

THE EXPLORERS CLUB FLAG 117 REPORT

Archaeological Exploration of Rockley Bay, Tobago, West Indies
20 May to 10 July, 2013



Figure 1: Select artifacts from the RBRP 2013 field season in Scarborough Harbour, Tobago



Jason Paterniti, FRGS, MN'10, Douglas Inglis, TM'13

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Summary:

This Flag 117¹ report describes the findings from the preliminary assessment survey to locate, evaluate and record 17th century shipwrecks within the territorial waters of Trinidad & Tobago. During the seven week expedition, the team conducted test excavations at three potential shipwreck sites, pioneered new 3D recording techniques and collected samples of intact hull structure for dendrochronological dating. Long term capacity building activities included establishing the first dendrochronology laboratory in the Caribbean, breaking ground for Trinidad & Tobago's first archaeological conservation laboratory, and cooperating with the Tobago House of Assembly (THA), the Tobago Ministry of Tourism and local stakeholders to promote professional underwater archaeology in Trinidad & Tobago.



Figure 2: RBRP Assistant Director Doug Inglis TM '13, Operations Director Jason Paterniti MN'10 and Director Kroum Batchvarov at Rockley Bay.

¹ Flag 117 was issued 10 June 2013 but due to logistical challenges was not received on site during the Field Study.

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Introduction & Background:

The 17th century was a period of great exploration and discovery. Advances in ship technology and construction allowed European nation states to project power around the globe and dominate previously unexploited regions. In the struggle to control the Caribbean, the strategically positioned island of Tobago came almost continually under attack. For the Dutch, the conflict culminated in March 1677 when a French squadron assisted by a large detachment of troops attempted to wrest control of Tobago from the Dutch West Indies Company. The fleets fought a crucial battle in the modern commercial port of Scarborough Harbor, Rockley Bay², on the island of Tobago. Twelve Dutch ships and two French ships were sunk or destroyed and over 1,200 men woman, children were killed in the action. It was one of the largest naval conflicts outside Europe in the 1600s. Although the battle ended in stalemate, the Dutch lost the Tobago in a renewed French assault a few months later (Goslinga, 1971). The battle marked the end of efforts by the United Provinces of the Netherlands to assert military and economic influence in the western hemisphere, and one of the most significant turning points in the history of Caribbean settlement (Shomette, 1994). After the battle the island was abandoned for several decades, and the wrecks were quickly buried by sediment running off the surrounding hills.

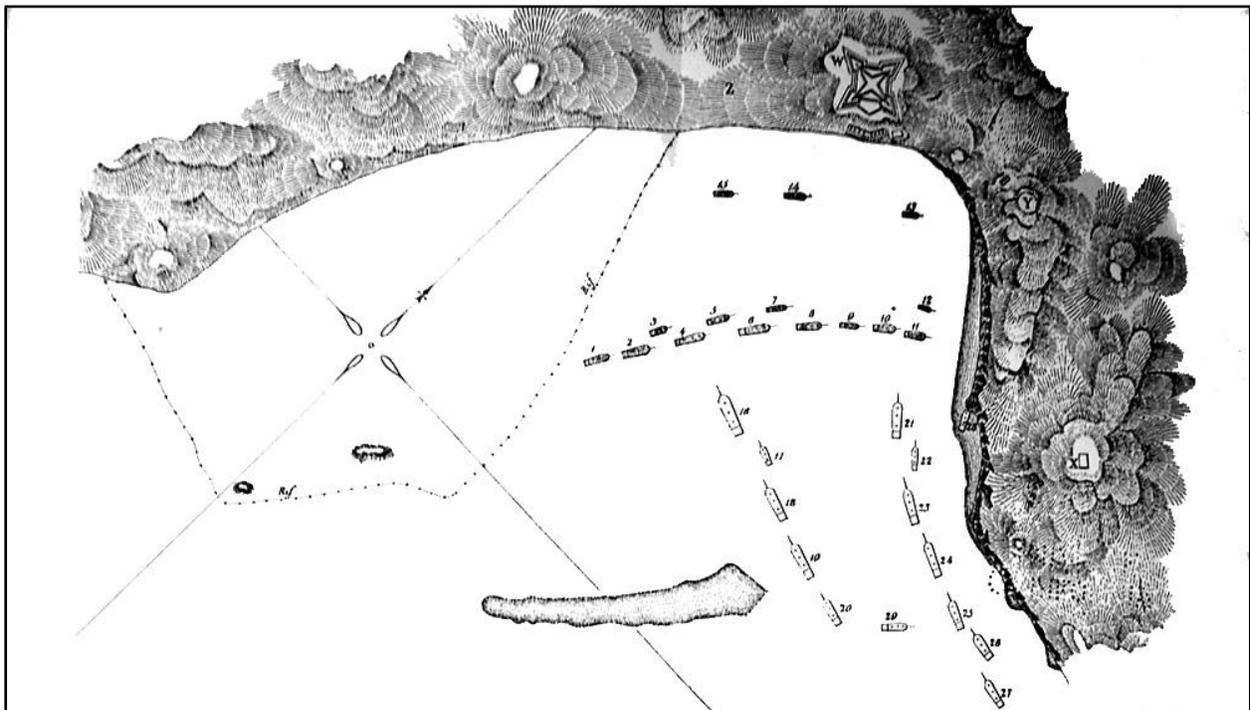


Figure 3: Map showing Scarborough Harbour, the Dutch line of battle and the advancing French Squadron. (Woodcock, 1866)

² Scarborough Harbour is alternatively spelled "Scarborough Harbor", and Rockley Bay is alternatively spelled "Rockly Bay". As both modern and historic references are inconsistent, we use "Harbour" and "Rockley" when referring to each specific location.

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In 1990, the Tobago House of Assembly (THA) commissioned the construction of a new marine terminal in Scarborough Harbor, Tobago. This project included dredging the harbor to facilitate larger draft vessels. During construction, ballast rock, cannon, ship timbers, associated artifacts and human bones were encountered. Based on the material discovered by the construction crews, including an 18 pound bronze cannon bearing the crest of Louis XIV and dated “1663”, it was possible that remains from the previously lost “Battle of Scarborough Harbor” had been uncovered.

As a result of these finds, the THA commissioned experienced marine archaeologist Wes Hall, (who had been a member of Clive Cussler’s team which identified the submarine *C.S.S. Hunley*), to conduct an underwater archaeological survey of the inner harbor in 1991. Hall identified two sites containing wreck material. Hall designated these sites “A” and “B” (Hall, 1999, p. 10). In 1992, the THA commissioned Hall to conduct a second survey in order to determine the extent of Target “A” and ensure that a planned construction of a new Coast Guard pier would not impact the site. (Hall, 1999, p. 3) A single shallow trench was excavated.

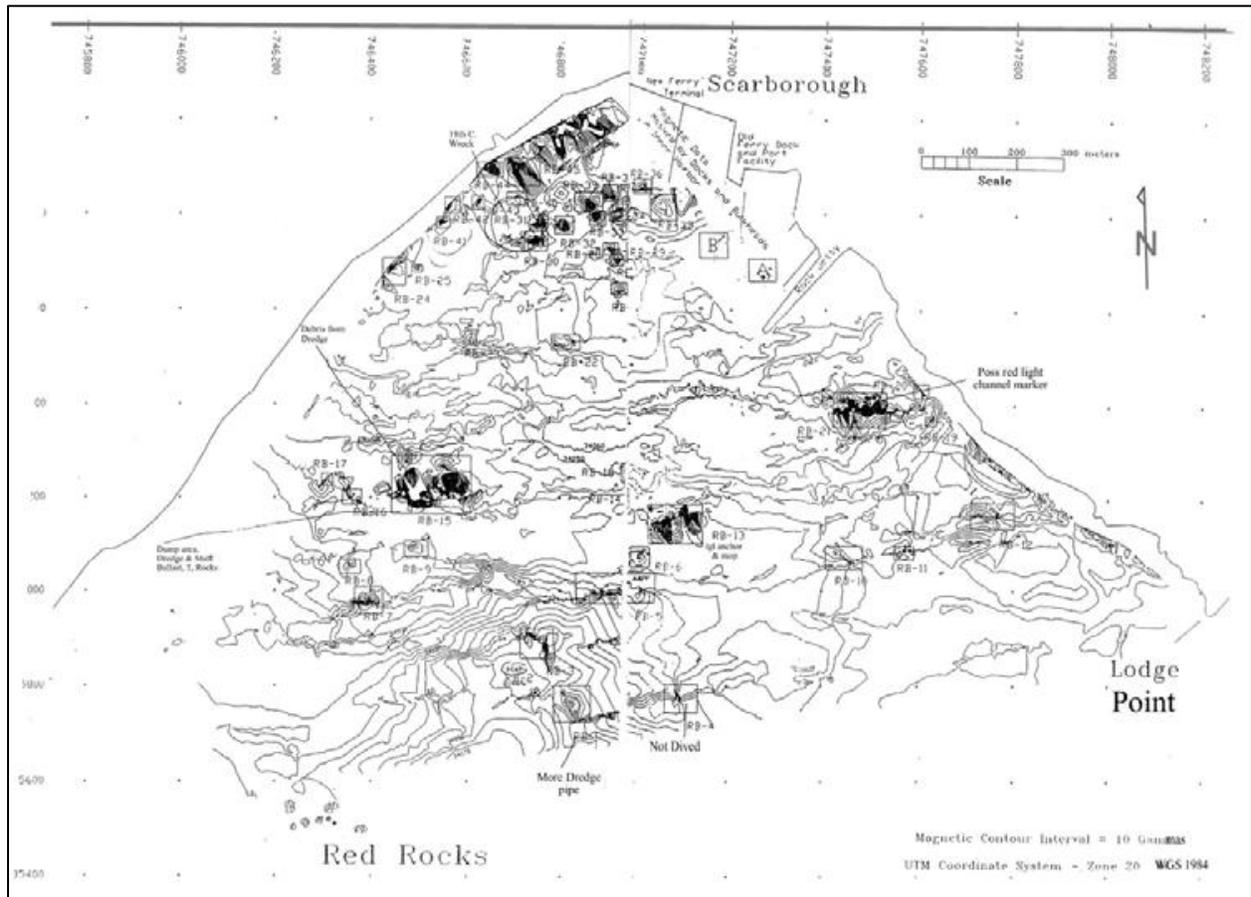


Figure 4: Map shows the results of the magnetometer survey by Wes Hall.

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In 1997 the THA contracted Heritage Development Consultants (HDC)³ to study the shipwrecks in Scarborough Harbour. In cooperation with HDC, Wes Hall conducted a geophysical survey using a marine magnetometer⁴ to locate and assess possible ship remains within Rockley Bay. More than 45 anomalies were identified during the survey, which covered the area north Red Rocks and east of Lodge Point, including all of Scarborough Harbour and the areas around the jetties (Hall, 1999, p. 10).

Claire Broadbridge of HDC invited a dive team from the UK to investigate vessel "A". After probing the site, the dive team began excavation in April 2000. They opened two trenches (A and B) across the site, brought over 150 artifacts from site A to the surface (McKewan, 2006, p. 12). The team also ran a Nautical Archaeology Society (NAS) Part I training course during the project, with the aim of raising awareness of the potential of the project and to provide some initial archaeological survey skills and training for local divers. HDC ultimately abandoned the excavation, and the only published documentation is a 2006 NAS Part II report by L. M. P. McKewan. The artifacts, associated paper records of the artifacts as well all photographic documentation were left with HDC. (Underwood, 2013). The present location of this material is not known.



Figure 5: A cannon raised by HDC in 2000. It was never conserved, and believed to be lost until it was discovered behind a warehouse in 2012.

³ HDC is erroneously listed as Heritage Management Consultants in McKewan 2006.

⁴ A magnetometer is an electronic instrument which measures localized changes in the earth's magnetic field. Magnetometers are used in survey work to detect the presence of ferrous metals like iron and steel fasteners, anchors, cannons etc. (Hall, 1999)

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The cultural material & artifacts located in Scarborough Harbor are potentially one of the world's primary sources of knowledge concerning 17th century seafaring, ships and maritime culture. As such, a concerted effort was initiated in 2007 to obtain permission from the THA to conduct proper scientific excavation and conservation of these endangered material remains. In April 2012 the THA issued our project team a permit to conduct an archaeological investigation of the shipwrecks located in Rockley Bay, Scarborough Harbor.

The Rockley Bay Research Project (RBRP) team conducted a ten day expedition in June 2012, carrying Explorers Club Flag 117. During expedition, the team located and recorded multiple cannons, anchors, metal artifacts, and ceramic vessels and glass bottles. The team also investigated an 18th-19th century wreck off of Monos Islands, Trinidad. (Paterniti, 2012) A subsequent reconnaissance survey was conducted in March 2013 to prepare of the summer 2013 field season. The 2012 and 2013 surveys identified four sites with potential for further investigation, catalogued as Tobago Rockley Bay Site 1 through 4 (TRB-1 through TRB-4).

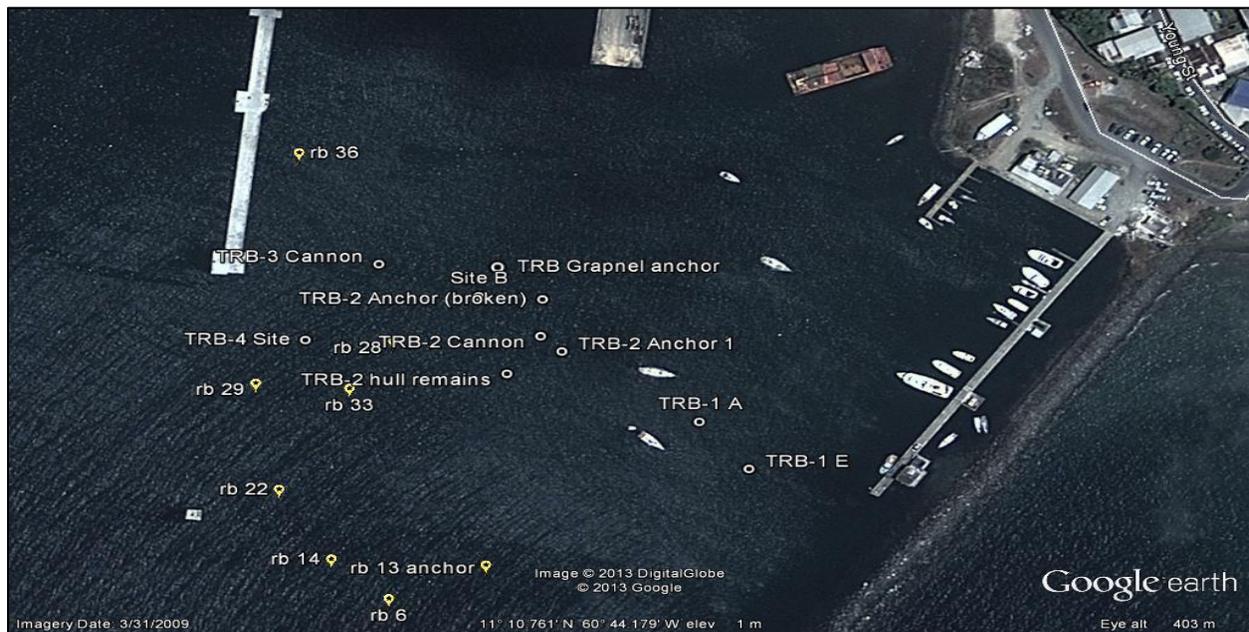


Figure 6: A Google Earth map showing the locations of TRB-1 through 4 and associated finds.

Site TRB-1 is a large ballast pile just west of the T&T Navy base station. The ballast pile was identified as Site "A" in the 1999 survey report by Wes Hall and subsequently investigated by HDC/MRT. TRB-2 is a complex, multi-component site lying between the Ferry jetties. It includes a 17th century cannon, two 17th or 18th century anchors and numerous surface artifacts. Site TRB-3 consists of an isolated cannon located just southeast of the long, western cruise ship jetty. It possibly dates to the 17th century, and was initially identified as a potential wreck site in 2012. Site TRB-4 is large ballast pile southwest of TRB-3 and the jetty. It has not yet been investigated.

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Figure 7: A Bellarmine Jar found near TRB-2 in 2012.

The primary objective of the Rockley Bay Research Project is to locate 17th century shipwrecks for survey and recording. The project team had been successful in 2012 in identifying multiple sites in Scarborough Harbor Tobago which appeared to contain 17th century material and artifacts. Based on material data and conversations with locals, the RBRP selected TRB-1 for excavation during the 2013 season. The following criteria were used: 1.) While other possible sites were identified, the location of a wreck at Site TRB-1 been confirmed. 2.) Site TRB-1 lies out site of the path of commercial traffic in the Scarborough Harbour, which facilitated a safe and accessible working environment. 3.) Site TRB-1 reportedly had coherent hull structure. It also remained deeply buried which increased the probability that the timber structure and associated artifacts would be in a better state of preservation.

RBRP also conducted exploratory excavation around the TRB-2 and TRB-3 cannons to gather diagnostic information and to understand the underlying site composition. No artifacts were permanently raised during the project, as no conservation facilities were available. The project team has been in negotiations with the Tobago House of Assembly (THA) to establish an independent conservation facility in Tobago that will enable the proper conservation of endangered hull remains and associated cultural artifacts located in Rockley Bay.⁵ A ceremony commissioning the conservation facility was held on July 14th, 2013 in Scarborough.

⁵ The expedition rigorously adhered to the procedures used by the Institute of Nautical Archaeology (INA). It is the policy of the Project and INA to recover all objects for the sake of the host Government. No artifacts will be sold for profit.

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Objectives:

Project Objectives

- 1.) Locate and survey 17th century shipwrecks potentially associated with the Franco-Dutch naval battle of 1677 which took place in Rockley Bay, Scarborough Harbour, Tobago.
- 2.) Cooperate with the Tobago House of Assembly (THA) and the Tobago Ministry of Tourism to establish conservation facilities on the island of Tobago for the eventual excavation, recording, documentation and proper conservation of endangered hull remains and associated cultural artifacts located in Rockley Bay.
- 3.) Publish results in a professional manner.

2013 Season Objectives

- 1.) Investigate sites identified in the 2012 field season and March 2013 reconnaissance (TRB-1, TRB-2, TRB-3 and TRB-4) and:
 - a. Determine if these sites contain 17th century components
 - b. Record associated archaeological material
 - c. Evaluate the threat of marine traffic, dredging and looting to site integrity
- 2.) Excavate the coherent hull structure of TRB-1 to collect dendrochronological samples from multiple timbers and analyze the method of construction
- 3.) Train university students to professionally survey, excavate and document submerged archaeological sites.
- 4.) Evaluate local infrastructure, personnel and resources to determine if it is viable to conduct full scale archaeological excavation in Tobago.

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Figure 8: INA in Tobago: Assistant Director Doug Inglis, Director Kroum Batchvarov and DSO Mike Gilbert. While proudly carried in 2012, the re-issued Flag #117 did not arrive in time to join our second expedition to Tobago in 2013.

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Expedition Members and Areas of Responsibility

Name	Profession	Nationality	Role
Dr. Kroum N. Batchvarov	Assistant Professor of Maritime Archaeology, University of Connecticut	Bulgarian	Project Director
Douglas Inglis	Professional Archaeologist, MA Candidate, Nautical Archaeology, Texas A&M University, College Station, TX	USA	Assistant Project Director
Dr Nigel Nayling FSA MIFA	Associate Professor, School of Archaeology, University of Wales	UK	Dendrochronologist
Veronica Morriss	Professional Archaeologist, MA, Nautical Archaeology, Texas A&M University, College Station, TX	USA	Collections Manager
Michael Gilbert	MA Candidate Nautical Archaeology, Texas A&M University, College Station, TX	USA	Dive Safety Officer
Dr. Levis Guy-Obiakor		Tobagonian	Government Relations
Jason Paterniti	President, GEOS Foundation	USA	Operations
Iain "Waba" Milne	Boat Captain	Trinidadian	Boat Captain
Matthew Milne	First Mate	Trinidadian	First Mate
Thomas Lacey	Graduate Student, East Carolina University, B.A., University of Connecticut	USA	Volunteer
Cassandra Devney	B.A., University of Connecticut	USA	Volunteer
Joe Bingaman	B.A., University of Connecticut	USA	Volunteer
Robert Steinhoff	Bermuda Maritime Museum	Bermuda	Project Sponsor/ Advisor

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Figure 9: The 2013 RBRP Team (from left to right): Doug Inglis, Matthew Milne, Bob Steinhoff, Mike Gilbert, Dr. Kroum Batchvarov, Capt. Iain "Wabba" Milne, Dr. Nigel Nayling, Cassie Devney, Joe Bingaman and Tom Lacey.



Figure 10: The 2013 RBRP Team (from left to right): Joe Bingaman, Matthew Milne, Capt. Iain "Wabba" Milne, Jason Paterniti, Tom Lacey, Will from T&T Ferry, Dr. Kroum Batchvarov, Cassie Devney, Mike Gilbert, Dr. Nigel Nayling, Veronica Morris, and Doug Inglis.

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Methods:

Survey

Although we had recorded GPS coordinates for TRB-1, TRB-2, TRB-3, and TRB-4, the landscape of Scarborough Harbor dramatically changed between the 2012 and 2013 expeditions. It was difficult to relocate the sites on the seafloor. Approximately 20 – 50 cm of additional sediment was observed at TRB-1, burying transect lines placed during the previous season. Probing and test excavation were ultimately used to identify the southern trench excavated by HDC/MRT in May 2000. Divers used radial search to relocate the TRB-2 cannon and anchors, TRB-3 cannon, and TRB-4 ballast pile. A swivel gun associated with TRB-2, visible in March 2013, was never relocated. Our team also conducted a sweep of the harbor; teams of divers swam transects across the seafloor to identify additional sites and diagnostic material associated with the 17th century.



Figure 11: Veronica and Jason (left) discuss the dive plan before beginning a radial search survey (right).

Surface Collection & Survey Grid

Small finds around the TRB-2 site were mapped using a survey grid made from rebar and polypropylene rope. Each grid square was three by three meters. The grid contained 25 squares, labeled E5 through I9, encompassing 225 square meters. Grid squares were subdivided into sixteenths during recording. The grid facilitated mapping and allowed our team to monitor the movement of artifacts displaced by currents and marine traffic. Jet wash from the ferries creates turbulence at ten meters below the surface, making the ferry corridor an extremely dynamic environment. Lightweight artifacts, (such as pottery sherds, pipes, and broken glassware), can shift position by as much as three meters on a daily basis. To protect these fragile artifacts, they were collected, documented and reburied in the TRB-1 trench. No artifacts were permanently raised, because there were no conservation facilities available.

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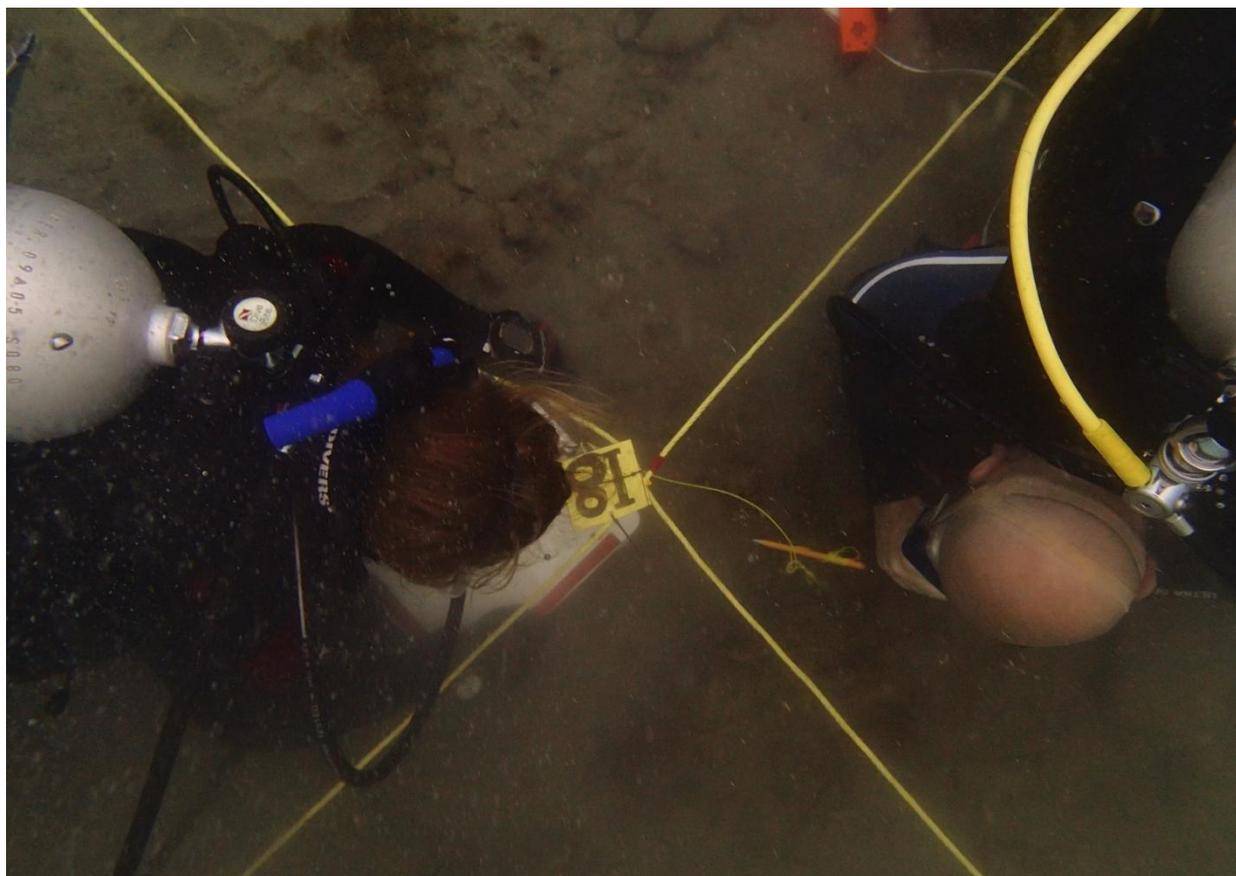


Figure 12: Cassie and Kroum map artifacts using the grid.

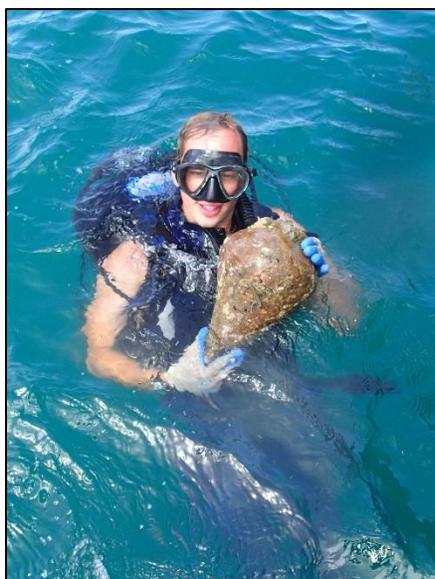


Figure 13: Doug (left) brings an olive jar to the surface for recording. Joe (right) pieces together two halves of a blue and white transferware plate, found 10 m apart on TRB-2.

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DSM

In conjunction with the survey grid, our team used the Direct Survey Method (DSM) to create a three-dimensional site plan of TRB-2. Fixed control points were placed throughout the site; they consisted of two meter sections of pipe anchored in concrete filled tires.



Figure 14: The team building DSM control points from pipe, tires and concrete.

Archaeologists trilaterated the position of each artifact by measuring its distance to at least four of these control points. To capture the shape and position of complex objects, such as the cannon or anchors, divers trilaterated the positions of multiple points on artifact's surface.

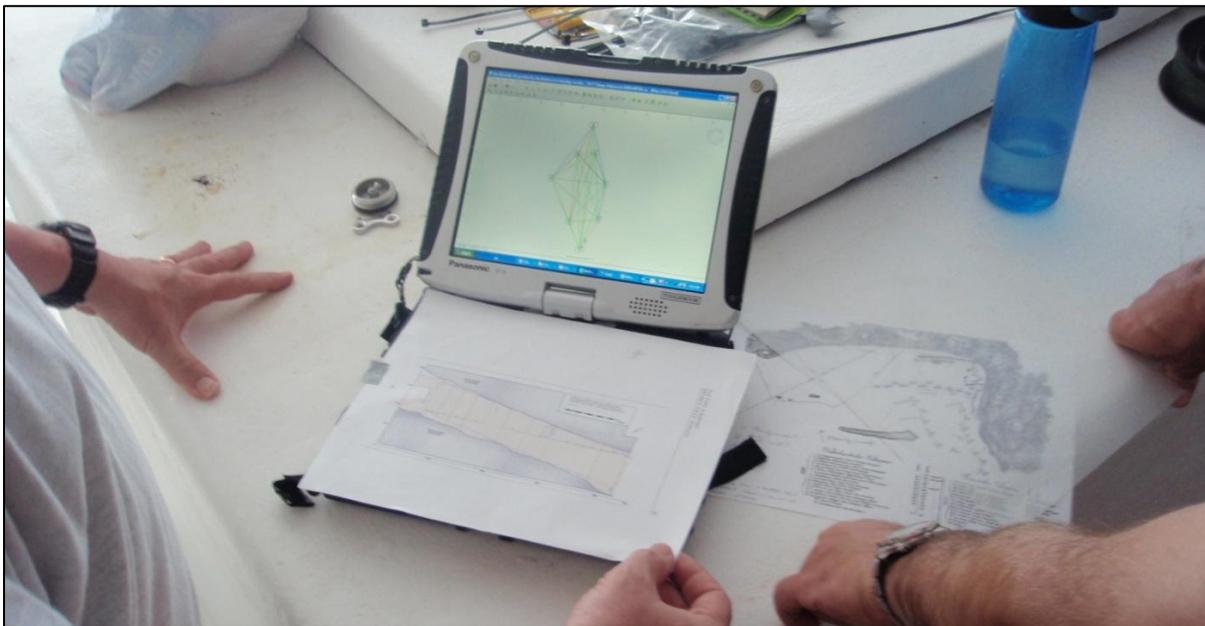


Figure 15: Examining the TRB-1 DSM model in 2012.

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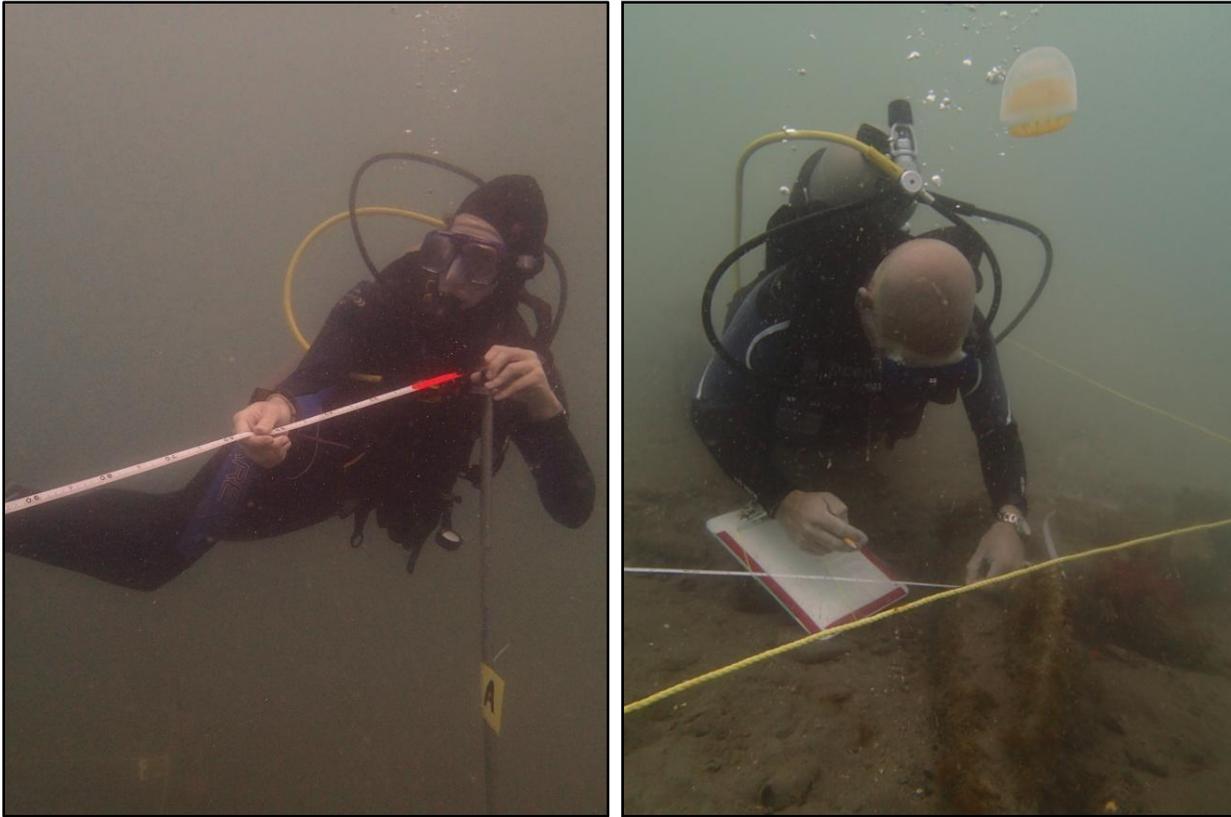


Figure 16: Joe (left) and Kroum (right) use DSM to map an anchor.

DSM data was processed in Site Recorder 4 with a residual error of less than 1 cm. In addition to the digital model, our team plotted the artifact coordinates on Mylar to create a large working site plan. Large maps are useful in coordinating dives, discussing artifact provenience, and providing a clear picture of how the recording and excavation process is progressing.

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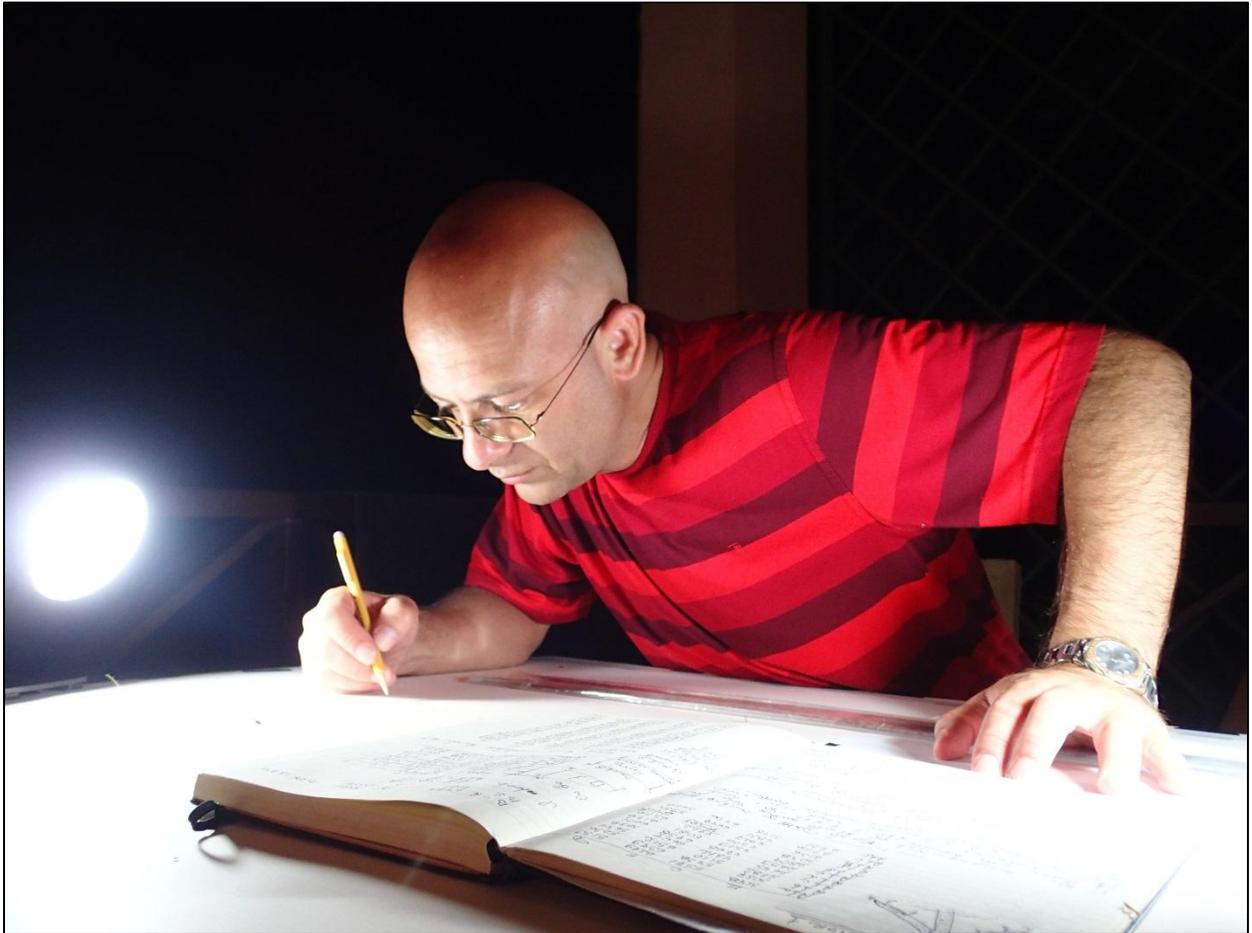


Figure 17: Kroum drafting the site plan.

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Excavation

The catamaran R/V *Blu Spartan* (owned and operated by “Wabba” Iain Milne) served as our dredging and diving platform. Archaeologists excavated test units at TRB-1, TRB-2 and TRB-3 using a water dredge powered by an 11 hp, 3-inch marine diesel pump mounted on *Blu Spartan’s* bow. Archaeologists carefully hand-fanned sediment off the wreck into the dredge, uncovering timbers and artifacts *in-situ*. When appropriate, the dredge spoil was sifted through a ¼ inch screen. The dredge’s power jet was unreliable. Scarborough Harbor’s thick cloying mud clogged the internal jets on numerous occasions. The power jet had to be raised and cleaned often.



Figure 18: Mike, Joe and Kroum (left) trying to fix the frequently clogged powerjet. Doug and Mike (right) deploy the dredge hoses off the stern of R/V *Blu Spartan*.

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Recording

Our team did not permanently raise any artifacts, as no conservation facility was available. All artifacts encountered during excavation or surface collection were carefully drawn, photographed, and measured. Once documentation was complete, they were reburied with tags on TRB-1. The coordinates of the reburial location were given to the THC. Once conservation facilities are operational, these artifacts can be relocated, raised and properly conserved. All artifacts will remain in Tobago.



Figure 19: Tom carefully illustrating a blue and white transferware platter in the lab.

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Dendrochronology

The RBRP is helping to establish the Caribbean's first dendrochronology lab through a partnership with Dr. Nigel Nayling and the University of Wales Trinity Saint David. Dendrochronology uses ring counts to date archaeologically preserved wood. The process can produce dates as precise as the season of felling, and is effective for dating shipwrecks. For an accurate date, the sampled timbers must well-preserved, retain sapwood, and match an existing chronology. Ships involve thousands of timber components which could represent repairs or different material sources, so numerous samples are needed from each wreck to create an accurate picture of its working history. Although wood does not generally survive well in tropical water, the high siltation rate in Scarborough Harbor means that timbers would have been quickly covered and protected.

The 2000 excavation of TRB-1 by HDC revealed intact hull structure. Ceiling planking was discovered in Trench A, while frames and keel were uncovered in Trench B. No date for the wreck was produced, although the excavators suggested that the ship was from the 17th century. Since TRB-1 was known to have intact timber, and there was a question of her date, our team elected to re-open Trench B to collect dendrochronological samples. These samples were analyzed in Tobago by Dr. Nayling in the newly established mobile dendrochronology lab.

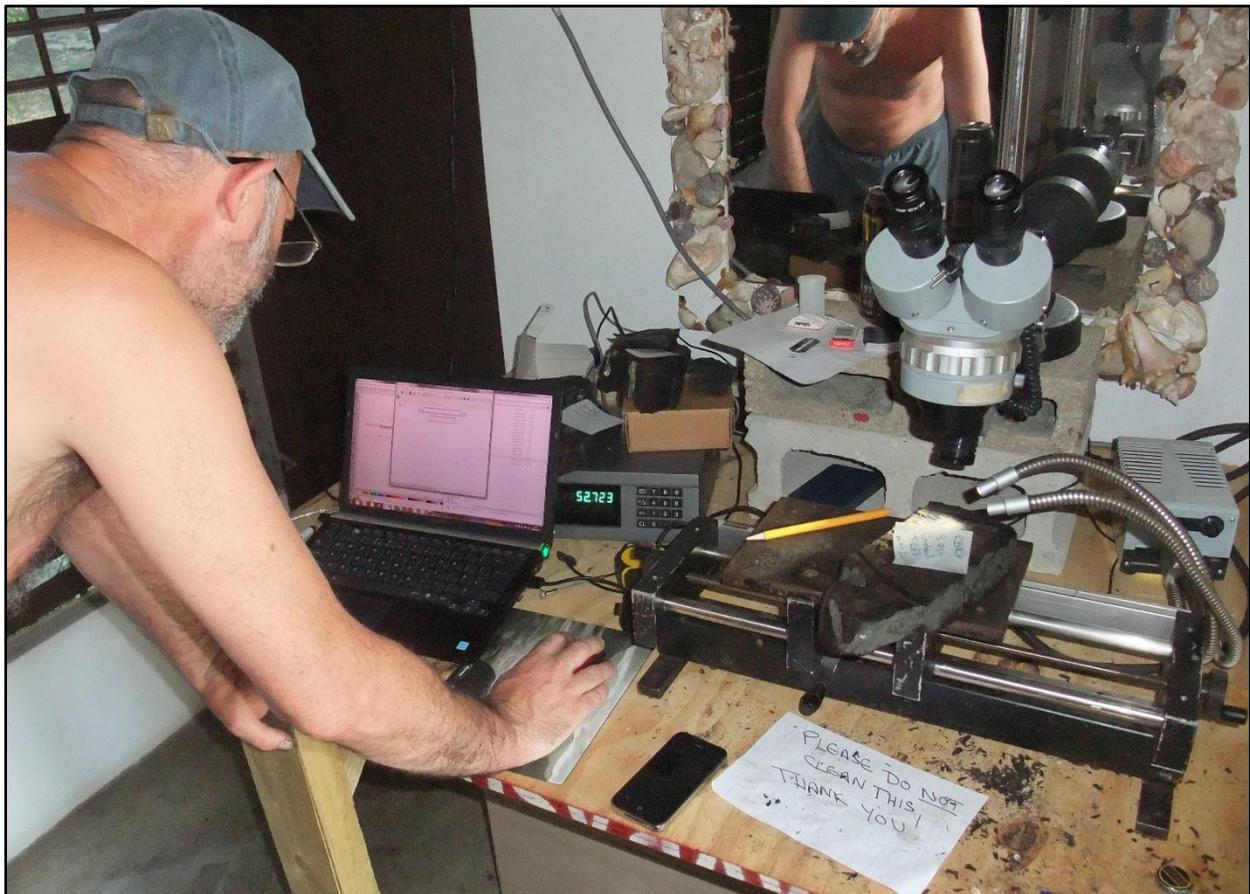


Figure 20: Nigel analyzing dendrochronological samples from TRB-1 with the mobile lab.

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Cannon Documentation

At this point we have identified six cannons that potentially date to the 1677 battle. Two are underwater: TRB-2 and TRB-3. The third was raised by HDC during the 2000 field season. Three others are mounted together in a monument near the Scarborough bus terminal. The paucity of known cannons is a mystery. Undoubtedly, colonial forces would have salvaged as many as possible with the technology available. Modern salvagers have also played a role. Several local informants have independently cooperated stories that numerous cannons were recovered during recent dredging operations in the harbor. Even so, considering the number of ships involved in the battle, many more pieces of ordnance should be present in the bay. Our team documented all six known guns in hope of determining their caliber, confirming 17th century manufacture, and potentially even tracing them back to the originating foundries. Each cannon was carefully hand recorded so that we create precise archaeological illustrations and 3D models.



Figure 21: Doug documenting the 17th century cannon raised and subsequently abandoned by HDC.

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Photomosaics & SFM

Our team collected photographic and HD video data from TRB-2 and TRB-3 to create 2-D and 3-D models of both sites. Visibility was generally limited to one or two meters, which severely constrained photo-documentation. TRB-1 is located in a deep silt bed, and the surrounding water column was consistently full of suspended sediment. Consequently, effective photo-documentation of TRB-1 was impossible.

We created high-resolution post-excitation photomosaics of both TRB-2 and TRB-3 cannons. Each was photographed in plane at a distance of one meter. The images were compiled and mosaicked in Microsoft Image Composite Editor.



Figure 22: A preliminary mosaic of the TRB-2 cannon and brick pile. Composite created in Microsoft ICE from 19 photos.

Our team is collaborating with Dr. Albert Lin and Perry Naughton from University of California San Diego (UCSD) to test a developing technology known as Structure from Motion (SfM). SfM uses two dimensional photographs and video to construct precise three-dimensional models. Once perfected, this new technology will allow archaeologists to quickly and accurately capture spatial data which would take much longer to record by direct measurement. By periodically creating models of a site, archaeologists will be able to record an excavation over time, preserving not only spatial data, but process as well.

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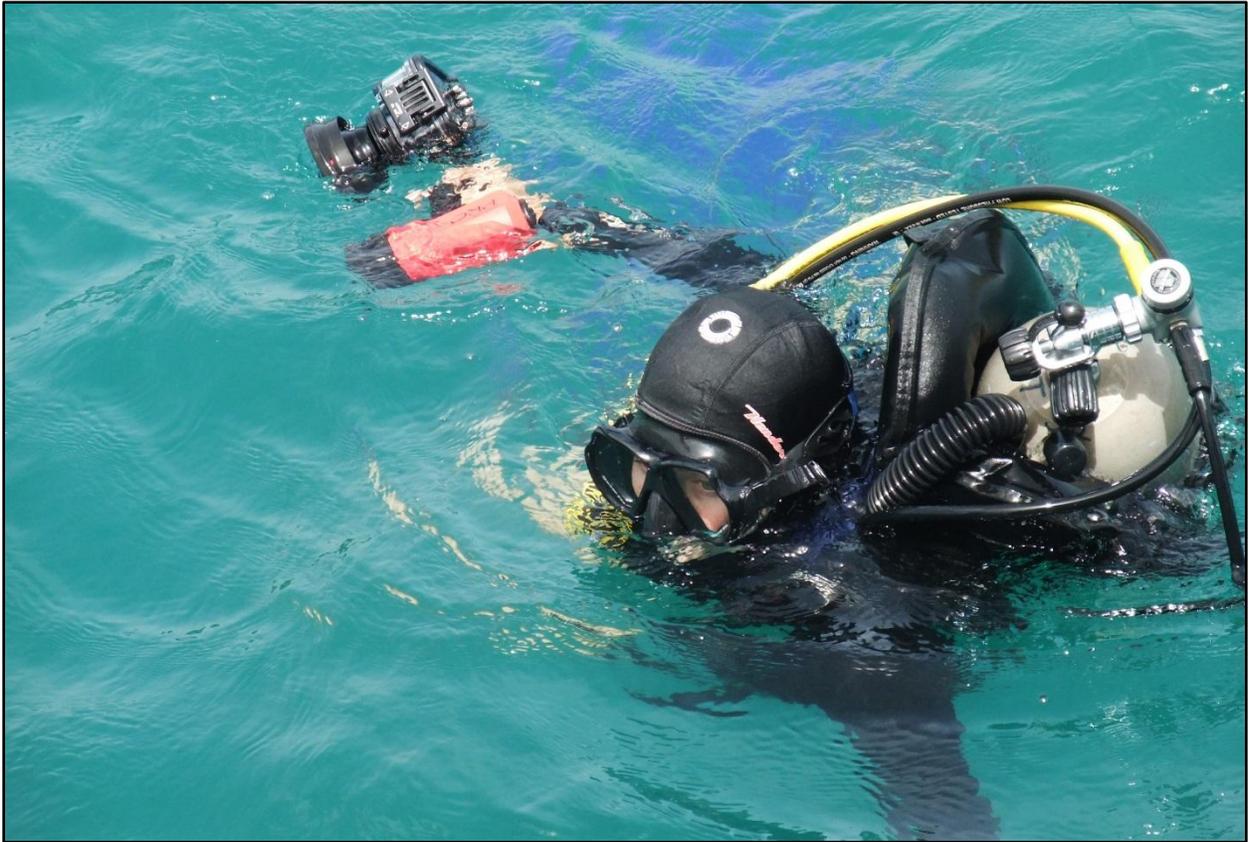


Figure 23: Veronica returns from making a photomosaic.

Scarborough harbor presented numerous challenges for SfM modeling. Visibility and lighting were poor, limiting our ability to collect photographic data. The site was blanketed with a new layer of fine brown silt every day, making it difficult for the algorithm to delineate features. Additionally, light moves through water differently than through air, making difficult to calibrate the images. However, if SfM can be developed to work in low visibility environments, it will provide archaeologists with the ability to see the entire expanse of a site on the computer, something they could not physically do underwater. Our team gathered SfM data from both TRB-2 and TRB-3 cannons. The team at UCSD will process the images. We will jointly compare their resulting models of the cannons with hand measurements taken in field to test algorithm accuracy.

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Logistics:

The Project Director, Assistant Director, Collection Manager, Dive Safety Officer, and Director of Operations arrived in Tobago via commercial aircraft in Late May. They were joined by three students from UCONN in early June. We established our base of operations at a cottage in Grange, near Mt. Irving Bay. The cottage was approximately 30 minutes by car from the Port of Scarborough. The THA constructed a temporary shed within the port facilities where the team could store equipment and process artifacts. Our team constructed shelves and tables for processing artifacts. Tanks, fins, weights and other dive equipment were rented from Extra Divers Tobago. All equipment was transported with rented cars to the dive site.



Figure 24: Our research station. Our team added benches for processing artifacts and storing equipment.

The 45 ft catamaran R/V *Blu Spartan* was chartered and outfitted to serve as our dive and dredging platform; the same vessel was used during the 2012 season. The boat's captain and owner "Wabba" Iain Milne was familiar with the harbor and local facilities, and is also an advocate for local heritage.

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Figure 25: R/V Blu Spartan, with Wabba at the helm, and Tom logging divers.

When R/V *Blu Spartan* was unavailable, the team dived from shore via an access point on the south side of the port. TRB-2 was only a 5 to 10 minute surface swim from the gate. Shore entry was not ideal as the large retaining rocks at the harbors edge could be slippery. We constructed a stable ramp, greatly improving situational safety.

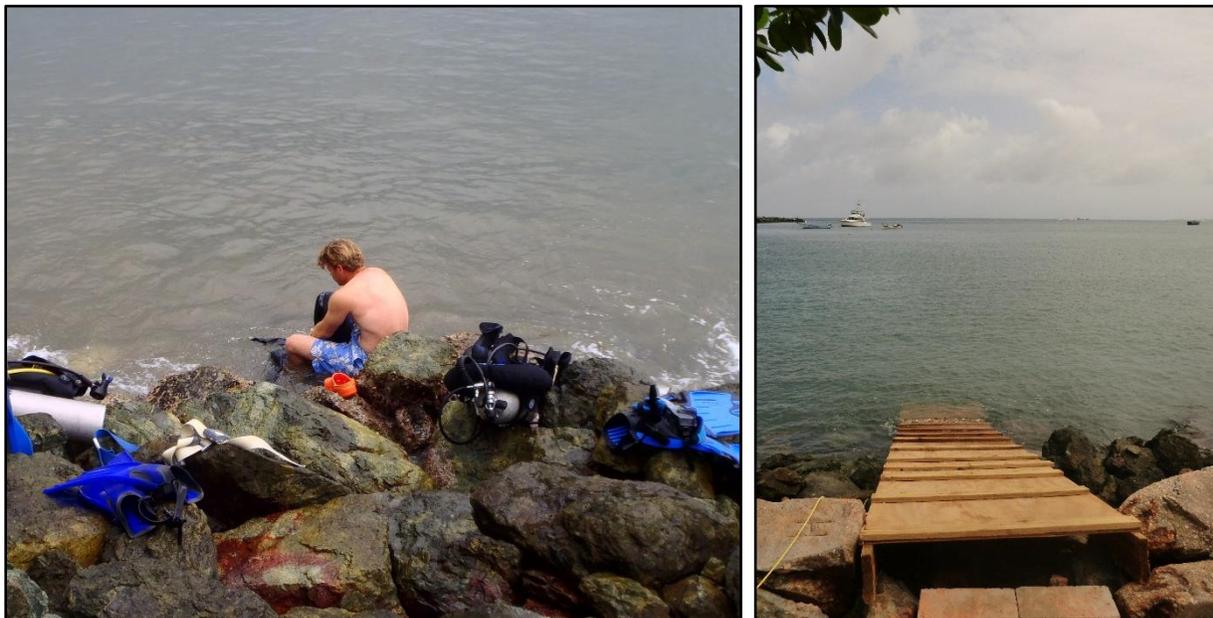


Figure 26: Jason (left) prepares to enter the water from the break water wall. A ramp (right) was later added for safety.

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Findings & Results:

I. Site TRB-1

Site TRB-1 is a large ballast pile just west of the T&T Navy base station. The ballast pile was identified as Site "A" in a 1999 survey report by Wes Hall for Mid-Atlantic Technology and Environmental Research, Inc. The report describes the (then) elevated mound:

"The major extent of Vessel A (TRB-1) was identified and a single shallow test trench was excavated. The shipwreck consisted of a large pile of ballast (16 meters wide by about 45 meters long. The ballast pile (wreck) was covered by 20 to 150 centimeters of sticky grey sediment. Below and within the ballast were portions of the ship's hull, hardware, and artifacts still in an excellent state of preservation." (Hall, 1999, p. 3)



Figure 27: Overview of TRB-1 site, the breakwater and the Navy Station jetty.

The site was excavated in May 2000 by a Trinidad based company known as Heritage Development Consultants (HDC), in cooperation with a dive team from the Mary Rose Trust (MRT). HDC ultimately abandoned the excavation, and the only known published documentation is a 2006 NAS Part II report by

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L. M. P. McKewan. The dive teams opened two trenches across the site (A and B) exposing the remaining hull structure. Ceiling planking was identified in the northerly trench (A) while frames and a keel were identified in the southerly trench (B). The team took a dendrochronological sample, but the results are not published. McKewan (2006, 13) concluded:

“...it was not possible to identify the wreck with any certainty, other than to say it was probably 17th century based on the artefacts found. There were no markings on the timbers, nor many fastenings. The finds recovered included pottery shards, glass fragments, and even a complete glass bottle, but most artefacts on this site were mixed in with several stratigraphic layers, indicating recent deposition and disturbance.”

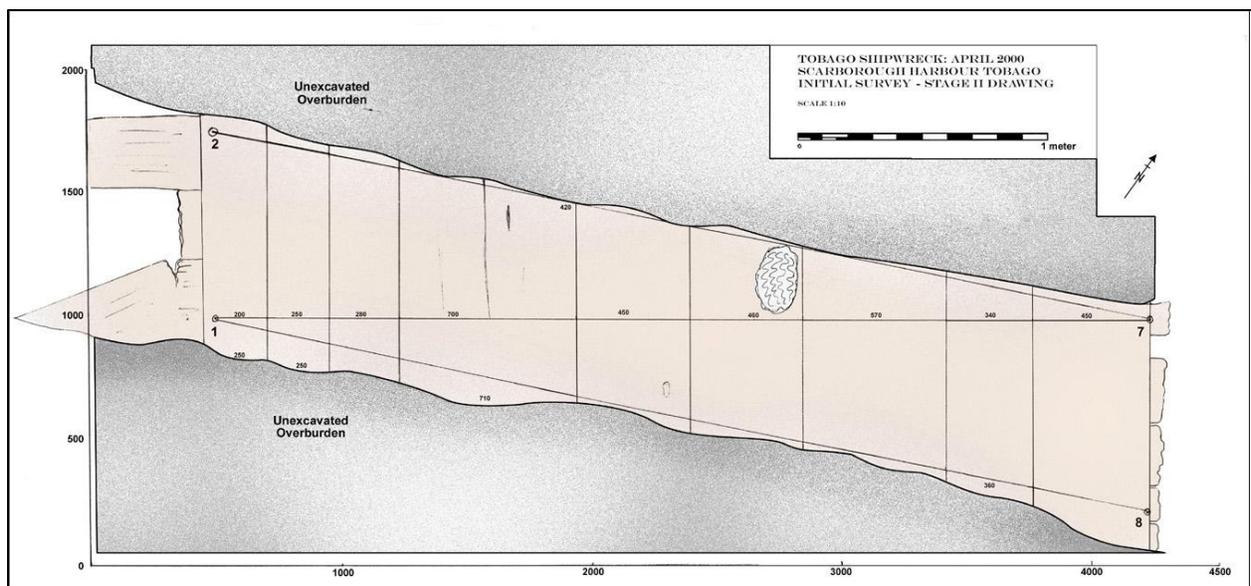


Figure 28: Final HDC/MRT site plan of Trench A. Illustrated by L. M. P. McKewan (McKewan, 2006, p. 13).

RBRP chose to relocate the wreck because it had coherent hull structure, potential for dendrochronological dating, had been poorly reported and, according to HDC/MRT, “was probably 17th century” (McKewan 2006). Critically, the location of the Site A was near the projected position of the 1677 Dutch line suggested by the 1866 Woodcock map. The size of the ballast pile and orientation of the site did not preclude it from being one of the Dutch vessels, potentially: *de Gouden Star* (28 guns), *Popkesburg* (24 guns), or *Leyden* (34 guns). In 2012, Dr. Batchvarov, Dr. Hocker and Wes Hall used probing to relocate the ballast pile; it measured 10.5 meters wide by 28.5 meters long and was buried beneath deep sediment (Paterniti, 2012).

The underwater landscape within Scarborough Harbor is dynamic and diverse. TRB-1 lies in a region of high siltation. The river mouth north of the site delivers large amounts of sediment into the bay during rainstorms. The currents created by the large breakwater to the east also contribute to deposition. Additionally, sediment displaced east from the ferry corridor collects on the site. The deposits result in fine, supersaturated silt that instantly clouds the area when disturbed. Beneath the supersaturated silts,

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we encountered a layer of hard, compacted mud containing modern trash. This stratigraphic layer directly overlies the TRB-1 Hull remains.

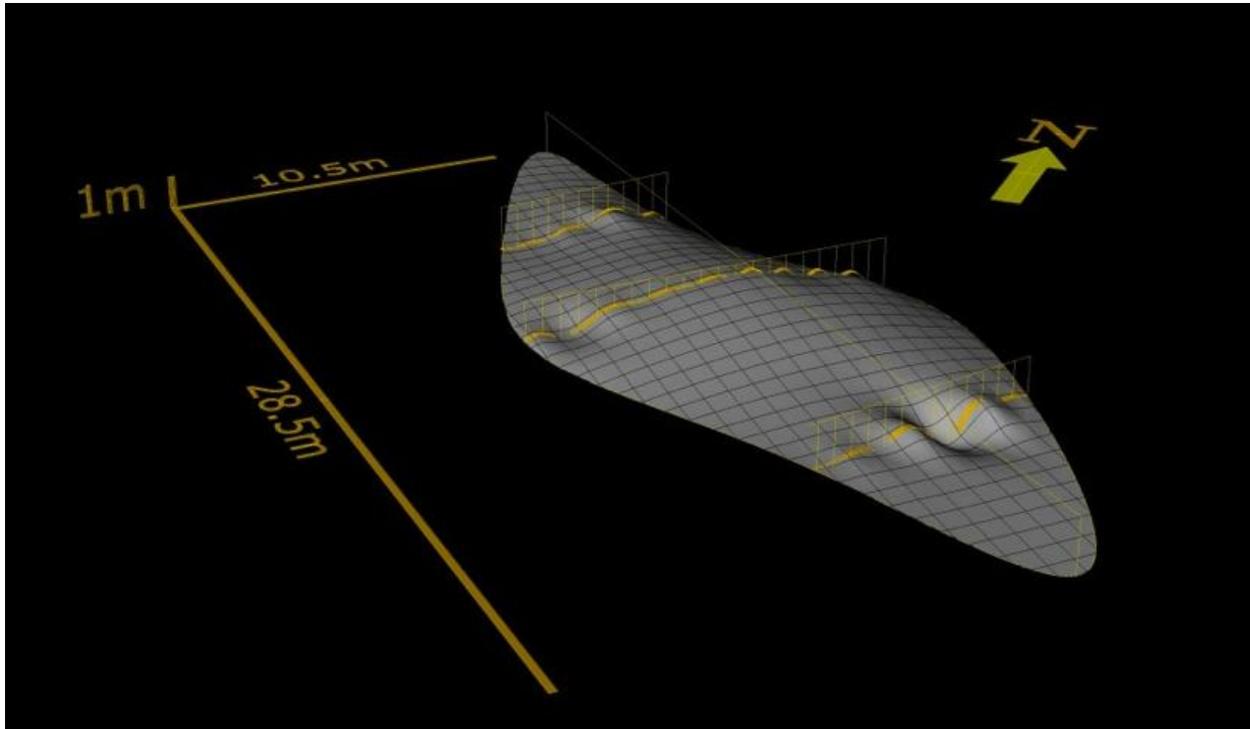


Figure 29: Rhino model of the TRB-1 ballast pile. The three probing transects are shown. (Created by Fred Hocker).

We used probing to identify one of the trenches previously excavated by HDC/MRT. Our team opened a roughly three by three meter square in the soft sediment. The sediment was over a meter and a half deep and required extensive layback, so a much more limited portion of the wreck was uncovered. During excavation, we encountered a number of the tags originally placed by HDC/MRT, 19th century bricks (probably from backfilling) as well as a great deal of modern trash. The mud directly overlaying the timbers was so compact that it could be peeled up off the frames. The extent of the HDC/MRT trench was clearly defined; ballast covered the unexcavated timbers while exposed frames still retained their tags. As Trench A primarily contained ceiling planking (McKewan 2006, 13), we concluded we were within Trench B. This was fortunate, as there is no published illustration of the structure encountered in Trench B.

Dr. Nigel Nayling collected dendrochronological samples from all exposed timbers. The samples were analyzed at the mobile dendrochronological lab. All samples were subsequently reburied in a pit beside the keel, in plastic bags with artifact tags. The timber was not in prime condition. Despite a large number of samples, only a few had enough rings to be accurately assessed. Preliminary attempts to date the vessel were inconclusive, though additional analysis is being conducted in England. The timbers did not match established English or Continental European chronologies, so other possibilities are being

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explored. TRB-1 has extensive wood remains, and other sections of the wreck may provide better data. The wide ceiling planks have potential, and continued excavation of the wreck is recommended.



Figure 30: Kroum explains his underwater notes concerning TRB-1's remaining hull structure.



Figure 31: Dr. Nayling (left) analyses a sample from one of the ships timbers. A high-power lighted microscope (right) is used to count individual tree rings.

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II. Site TRB-2

TRB-2 is a complex, multi-component site lying between the Ferry Jetties. It includes a 17th century cannon and two 17th or 18th century anchors. The jet wash from the ferries has dispersed most of the sediment from the area, exposing a great number of artifacts. Approximately 1 to 5 cm of sediment remains. The seafloor is covered with an assemblage of 19th century bricks, bones from butchered animals, rigging elements, bottles dating to the 18th and 19th centuries, 18th and 19th century pipes, crude earthenware, stoneware, tile, and 19th century blue-and-white transferware. There are deposits of water rounded pebbles (possibly shingle ballast) throughout the site. Larger ballast stones are found in concentrations.



Figure 32: Bricks, concretions, pottery, bottles and even rigging elements were dispersed over a wide area (left). Veronica (right) displays a small sheave recovered from the bottom for recording.

The redware, transferware, bottles, bones, single ballast and bricks are not unique to the TRB-2 site. Survey transects across the harbor bottom revealed that these types of artifacts are ubiquitous south of the main ferry jetty. The exact extent of dispersal is not known, but deposits continue for several hundred meters. Even in areas covered by thin layers of silt, hand fanning revealed water rounded pebbles (possibly shingle ballast) and redware deposits. The source of the bricks is most likely a 19th brick carrier that reportedly wrecked in the harbor and spilled its contents seaward. The dispersed ballast, pottery, bones and bottles are likely remnants of the 1790 and 1847 hurricanes.

The survey grid around TRB-2 was destroyed just weeks after it was erected. Sailboats attempting to moor in the harbor dragged their anchors through the site on three known occasions. The anchors ripped up the gridlines and further damaged the integrity of the site. Our team had not anticipated that mooring would be a factor in site degradation, as TRB-2 lies within ferry corridor. However, we observed private yachts dropping anchor directly in front of the ferry on multiple occasions. While the ferry jet wash exposes artifacts on the bottom, dragging anchors probably play a significant role in their

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destruction, and should be considered amongst the factors putting the site at risk. It is possible that the swivel gun observed in March 2013 was dragged offsite by anchoring.

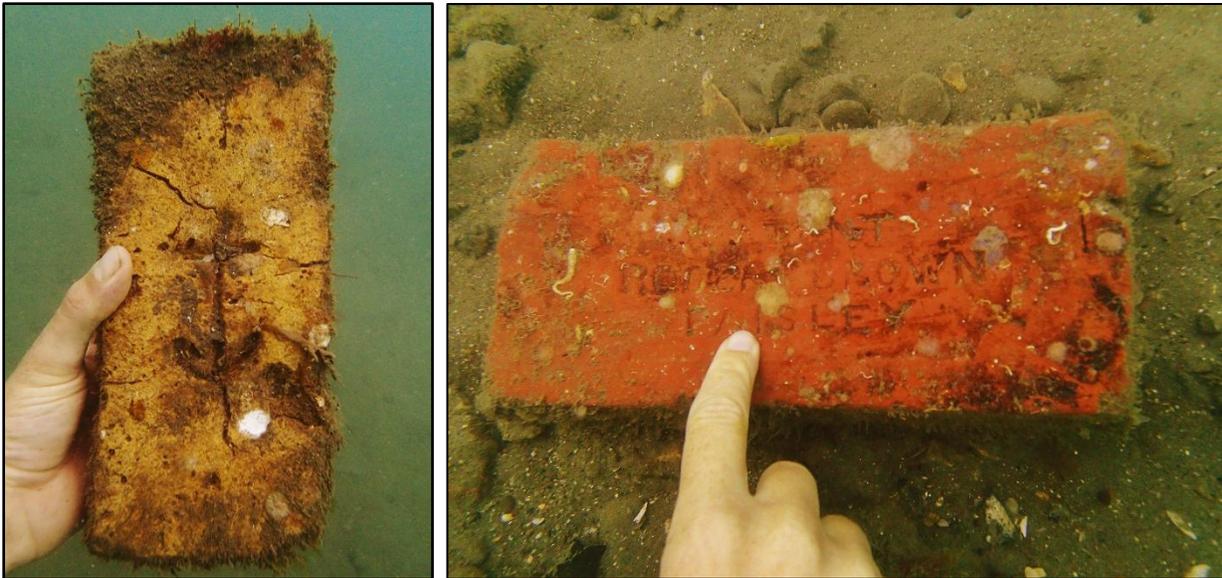


Figure 33: Diagnostic bricks an Anchor (left) and Patent Robert Brown Paisley (right) brickyards marks.



Figure 34: Bottles and pottery lying just outside the grid (left) as well as 19th century bricks and an ornate pipe from TRB-2.

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Despite the prevalence of 18th and 19th century material, our team decided to investigate TRB-2 because both the cannon and the anchors potentially dated to the 17th century. Our team had identified a swivel gun at the site in 2012, but we were not able to relocate it in 2013 (Paterniti, 2012).

Our team set out a 15 m by 15 m survey grid position to include the cannon and one of the anchors. It provided a systematic way to record and plot surface finds. Each grid square was divided in sixteenths. We used DSM to precisely map diagnostic material, the anchor and the cannon. Significant surface finds included a number of pipe bowls with maker's marks, 19th century blue and white transferware, bricks with brickyard marks, glass and stoneware bottles, as well as plate fragments from the wreck of a mail packet.



Figure 35: Veronica (right) investigates the TRB-2 cannon's trunion, wrapped with wire from a modern salvage attempt. The cannon was dropped on site next to a pile of bricks (left).

The bricks in the array directly in front of the muzzle were unmarked, but likely date to the 19th century. Our working hypothesis is that they were part of a brick pallet or the remnants of the flooring around a stove. The cannon had been dropped next to the bricks on a jumble of 19th century artifacts. We elected to conduct test excavations along the north face of the cannon to see if we could identify any diagnostic 17th century material beneath the 19th century deposits.

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The TRB-2 cannon was in secondary context next to an *in-situ* array of thick yellow bricks. We found steel wire wrapped around the cannon's trunions, strong evidence of an attempt to lift it, most likely made in the last few decades. We do not know where it originated from, or how far it had traveled.

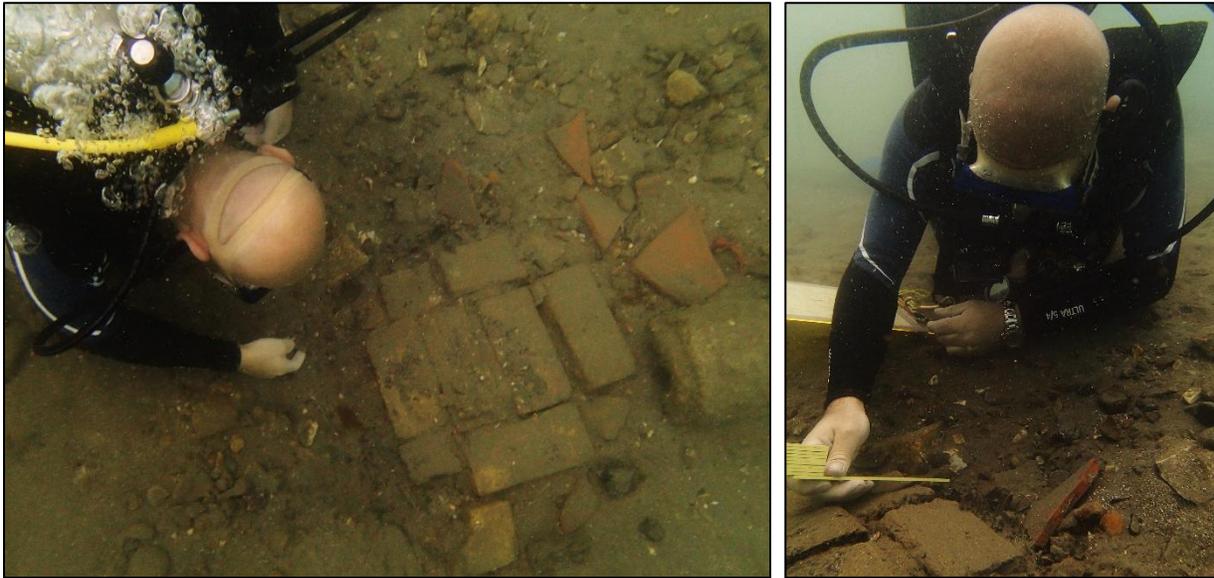


Figure 36: Kroum investigates the bricks in front of the TRB-2 cannon's muzzle.

Excavation revealed deposits of shingle ballast, butchered bones from both cows and medium sized mammals, a layer of crushed red earthenware tile or pottery, blue and white transferware, exfoliating glass, concreted bolts and nails, iron barrel hoops or box straps, and the degraded fragments of a wooden container. Within these deposits, our team uncovered an English penny. The face had a crown above the London arms, while the reverse showed the date 1827 and a crown above the W of King William.

Excavation of TRB-2 was discontinued so that the team could focus on excavating the hull remains from TRB-1. The TRB-2 site requires additional work. Our team was unable to reach the bottom of the 19th century deposits in the time allowed. TBR-2 has been heavily impacted, and the site formation process has been complex, involving salvage, two hurricanes, a battle, harbor dredging, and marine traffic. The array of bricks should be investigated, as well as the anchors. The swivel gun needs to be relocated; it is possible, however, that it was dragged off site by an anchoring vessel (like our grid) or salvaged illegally.

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Figure 37: An 1827 English penny from TRB-2; the reverse shows a crown above the London arms.

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III. Site TRB-3

Site TRB-3 consists of an isolated cannon, possibly dating to the 17th century. It was initially identified as a potential wreck site in 2012. TRB-3 is located just southeast of the long, western cruise ship jetty. It lies northeast of the TRB-4 ballast pile. The jet wash from the ferries has dispersed some of the sediment from the area, leaving approximately 5 to 10 cm of deposits. The site is at the perimeter of the ferry pivot point, so scouring is not as extreme as at TRB-2. Surface finds in the vicinity included 19th century bricks, 18th and 19th century bottles, concreted bolts and machinery, as well as fragmentary pipes and ceramics. There are deposits of water rounded pebbles (possibly shingle ballast) throughout the site.



Figure 38: Mike (left) examines a broken pipe found in the deposits surrounding the TRB-3 cannon (right).

Our team made several unsuccessful attempts to relocate TRB-3. The cannon was finally encountered during a radial search by UCONN students Cassie Devney and Tom Lacey on their final dive of the season. Between the 2012 and 2013 seasons, sediment had buried the gun, leaving only a portion of the muzzle visible. A stonefish had made its home within the muzzle; it was promptly encouraged to leave for safety reasons.

Our team excavated a narrow trench around the gun so that it could be precisely recorded. Once the cascabel was uncovered, we could see the button had been impacted at some point in time. The button was distorted and missing 5 cm of material from the right side. Deposits around the gun were primarily pebbles mixed with compact silt. Excavation revealed a couple pipe fragments, brick, glass, and a few sherds of stoneware and blue and white transferware. A short, forked iron rod was also encountered. Artifact density was sparse.

The TRB-3 cannon was in excellent condition. Marine growth and concretion were limited, except around the permanently exposed muzzle. We thoroughly documented the gun and collected both photographs and video for SfM. We reburied the gun beneath a blue to discourage marine growth.

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Figure 39: The TRB-3 cannon, mid excavation.

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Figure 40: The exposed cascabel and damaged button.

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Conclusions:

The Rockley Bay Research Project met its 2013 expedition season objectives, and made significant progress toward the overall project objectives. Our team has cooperated with the Tobago House of Assembly to conduct a professional archaeological expedition in Scarborough Harbour and to lay the groundwork for a new conservation facility. The RBRP team investigated four sites identified in 2012 and March 2013 to determine if they contained 17th century components. We recorded associated archaeological material and evaluated the threats to site integrity. Our team focused on excavating TRB-1, recorded its hull structure and collected dendrochronological samples. During this process, we trained university students in underwater archaeological field methods and collaborated with local stakeholders.

Preliminary results indicate that TRB-1 may not be a 17th century wreck. Although numerous dendrochronological samples were collected, they did not match known chronologies. Initial evaluation of the hull structure suggest that the ship was not constructed in the Dutch fashion, and very likely postdates the 17th century. The results of our investigation will be professionally published and shed light on previous cursory reports. TRB-2 is a complex multi-component site. No additional evidence for a 17th century shipwreck was encountered during investigation. The cannon, which probably dates to the 17th century, was deposited on site during a modern salvage attempt. If there is a 17th century component to TRB-2, it is likely buried deep beneath 18th and 19th century material. Excavation at TRB-3 allowed our team to document the cannon, which is similar to the TRB-2 cannon and also likely dates to the 17th century. No evidence of hull structure was encountered at either TRB-2 or TRB-3.

The primary objective of the RBRP is to locate and survey 17th century shipwrecks associated with the Franco-Dutch naval battle of 1677. Local informants and previous archaeological work by both Wes Hall and Heritage Development Consultants indicated that TRB-1 and TRB-2 might be 17th century wrecks. Our investigation did not confirm these assessments. The next stage of the Rockley Bay Research Project will be to conduct a thorough survey Scarborough Harbour, assess Site TRB-4, and relocate sites along both the ferry jetties and the Navy station jetty where construction cut through ship remains. We look forward to continued collaboration with the people of Tobago to investigate and preserve this important heritage site.

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Works Cited:

- Batchvarov, D. K. (2011). *Proposal for the Archaeological Investigation of Shipwrecks in Scarborough Harbour, Tobago*. Avery Point: University of Connecticut.
- Batchvarov, D. K. (2012, 18 June). (J. Paterniti, Interviewer)
- Bowens, A. (2009). *Underwater Archaeology The NAS Guide to Principles and Practice*. West Sussex: Blackwell Publishing.
- Goslinga, C. C. (1971). *The Dutch in The Caribbean and on the Wild Coast: 1580 - 1680*. Gainesville, Florida: University of Florida Press.
- Hall, W. (1999). *Phase 1: A Marine Magnetometer Survey and Submerged Cultural Resource Reconnaissance of Rockly bay and Scarborough Harbour, Tobago*. Castle Hayne, North Carolina: Mid-Atlantic Technology and Environmental Research, Inc.
- Hall, W. (2012, 06 19). (J. Paterniti, Interviewer)
- Hocker, D. F. (2012, June 14). (J. Paterniti, Interviewer)
- McKewan, L. (2006). *Scarborough Harbour Internation Project*. Nautical Archaeological Society.
- NAS. (2010). N.A.S. Part III Underwater Surveying. Nautical Archaeology Society.
- Paterniti, J. (2012). *The Explorers Club Flag 117 Report: Archaeological Exploration of Shipwrecks in Trinidad & Tobago, 14 June, 2012 – 24 June, 2012*. New York: The Explorers Club.
- Shomette, D. G. (1994, April 1). Private communications with Wes Hall.
- Woodcock, H. I. (1866). *A History of Tobago*. Port of Spain, Trinidad: Columbus Publishers Ltd.

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