbed of its copper and iron fastenings" (Howison 1846:5). In October 1846, *Shark*'s Lieutenant Commander, Neil M. Howison, received information through a group of local Clatsop Indians that part of the hull, with guns upon it, had come ashore below Tillamook Head, about 20 or 30 miles (32 to 48 km) south of Point Adams, in an area now known as Arch Cape.

Howison dispatched Midshipman T.J. Simes to the location

and Simes reported that "the deck between the mainmast and forehatch, with an equal length of the starboard broadside planking above the wales, had been stranded, and that three of the carronades adhered to this portion of the wreck" (Howison 1846:6). Simes managed to move one of the carronades above the high water mark, but the other two were inaccessible due to the surf. Howison determined that the transportation of the carronades over the rough mountain trail was impractical and the decision was made to abandon the guns to the surf and sand. Although Howison relayed to Governor George Abernathy the location of the carronades, with the hopes of sending a boat round in the summer months to collect them, the guns remained in Arch Cape for the next eight years.



Figure1: George Luce and John Gerritse with the 18-pounder carronade circa 1898 (Oregon Stare Archives).

The *Morning Star* of Tillamook

With the arrival of the first settlers into Tillamook County in 1851, the dairy industry of the area began to flourish and there was soon an abundance of butter and milk to take to the larger markets of Portland and Astoria (Orcutt 1951:62). Due to the remote location of the region, bordered by the Pacific Ocean to the west and the Coast Range to the east, these larger markets were difficult to reach without the often unreliable trading ships or the long wagon rides over rough roads. In the summer of 1854, the last small sloop sailed out of Tillamook Bay but was reported wrecked on Peacock Spit at the mouth of the Columbia River.

Instead of seeing their products go to waste, a group of desperate pioneers, which included Warren Vaughn, Charles Hendrickson, Peter Morgan and O.S. Thomas, met on 24 September 1854, with the intention of building a small trading schooner. The group set to work and from native Douglas fir, they shaped a 37-foot keel and constructed a six-foot hold using six foot by eight foot timbers spaced ten inches apart. These were then covered with a two-inch thick planking of Douglas fir, sawed by hand into 40-foot lengths (Marshall 1984:77). There was, however, a dire shortage of iron.

John Hobson, a pioneer of Clatsop, informed the group of USS *Shark*'s demise in the mouth of the Columbia and that pieces of the deck and hull, all heavy with iron, had washed ashore on the beach of Arch Cape. The group reached Arch Cape on horseback and discovered many pieces of hardware that could be salvaged for their schooner. They packed only the useable iron, bolts, knees and nails from the wreckage – nearly all the brass fittings and copper bolts had been taken by earlier scavengers. The group left the two remaining carronades where they laid at the mouth of a small creek near a hemlock tree (Marshall 1984:78). This stream would subsequently be called "*Shark* Creek."

A total of six trips with four packhorses were required to carry the iron loads on the trail over Neah-Kah-Nie Mountain, across the Nehalem River and south to Kilchis Point in Tillamook Bay – roughly 289 miles (465 km). The pioneers quickly built a small blacksmith's shop and converted the left-over ship's lumber into charcoal. A local settler by the name of Clark became the town's blacksmith and began re-shaping *Shark*'s iron as needed. The rigging and sails for their new schooner were made from bolts of canvas, rope and blocks purchased for \$10 from the Tillamook Indians, who had salvaged the materials from the 1851 wreck of the bark *Oriole* in Netarts Bay (Marshall 1984:79-80). On January 5, 1855, the *Morning Star* of Tillamook, a two-masted schooner, was launched.

"Cannon" Beach

In 1891, James P. Austin moved to the location where the first carronade was supposed to have been left by Midshipman Simes in the creek south of Hug Point. After building the "Ocean View House", Austin applied to establish a new post office, which he named "Cannon Beach" (McArthur and McArthur 2003:40). He became the first postmaster of Cannon Beach on May 29, 1891. James had always been fascinated with the prospect of finding the carronades buried beneath the sand and he spent the remaining years of his life searching for them until his death on May 7, 1894.

A winter storm in January 1898 revealed one of the carronades on the beach in front of the town's post office. Mailcarrier George Luce of Nehalem discovered the gun embedded in the creek while on his regular route. Upon returning to Nehalem, Luce told John and Mary Gerritse about his find and they brought a team of horses to the location, where the carronade (fig. 1) was pulled from the sand, along with *Shark*'s capstan, chock and cleat (Miller 1954:7). The gun was no doubt the carronade Midshipman Simes had removed from *Shark*'s deck. The other two carronades were believed to be in the surf, per



Figure 2: ACC Oregon Carronade A (Pre-Conservation).



Figure 3: ACC Oregon Carronade B (Pre-Conservation).

Howison's report, and presumed buried there still.

The Recovery of the Arch Cape Carronades

After a winter storm in mid-February 2008, a father and daughter from Tualatin, Mike and Miranda Petrone, discovered one of the two remaining carronades while walking along the beach. Upon recognizing the shape of the carronade (henceforth referred to as Carronade A), they contacted representatives from the Cannon Beach Historical Society who, in turn, contacted the town's mayor to confirm the discovery (Rollins and Crombie 2008:A4). News of the carronade attracted many people to the Arch Cape beach and State Park personnel



Figure 5: The carronade and capstan at the Cannon Beach History Center and Museum circa 2008 (Cannon Beach Historical Society).

became worried that the gun or other associated artifacts would disappear during low tide with many people looking to obtain a piece of Oregon's past.

A second carronade (henceforth referred to as Carronade B) was located further up the beach from Carronade A by Tualatin resident, Sharisse Repp. State Archaeologist, Dennis Griffin, along with staff members of Nehalem Bay State Park, recovered the guns with the assistance of a backhoe and placed them immediately into tubs of saltwater in order to maintain a saturated condition.

Seven heavily concreted artifacts were recovered during the salvage operations, including the two carronades and their gun carriages (figs. 2 and 3), pieces of chain link and an iron wedge. In early 2009, the Oregon Parks and Recreation Department signed a contract with the Center for Marine Archaeology and Conservation at Texas A&M University and the carronades and associated artifacts were transported to the university's Conservation Research Laboratory for long-term preservation and conservation (fig. 4). With one of the guns already conserved and the remaining artifacts in treatment, the Conservation Research Laboratory is currently working with the Cannon Beach History Center and Museum to preserve the carronade and capstan originally discovered in 1898 (fig. 5).



Figure 4: Master's student Brennan Bajdek conserving Arch Cape, Oregon Carronades Project at the CMAC Conservation Research Laboratory.

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Over the past two decades Texas A&M University (TAMU), through its affiliation with the Institute of Nautical Archaeology (INA), the joint excavations of significant shipwrecks with INA, and the establishment of the Nautical Archaeology Program (NAP) in the Department of Anthropology, has become recognized as having one of the best nautical archaeology academic and research programs in the world. Over this same period, the conservation laboratories that are part of NAP have become very innovative and are acknowledged as being leaders in this field of conservation. In order to capitalize and build on this recognition, a Center for Maritime Archaeology and Conservation (CMAC) was created by the Texas A&M University Board of Regents in May 2005 as the best means by which the goals and mission of nautical archaeology at TAMU can be realized.

The mission of CMAC is simple. CMAC, as a research center at TAMU, and through its affiliation with INA and the Department of Oceanography, will continue to keep TAMU in the forefront of nautical, maritime, and underwater archaeology research. It will continue to build on our expertise in artifact conservation, advance underwater mapping technology, and build on the reputation it now has in these research areas. More simply put, CMAC's mission is to form research alliances such as the one we have with the INA in order to continue to be in the forefront of maritime archaeology research and be an active partner in one of the best academic programs in nautical archaeology in the world. To accomplish these ideals, CMAC has incorporated several varied laboratories specializing in various research areas and aspects of nautical archaeology.

By concentrating on these objectives, CMAC will accomplish this multifaceted mission, but we need your support. Contact us today to learn how you can contribute to our research efforts in exploring, documenting, conserving, and studying underwater archaeological sites, and educating the next generation of maritime archaeologists.

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