OCS Study
BOEM 2015-030

Virginia Collaborative Archaeological Survey

US Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

US Department of Commerce
National Oceanic and Atmospheric Administration
Office of National Marine Sanctuaries

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Authors

Brandi Carrier
Joseph Hoyt
William Hoffman
Doug Jones
John McCord
Kara Fox
William Sassorossi

Prepared Collaboratavely under BOEM IA M14PG00007 by

BOEM's Office of Renewable Energy Programs
45600 Woodland Road, Sterling, VA 20160

and

NOAA's Office of National Marine Sanctuaries
100 Museum Drive, Newport News, VA 23606

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ACKNOWLEDGEMENTS

The team of the 2014 Virginia Collaborative Archaeological Survey wishes to acknowledge the contributions of the following individuals, without whom the investigations could not have been accomplished.

Mr. John McCord, Education Programs Coordinator at University of North Carolina Coastal Studies Institute, directed and produced an outstanding educational video that will support the missions of both BOEM and NOAA long after this project is archived.

Captain Pasquale DeRosa of Cardinal Point Captains consistently conducted our operations safely, efficiently, effectively, and enjoyably. It is no small effort keeping a vessel and its scientists happy and operating smoothly and we remain grateful to Captain DeRosa.

The staff and administrators of Nauticus provided docking for the survey vessel in downtown Norfolk, Virginia. This location both greatly reduced the expense for the survey and provided the unique opportunity for BOEM and NOAA to showcase this work during a dockside public event in August 2014. We offer our sincerest thanks to Nauticus for this generous hospitality.

INTRODUCTION

With the passage of the Energy Policy Act of 2005, the Bureau of Ocean Energy Management (BOEM) acquired regulatory authority for renewable energy activities on the Outer Continental Shelf (OCS), including wind energy development. As part of this responsibility, BOEM conducts detailed environmental analyses of projects proposed for development. The potential direct, indirect, and cumulative impacts on the human, coastal, and marine environments must be evaluated in order for BOEM to make environmentally sound decisions about managing renewable energy activities and developing mitigation measures to avoid or minimize impacts.

BOEM's overarching strategic goal is to achieve expeditious and orderly development of resources, while minimizing impacts on the environment and developing and employing sound science and partnerships. As such, BOEM joins its need to gather baseline data with efforts to leverage partnerships with other Federal agencies, state agencies and universities, and tribal governments. Doing so creates efficiencies in BOEM's processes and reduces expenditures; builds relationships that will extend these efficiencies and cost reductions into the future; and provides needed data to inform sound decision-making in the present.

BOEM has issued both a Section 238 research lease and a commercial wind energy lease offshore Virginia near and within the Virginia Commercial Wind Energy Area. BOEM needed baseline data for these areas in order to make sound decisions about how to minimize impacts, to form post-construction comparisons during monitoring of environmental changes that might be discernible later, and to meet its responsibilities under the National Historic Preservation Act (54 United States Code (U.S.C.) 306101(a) and 306102). Previously identified geophysical targets (side scan sonar contacts and magnetic anomalies) and listings in BOEM's Atlantic Shipwreck Database in these areas could prove to be archaeological resources that should be avoided, or they could prove *not* to be resources and therefore should not prevent development. Archaeological ground-truthing of these targets was therefore necessary for informed, responsible decision-making and to consider the effects of BOEM's undertakings subject to 54 U.S.C. 300101 et seq.

To meet these needs, BOEM invited the National Oceanic and Atmospheric Administration (NOAA) to collaborate on an archaeological investigation near and within the Virginia Commercial Wind Energy Area (Figure 1). This afforded BOEM and NOAA the unique opportunity to explore both geophysical targets within the Virginia Commercial Wind Energy Area as well as another recently identified anomaly of archaeological interest positioned nearby the Wind Energy Area.

In 2013, NOAA Office of Coast Survey (OCS) was conducting a routine hydrographic survey off the Virginia Capes. During the course of the survey, an un-charted acoustic anomaly was recorded with mutlibeam and sidescan sonar. The imagery suggested possible cultural material and was shared with NOAA and BOEM archaeologists for further assessment. This anomaly, which lies in approximately 30 meters (m; (100 feet [ft]) of seawater 48 kilometers (km; 26 nautical miles [nm]; 30 statute miles [mi]) off Virginia Beach, became a second priority for this project while anomalies in and near the Virginia Commercial Wind Energy Area remained the primary priority.

The Virginia Collaborative Archaeological Survey is the result of two ocean agencies working in concert to achieve multiple missions. NOAA provided scientific and technical advice and services, shared resources, and assisted BOEM with conducting and analyzing the resulting data. BOEM contributed funds and scientific personnel as well as public affairs support. Both agnecies shared equipment and expertise for mutual benefit, and for the protection and stewardship of our shared maritime heritage.

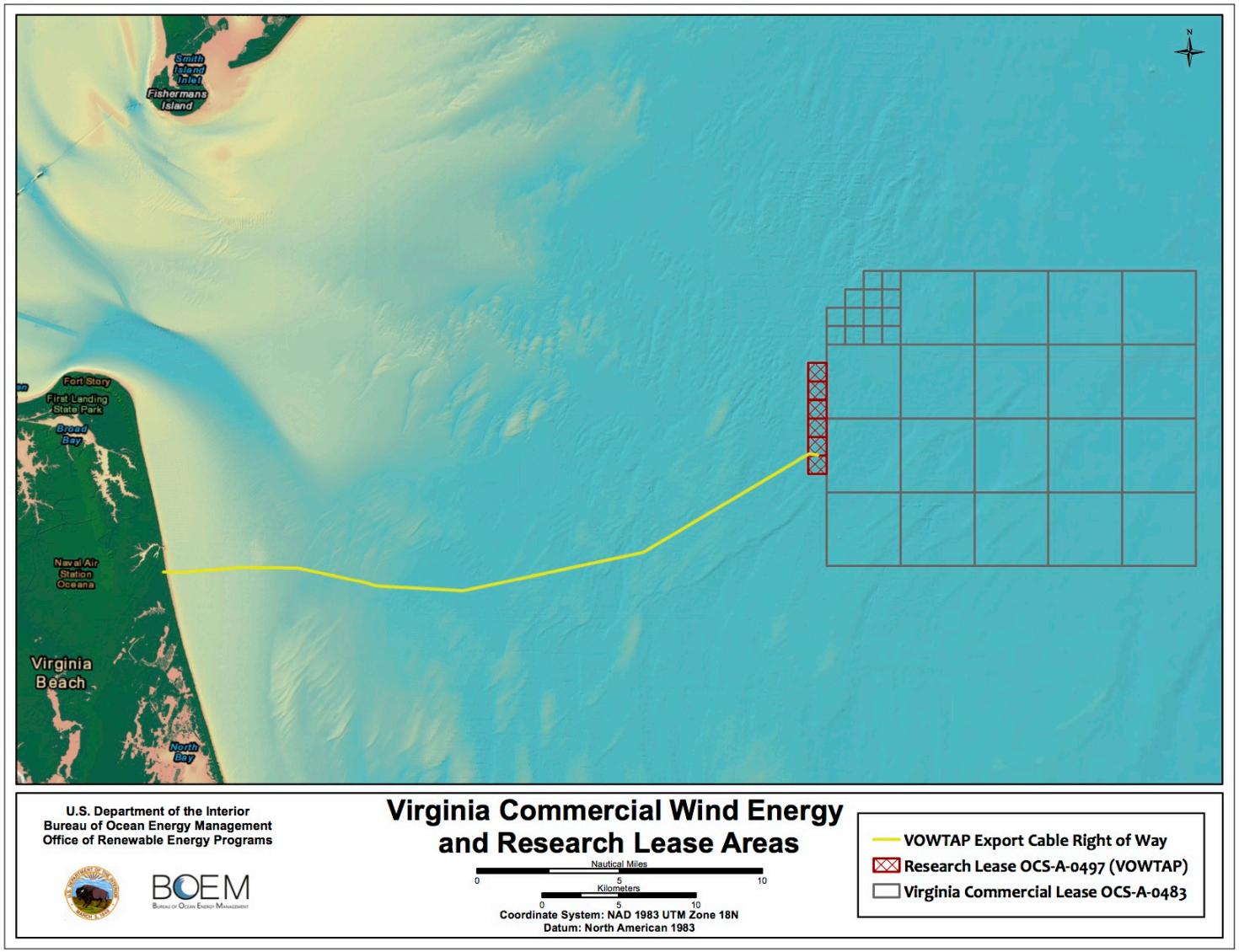

Figure 1. Chart depicting Virginia Commercial Wind Energy Area and Research Lease Area

OBJECTIVES

Research objectives of the investigation focused on obtaining preliminary baseline archaeological data near and within the Virginia Commercial Wind Energy Area in order to inform future decision-making. Specifically, objectives included ground-truthing, via geophysical survey and diver investigation, targets of potential archaeological interest that had been identified through previous geophysical surveys in and near these geographic areas or had been listed in BOEM's Atlantic Shipwreck Database. The agencies worked together to finalize a research design to achieve these goals and objectives, to collaboratively perform the survey and investigations, to analyze results, and to produce this joint report.

As discussed above, the priority objective for the investigation was to assess anomalies within and around the Virginia Commercial Wind Energy Area. Predominantly, the focus was to gain a better assessment of targets listed within the Atlantic Shipwreck Database and identified in two previous surveys: first, the Virginia Offshore Wind Technology Advancement Project Research Activities Plan, conducted within the Virginia Research Lease Area (Schmidt et al. 2014), and secondly, during a study jointly funded by BOEM and the Commonwealth of Virginia, conducted within the Virginia Commercial Wind Energy Area (McNeilan, Smith, and Fisher 2013). Efforts were focused on ground-truthing and characterizing acoustic and magnetic anomalies from these two surveys and their accompanying datasets and relocating Atlantic Shipwreck Database entries if possible. A secondary priority was to ground truth, record, and potentially assess the significance of the hydrographic survey target identified by NOAA OCS north of the Virginia Commercial Wind Energy Area, based on criteria for inclusion on the National Register of Historic Places.

Research Design

The research design identified several tasks to achieve these objectives. Where possible, these included:

1. Collect high resolution side scan sonar imagery of each identified priority target;
2. Conduct concurrent magnetometer survey of each identified priority target to characterize the anomalies for further assessment, if deemed valuable;
3. If warrented, based on the results of the remote sensing data, conduct diver investigation of the targets;
4. Identify to what degree archaeological site preservation is influenced by environmental formation processes and anthropogenic impacts; e.g. determine whether the site has been subject to post-deposition looting or disturbance due to trawling activity; Complete a rapid assessment and visual exterior survey of each archaeological resource;
5. As conditions allow, produce a cursory site map (or photomosaic) of each archaeological resource for interpretation and as a representation for use in potential follow-up inquiry;
6. Complete video and photographic surveys of identified archaeological resources;
7. Determine whether or not the archaeological resource warrants further investigation; and,
8. Assess the historical significance and archaeological integrity of each confirmed archaeological resource, and, if possible, determine if any identified archaeological

resource possesses the characteristics of significance making it eligible for listing on the the National Register of Historic Places.

In order to achieve these objectives, the survey methods were designed to recover data that would potentially identify each archaeological resource, and may contribute to later nomination to the National Register of Historic Places, if warranted.

Scope and Limitations

The research design provided detailed boundaries for the scope of the project. This project was not designed to be a completely comprehensive investigation, and should be viewed as a preliminary baseline assessment upon which future research can be founded, if deemed necessary by BOEM or NOAA. Without this baseline information, however, it is difficult to know what questions to ask because the resource is generally undefined until this type of survey is completed. So the questions posed in this project are of a general nature with the intent to provide a more solid basis for formulating more advanced questions.

As with any project, certain limitations are present that are taken into account in preparing the expedition. Fiscal constraints limit the amount of time and the availability of resources, which typically governs the duration of the project. As weather conditions off Virginia vary, predicted days of inactivity are built-in and personnel process collected data sets during this time. This particular survey enjoyed exceptional weather conditions, which allowed for extensive data collection and no forced down days.

Additionally, certain site locations also pose limitations underwater. High and variable currents may be present, and visibility may range from zero to more than 15 meters (m; 50 feet [ft]). These factors produce differing degrees of in-water efficiency from day-to-day. Furthermore, the depth of the sites, ranging from 21 to 40 m (70 to 130 ft), greatly limits the amount of time that can be spent on-site each day. While currents and sea-state were mild on this project, many sites did encounter poor but workable visibility.

Finally, the survey was limited to exterior observations only. In addition, the research team did not conduct any exterior work that would impact or disturb the site in any way. This precluded establishing permanent baselines or removing or manipulating anything on-site.

METHODS

The Virginia Collaborative Archaeological Survey was conducted between 27 July and 10 August 2014. Designed as an archaeological investigation cruise, the survey collected acoustic and magnetic data on selected geophysical targets with archaeological potential located within and near portions of the Virginia Commercial Wind Energy Area, as well as performing diver investigation with photography and videography as appropriate. Field operations consisted of at sea operations from NOAA's SRVx *Sand Tiger* platform, a 26-m (85-ft) research vessel which also provided berthing for crew; high-resolution side-scan sonar and magnetometer survey of anomalies; and sector scanning sonar of anomalies. Field operations also consisted of joint BOEM/NOAA diving operations appropriate to the area of investigation including recording observations, photography, and videography. Finally, at the conclusion of field operations, BOEM and NOAA held a joint dockside public engagement event aboard the NOAA vessel in Norfolk, VA.

Target Prioritization

This project focused primarily on gaining higher resolution, diagnostic data on targets that originally were acquired in broader, lower-resolution surveys. The previously collected survey data and recommendations of original surveyors were analyzed by archaeologists to prioritize anomaly investigations. Original surveyor analysis was given qualitative evaluation and acoustic data were assessed quantitatively based on factors of size, shadow and reflectivity. This qualitative assessment included length, size of acoustic shadow, and reflectivity. Small size designation was given to targets less than 5 m (16 ft) in length; medium targets ranged from 5 to 10 m (16 to 32 ft) and large targets are over 10 m (32 ft). The same parameters were used to sort the size of the acoustic shadow. Reflectivity was assessed at either low or high based on visual observations. This method for assessing targets was designed to increase the possibility of identifying archaeological materials and providing data sufficient to assessing the significance of those remains. While the project attempted to assess as many sites as possible, priority anomalies from the original surveys were selected and given preferential focus, followed by the investigation of remote sensing targets that were located in the vicinity of previously reported sitesin BOEM's Atlantic Shipwreck Database.

Archaeological Methodology

Archaeological methods consisted of remote sensing survey (including side scan sonar, sector scanning sonar, and magnetometer survey) and in-water, diver investigation of sites through rough site sketches, recording diagnostic hull features, intensive video and photo documentation, and documentation of artifacts in situ, if observed. Due to the sites' dynamic environment and the nature of this non-invasive survey, permanent baselines were not established at the sites, though temporary tapes were carefully used by non-invasive means to measure approximate hull dimensions and site boundaries.

Divers were assigned specific tasks to document and record at each site. A photographic/video survey was conducted to document artifacts, ordnance, and diagnostic features of the site. The photographic/video documentation includes the outer hull structure, diagnostic structural features and any damage or degradation to the hull structure, as well as

artifacts in situ. At no point during the survey was the hull structure or any feature of the resource altered. Diving operations were conducted in a 'live boat' mode. This method eliminated the need for anchoring and mitigates the possible impact of anchoring into an archaeological resource.

All survey goals were designed to determine if the remote sensing targets of interest represent archaeological resources, to recover preliminary data, to document any archaeological sites identified, to assess the need for further investigation of a site, and to consider potential National Register of Historic Places eligibility of a site. The methodology employed to accomplish these goals is outlined as follow:

Remote Sensing Survey

1. Conduct targeted sidescan survey of priority targets
    a. Perform high-frequency 600khz acoustic surveys of each site with Klein 3000 sonar
    b. Post-process each survey to generate georectified (.tfw)
2. Conduct targeted magnetic survey of priority targets
    a. Perform magnetometer survey with Geometric G882 cesium vapor magnetometer.
    b. Post-process magnetometer data to produce comprehensive contour maps of target areas.
3. Collect site imagery using Sector Scanning Sonar
    a. Collect targeted surveys of individual sites using a Kongsberg Mesotech 1000 sector scanning sonar
    b. Post-process sonar imagery of sites to best reflect site characteristics.

In-Water Documentation

1. Documentation of the sites by observing and recording diagnostic features
    a. Identify and record diagnostic structural features such as deck machinery, hatches, etc.
    b. Identify and record hull damage due to the sinking event, if evident
    c. Identify and record hull damage caused to the sites post-sinking due to natural and/or man-made causes, if evident
    d. Identify and record the presence of exposed artifacts within the sites immediate vicinity
    e. Identify, record, and determine the extent of hazardous material remaining on the site while maintaining all safety protocols
2. Intensive video and photo documentation of the hull and diagnostic features
    a. Video/Photograph hull and diagnostic hull features from all angles
    b. Video/Photograph diagnostic artifacts from all angles with scaling device
3. Document artifacts, and any hazardous material, *in situ* showing their spatial relationships viz a viz the rest of the shipwreck
    a. Video, measure, and record exposed artifacts, and hazardous material *in situ*, and their relation to the rest of the site
    b. Identify artifacts with diagnostic features and makers' marks

Assessment

1. Identify the sites and make recommendations for future management
    a. Identify sites name and type
    b. Assess if historical accounts coincide with archaeological interpretations
    c. Assess whether additional fieldwork is needed
    d. Evaluate potential National Register of Historic Places eligibility, if possible.
    e. Make suggestions for public interpretation
2. Determine if remaining artifacts are threatened and/or have historical significance
    a. Identify artifacts of historical significance or unique type
    b. Evaluate danger to artifacts if left undisturbed
3. Determine if there are environmental hazards remaining at the sites and make recommendations for their possible removal or neutralization
    a. Identify environmental hazards at the site and contact the appropriate federal government oversight agency (*i.e.* U.S. Coast Guard)
    b. Identify ordnance at the site and contact the U.S. Navy, and NOAA General Consul
    c. Make recommendations for the possible removal or neutralization of any environmental hazards that balances public safety with preserving the historical significance and integrity of the site
4. Determine the site stability and integrity of each site and make recommendations for its long term preservation
    a. Assess site damage and determine if it was caused by the sinking event or post-sinking
    b. Evaluate post-sinking hull damage/alterations and determine causes based on environmental and cultural considerations.
    c. Evaluate long-term hull integrity and make recommendations for site preservation

In planning for factors beyond control (*e.g.* inclement weather, equipment breakdown, personal illness, poor visibility on the site, etc.) the task list is designed to provide flexibility and adaptability. Dive tasks could require a single dive or multiple dives, but each task is related to a discrete objective.

Operating within the conditions outlined above the archaeological investigation of these sites produced useful results. These environmental parameters establish the conditions that are potential detractors on site and may have impact on the work conducted. The diving procedures also govern the scope and practicality of each goal set forth. Ultimately the research questions and goals, in tandem with these other limitations and conditions, guided the project. These conditions are important to understand in order to be able to address these conditions as they are encountered.

Personnel and Roles

SRVx Sand Tiger has twelve berths, typically allowing for eight scientists and four vessel crew. The following individuals participated in the VCAS investigation:

1. Brandi Carrier – BOEM: Co-PI
2. Joseph Hoyt – NOAA: Co-PI

3. William Hoffman – BOEM: Maritime Archaeologist
4. Doug Jones – BOEM: Maritime Archaeologist
5. Dave Sybert – CSI: Photo and Video
6. John McCord – CSI: Photo and Video
7. Vitad Pradith – NOAA: Remote Sensing Specialist
8. Jason Nunn – CSI/ECU: Diving Safety and Logistics
9. Matt Weis – Crew
10. Zac Scott – Mate
11. Pasquale DeRosa – Captain

RESULTS

From among the highest priority targets, five sites were chosen for further investigation during the first deployment: Targets CR001, CR002, CR049, LA001, all originally identified during survey in support of the Virginia Offshore Wind Technology Advancement Project (Schmidt et al 2014; VA DMME 2014); and OCS Wreck, identified by NOAA OCS. Based on expected time available and level of recording desired, geographic location and distance between the targets, and forecasted weather conditions, it was estimated that these targets could be examined in a single three to five day deployment, beginning on 29 July 2014. Targets chosen for further investigation during the second deployment included Targets 92, 143, 144, and 159, all originally identified during a regional-scale study partly-funded by BOEM and the Commonwealth of Virginia (McNeilan, Smith, and Fisher 2013). Finally, several targets were selected from historic records and BOEM's Atlantic Shipwreck Database for investigation during the remaining time available to the investigation, including the *Middle Ground Wreck, Santore, John Morgan, and Kingston Ceylonite.*

Target CR001

As originally identified, Target CR001 was described as having only a magnetic signature with no collocated side scan sonar or subbottom profiler anomalies. Located at a depth of 15.5 m (50 ft) mean lower low water (MLLW), the target comprised one magnetic anomaly exhibiting high amplitude (193.38 nanoTesla [nT]) and medium duration (42.8 m [140 ft]) with a dipolar profile (Schmidt et al 2014).

Due to the possibility of shifting sands, the location was resurveyed on 29 July to determine if an acoustic anomaly was observable. The sidescan sonar imagery collected by the VCAS team did not reveal any discernable features on the seabed at the site of CR001, and thus diving operations were not planned. It is possible that a man-made or cultural object remains obscured beneath the seabed. Magnetic contour analyses suggested that the target possesses characteristics that might represent a potential submerged archaeological resource and this investigation did not alter that conclusion. Avoidance is recommneded of Target CR001 by a distance of 50.0 m (164 ft) unless additional investigations confirm the absence of sub-seabed archaeological resources at this location.

Target CR002

As originally identified, Target CR002 was described as a single side scan sonar anomaly comprising two objects; no collocated magnetic or subbottom profiler anomalies were identified. The first object, measuring 8.2 x 2.6 m (27.9 x 8.5 ft) was described as having a rounded end that tapered into a point. The second object was oblong and measured 2.9 x 1.3 m (9.5 x 4.3 ft). The objects' acoustic shadows indicated that there was at least 0.3 m relief and it appeared that the first object was attached to the oblong object. There also was evidence of scour. Acoustic analyses indicated that Target CR002 exhibited the characteristics of a submerged cultural resource, such as a shipwreck and avoidance of Target CR002 by a minimum distance of 50.0 m from its center point was recommended (Schmidt et al 2014).

The location of Target CR002 was resurveyed on 29 July, to reacquire the location for sector scanning sonar and diver investigations. Sonar imagery revealed a small acoustic anomaly with a

hard return, consistent with the original survey (Figures 2 and 3). As a result, diving operations were conducted on 2 August to identify the object. Diver observations along with video and still imagery revealed the target to be a large concrete block with a chain trailing out into the sand (Figure 4). Given its proximity to the shipping channel, it is hypothesized that this is an old channel marker mooring block that does not possess the characteristics of significance for listing on the National Register. No futher investigations of Target CR002 are recommended and no avoidance is recommended.

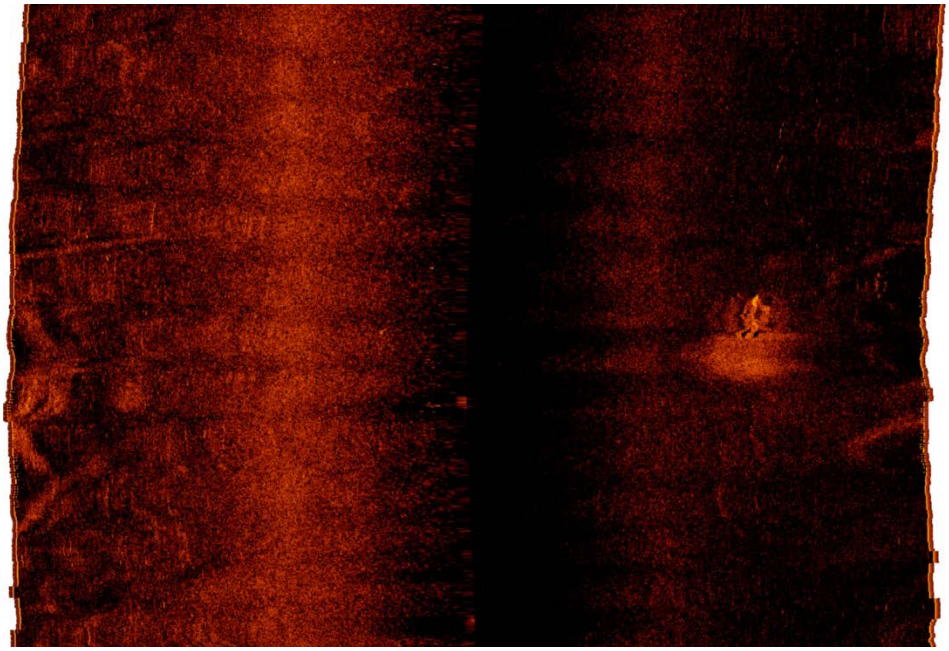

Figure 2. Side scan sonar image of Target CR002.

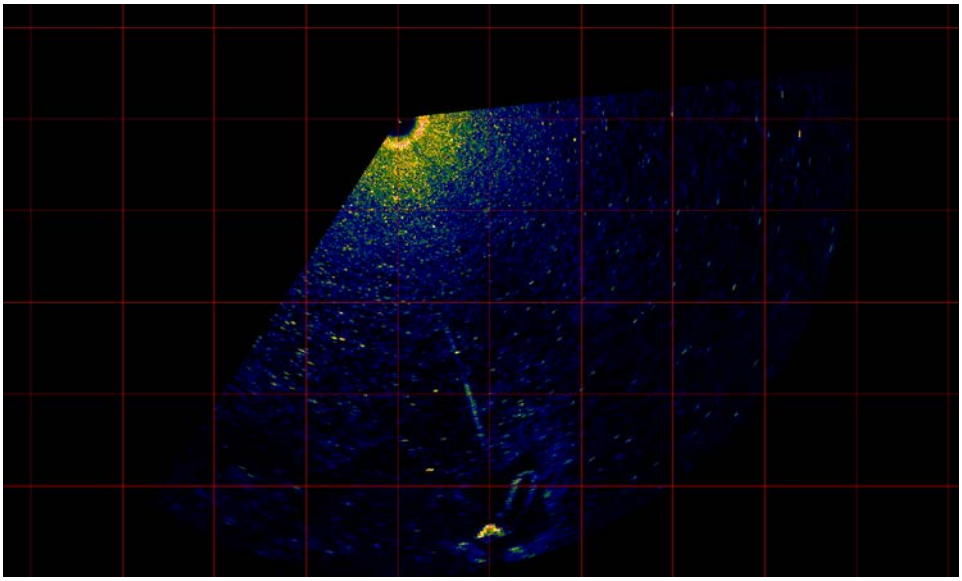

Figure 3. Sector scanning sonar image of Target CR002.

Figure 4. Photograph depicting Target CR002, a concrete mooring block.

Target LA001

As originally identified, target LA001 is described as comprising two magnetic anomalies located in BOEM Lease Block 6111, Aliquot H, at a depth of 24.5 m (80.3 ft). No collocated side scan sonar or subbottom profiler anomalies were associated with this target. The first magnetic anomaly exhibited medium amplitude (55.45 nT), medium duration (28.7 m [94.2 ft]) and a dipolar signature. It was recorded with a sensor height of 3.27 m (10.73 ft). The second anomaly comprising Target LA001 exhibited low amplitude (27.58 nT), medium duration (33.8 m [110.9 ft]), and a dipolar signature. It was recorded with a sensor height of 5.12 m (16.8 ft). The magnetic characteristics of Target LA001 as identified in the original survey represent a potential submerged cultural resource (Schmidt et al 2014). As a result of its review of these data, BOEM will require an avoidance of at least 50.0 m (164.0 ft) from this target.

Due to the possibility of shifting sands, the location was re-surveyed to determine if an acoustic anomaly was observable. The sidescan sonar imagery collected by the VCAS team on 2 August did not reveal any discernable features on the seabed at the site of LA001, and thus diving operations were not planned. It is possible that a man made or cultural object remains obscured beneath the seabed. Magnetic contour analyses suggested that the target possesses characteristics that might represent a potential submerged archaeological resource and this investigation did not alter that conclusion. Avoidance of Target LA001 by a distance of 50 m (164 ft) or additional investigations to confirm the absence of a sub-seabed archaeological resource remains justified.

Target CR049

As originally surveyed, Target CR049 was not identified as a target of possible archaeological interest (Schmidt et al 2014; Figure 5). Measuring 4.5 m (14.8 ft) in width with a height of 0.3 m (0.9 ft) and a length of 6.1 m (20.0 ft) with 1.5 m (4.9 ft) of shadow, the shape and other characteristics of the scour presented in the original side scan imagery suggested to the VCAS team the possible presence of a cultural object of some kind, though no magnetic anomalies were co-located with the side scan target. This prompted the VCAS team to attempt to relocate the target, an effort that was met with some difficulty due to observed disparity between the recorded location of the target in the original survey and the reacquired location of the target during this investigation. It is possible that an ionospheric scintillation event resulting from solar activity reduced locational accuracy of GPS equipment during this reaquisition effort.

During the first deployment, multiple solar events occurred, including coronal mass ejections, high speed streams, and solar flares (NASA 2015); several of these events, collectively referred to as "space weather," were Earth-directed and very possibly resulted in ionospheric scintillation, even at the mid-latitude location of the survey. Ionospheric scintillation is simply rapid variance in GPS amplitude and phase resulting from ionized particle density irregulaties in Earth's upper atmosphere. This variance can result in two types of error: interruption of signal (which is obvious to a surveyor) and degradation of locational precision as a result of ranging errors (which is *not* necessarily obvious to a surveyor) (Kintner, Ledvina, and de Paula 2007; Satellite Based Augmentation System Ionospheric Working Group 2010; Tilevitz nd). While ionospheric scintillation modeling suggests that GPS signals are typically subject to error more frequently at high (polar) and low (equatorial) latitudes, other evidence indicates that few studies of these effects have been conducted at mid-latitudes, let alone at mid-latitudes during solar maximum (Kitner, Humphreys, and Hinks 2009). Additional research would be necessary to further investigate the possibility of ionospheric scintillation disrupting the survey's GPS accuracy during these days of the first deployment, and such an effort may not conclusively confirm or refute scintillation as the cause. Nevertheless, it remains the likeliest explanation for the disparity of the originally-surveyed location and the newly identified location of Target CR049, particularly as other targets from both previous surveys were reacquired precisely in their originally-recorded locations.

After reacquisition, it was confirmed with side scan sonar imagery that Target CR049 presented very distinctive scour patterns that appear isolated and substantially different from the seabed conditioned observed in the surrounding area (Figure 6). Dive operations were planned on the site to determine what was on the seabed. As a result of the dives, it was concluded that this is a non-archaeological feature in the seabed, likely resulting from anchoring or other human activities; no further investigation or avoidance is recommended.

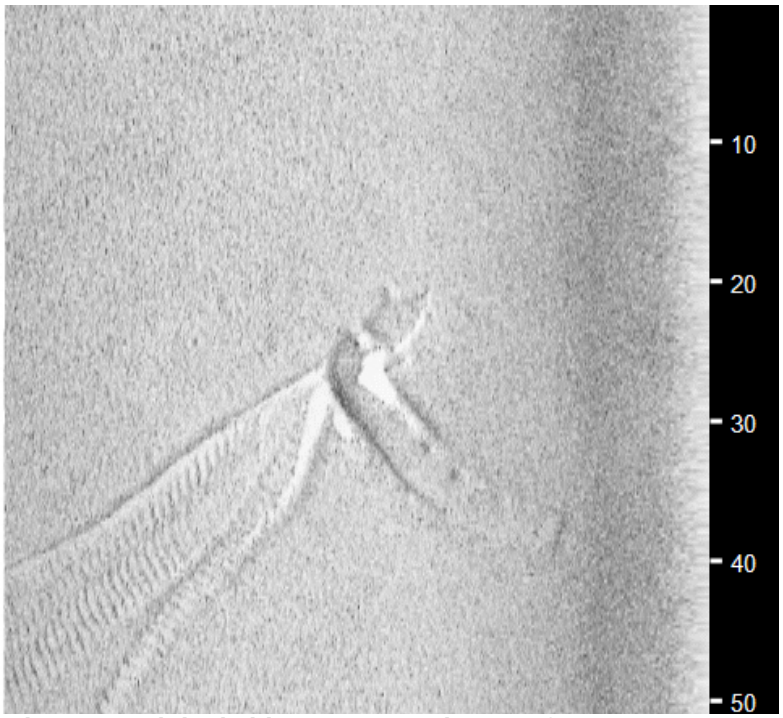

Figure 5. Original side scan sonar image of Target CR049 (Schmidt et al 2014).

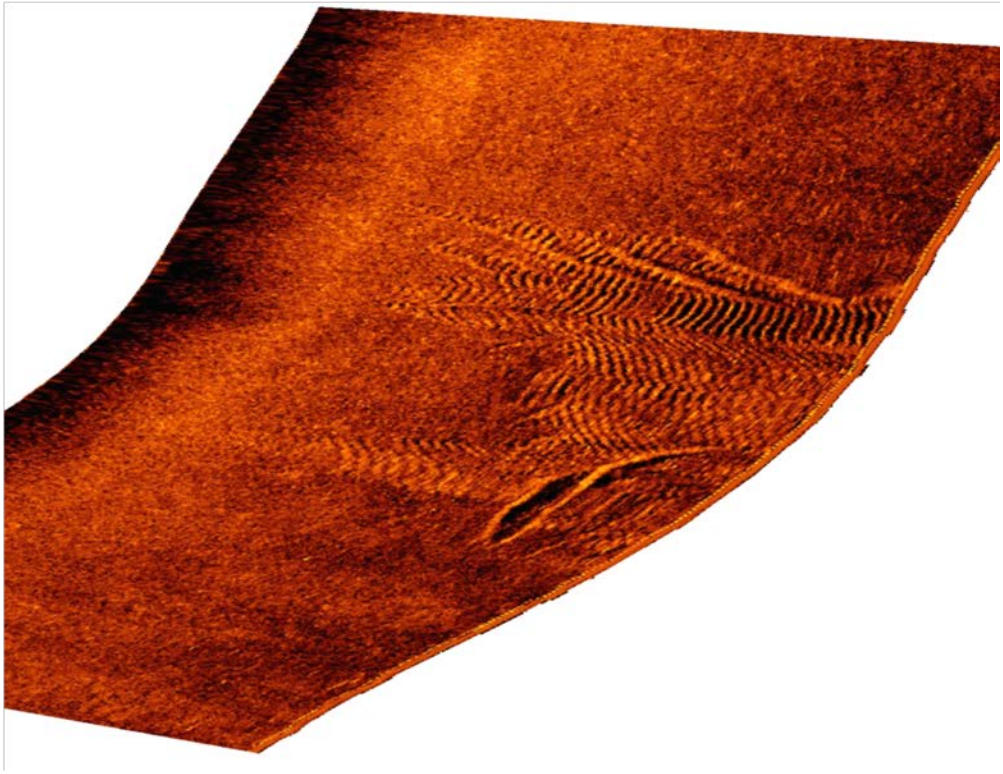

Figure 6. Side scan sonar image of Target CR049.

Target 92

The next sonar targets selected for survey were Targets 92, 143, 144, and 159, all originally identified during a regional-scale study partly-funded by BOEM and the Commonwealth of Virginia (McNeilan, Smith, and Fisher 2013). The VCAS team reacquired side scan sonar imagery of Targets 92, 143, and 159 in anticipation of diving operations. However, Target 144 could not be reaquired.

Target 92 was reacquired with side scan sonar on 5 August and appeared to be a shipwreck site with a large crane-like structure located at one end of the target (Figure 7). The site measured 47 m (153 ft) in length and 19 m (62 ft) abeam. There is a clear outline of a ship's hull with a defined centerline feature, which could represent a keelson or longitudinal support system. Sector scanning sonar imagery also was collected, which provided the layout of the site (Figure 8). Dive operations were conducted on this site; however bottom conditions presented extremely low visibility of less than 0.3 m (1 ft), which precluded divers from collecting further diagnostic photographic or videographic imagery. Considering the clear outline of the ship's hull, avoidance of this target by a distance of 50 m (164 ft) is justified until additional investigations may be conducted to confirm the presence of an historic property and assess the resource's eligibility for listing on the National Register of Historic Places.

Figure 7. Side scan sonar image of Target 92.

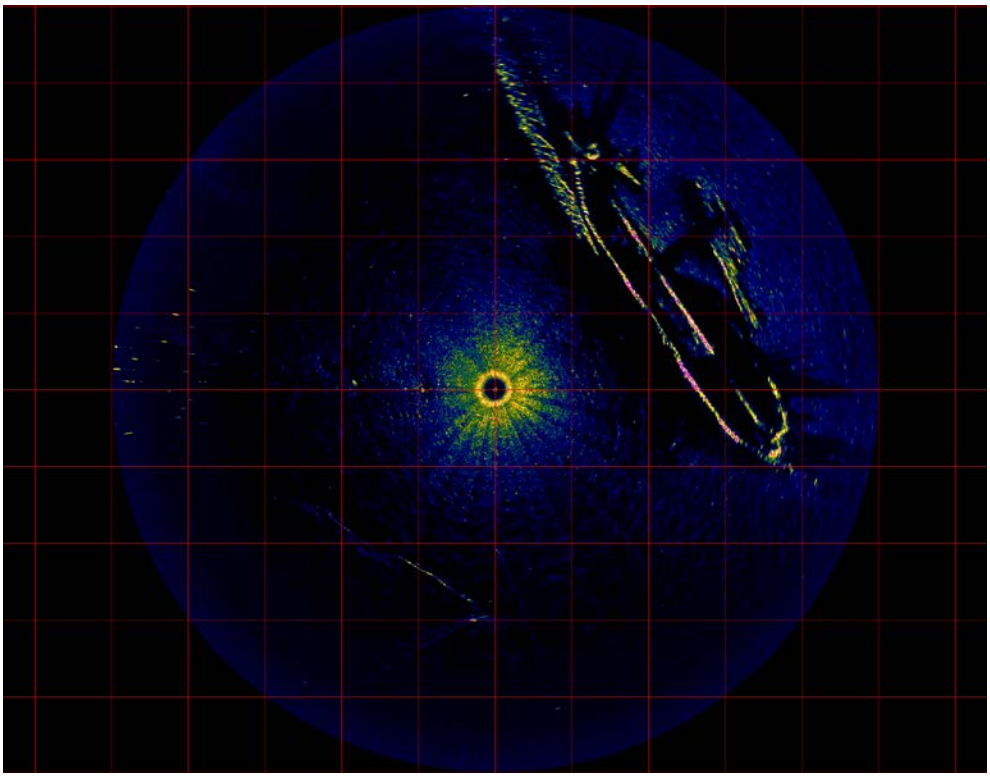

Figure 8. Sector scanning sonar image of Target 92, revealing more of the site layout.

Target 143

Target 143 was reacquired on 30 July with side scan sonar and revealed a long, smooth, hard return with a shadow, indicating that the feature was somewhat elevated above the seabed. This sonar signature suggested cultural features so diving operations were conducted to identify the target (Figure 9). A single dive was conducted on 4 August to make observations and collect photo and video data. The divers observed a small partial section of a fiberglass hull, a clearly modern piece of material. The site measured 10 m (32 ft) in length and 2 m (8 ft) abeam. This vessel's remains are modern and typical and lack integrity, and thus do not exhibit the characteristics of significance for eligibility to the National Register. No further investigations are recommended for Target 143. This material is not recommended for avoidance.

Target 159

The distinct features observed from the sonar imagery of Target 159, collected on 30 July, strongly suggested the remains of cultural material, albeit over a reasonably small area (Figure 10). Diving operations were conducted to measure the site and collect still and video imagery. The site measured 13 m (42 ft) in length and 6 m (19 ft) abeam. Target 159 appeared to be a relatively modern sailing craft with auxiliary mechanical propulsion (likely diesel engine), but was badly disarticulated. The bow section exhibited blue paint over what appeared to be fiberglass (Figure 11). Jutting forth into the seabed was the remnants of a wooden bowsprit, indicating that the vessel was, at least in part, powered by sail; some machinery also was

observed. Significant amidships remains were observed that suggest partial steel construction for ribs. Modern plumbing, including PVC piping with red plastic ball valves, also was observed (Figure 12). Though this plumbing could have been a modern addition or repair, the rest of the remains suggest a small vessel no earlier than mid twentieth century in construction, possibly the remains of a personal yacht or a small fishing vessel. This vessel's remains are modern and typical and lack integrity and thus do not exhibit the characteristics of significance for eligibility to the National Register. No further investigations are recommended for Target 159 and avoidance is not recommended.

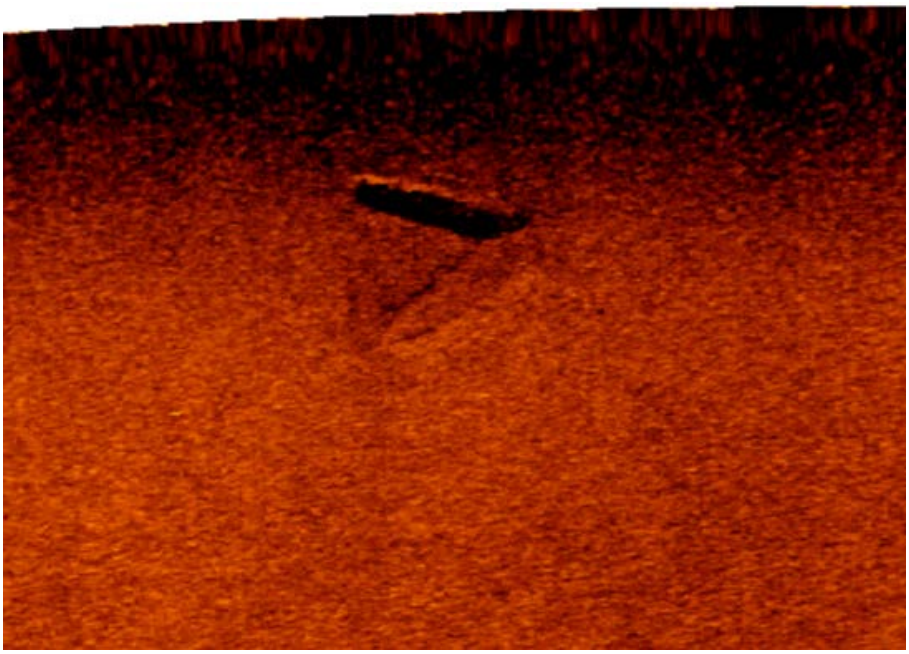

Figure 9. Side scan sonar image of Target 143.

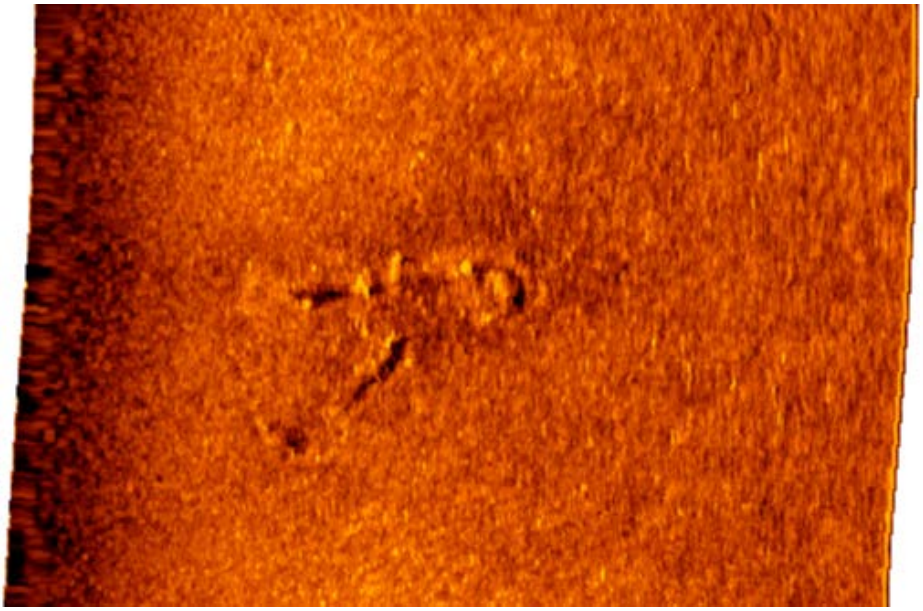

Figure 10. Side scan sonar image of Target 159.

Figure 11. Photograph depicting divers documenting the bow section of Target 159.

Figure 12. Photograph depicting modern plumbing observed on Target 159. This suggests either a recent construction or recent modification.

SS *John Morgan*

Also located near the Virginia Commercial Wind Energy Area are the remains of the *John Morgan,* lost in a collision during World War II. The site location was reacquired on 7 August using the side scan sonar (Figure 13) and diving operations were conducted to asses the condition and remains of the site. The *John Morgan* is broken into a few pieces, with a large somewhat intact main section that has almost 9 m (30 ft) of relief. Remains of cargo are clearly visibile, including a wide range of materials as well as tanks (Figures 14 and 15). The site measured 82 m (270 ft) in length and 23 m (76 ft) abeam. A visual and photographic survey of the site was completed.

The American cargo ship SS *John Morgan* was constructed by Bethlehem Shipbuilding Corporation in June of 1943, a shipbuilding division that was formed from Bethlehem Steel Corporation in 1905 (Figure 16). This type of Liberty EC2-S-C1 transport vessel was contracted by the United States Maritime Commission in response to the ever-increasing supply and demand of American ships during World War II (Chewning 2008:180). Throughout the year of 1942, German U-boats sank more than 1,000 Allied ships. As these ships were sank and lost, new ships were continually needed.

Throughout the war, shipyards all over the United States were contracted to build large capacity ships known as the "Liberty Ship." *John Morgan*'s design featured the typical cheap and easy "Liberty Ship" characteristics—including frame-first, standardized, steel construction. The armed cargo ship featured two oil-fired boilers and a three cylinder triple expansion engine that propelled the vessel up to 11 knots. The ship was 129.2 m (423.8 ft) long, with a 17 m (57 ft) beam, and a 10.6 m (34.8 ft) draft (Elphick 2006:220; Williams 2014:57).

The eventual sinking of *John Morgan* was the result of a collision involving two American ships. On 1 June 1943, the tanker SS *Montana* collided with the liberty ship *John Morgan* in heavy fog. *John Morgan* was on its maiden voyage, transporting a cargo of ammunition for Russia, sailing from Philadelphia to Bandar Shahpour, Iran. Its cargo included Valentine tanks, Willis jeeps, Ford trucks, Caterpillar tractors, P-39 aircraft, and thousands of small arms and munitions. According to historical records, the detrimental collision resulted in *John Morgan* breaking in half with the loss of 68 crew members, including 41 merchant crew and 25 of the 28 Armed Guard sailors aboard. The sections of the vessel sank in under two minutes and at the time of survey, rest in approximately 30 m (100 ft) of water. The tanker *Montana* was heavily damaged but survived the collision and was later transported to Norfolk Naval Shipyard where the damage on the port side of the vessel and the burned-out bridge area of the superstructure were repaired (Elphick 2006: 220; Chewning 2008:180; Williams 2014:57).

The remains of *John Morgan* are representative of cultural material associated with the Battle of the Altantic. This site is particularly unique in that it was carrying war materiel and military cargo rather than bulk commodities. While this practice was commonplace, the majority of vessels lost carrying this type of cargo in this region, were lost in much deeper and less accessible waters. This site likely meets the eligbility requirements for National Register listing, specifically under the multiple property designation 'World War II Shipwrecks along the East Coast and Gulf of Mexico'. The site warrants further investigation and the preparation of a National Register nomination; because of its significance, the *John Morgan* should be further monitored for looting and site condition degradation.

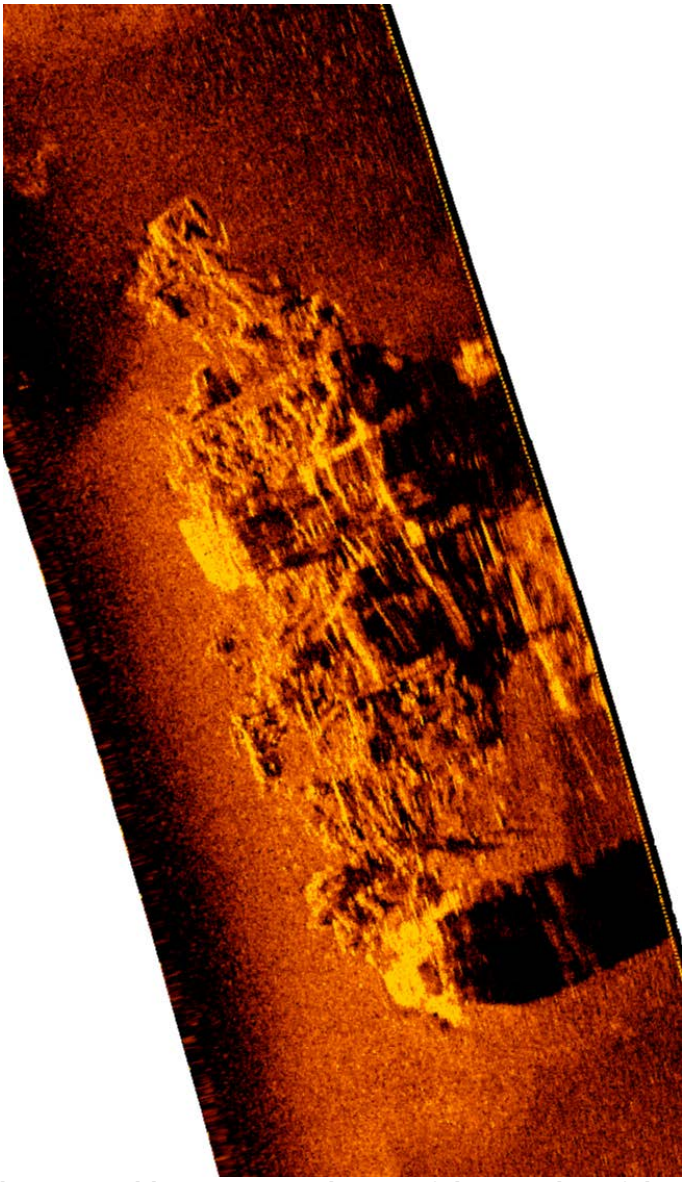

Figure 13. Side scan sonar image of the remains of the *John Morgan*.

Figure 14. Photograph depicting a tank, part of the cargo of the *John Morgan*.

Figure 15. Photograph depicting tires and other war materiel, part of the cargo of the *John Morgan*.

Figure 16. Photograph of the completed SS *John Morgan* before its launching event. (Courtesy of Wrecksite.com).

Kingston Ceylonite and *Santore*

The material remains of *Kingston Ceylonite* and *Santore* represent a significant historical event known to the investigators to have occurred in the areas offshore Virginia. These remains are associated with military operations related to the World War II-era Battle of the Atlantic; both vessels were sunk by the German U-boat *U-701*. *U-701* was a Type VIIC U-boat that had conducted two war patrols in the European theatre commanded by Horst Degen. They embarked on a third war patrol on 20 May 1942 (Wynn 1997: 126). This was to be by far the most successful patrol of the *U-701*, but also its last.

This patrol was in conjunction with seven other boats dubbed group *Hecht* (English: *Pike*). Five of the *Hecht* boats, including *U-701*, were diverted for special missions. The special operations of these five boats represent possibly the most aggressive coordinated U-boat assault on the United States in the entire war. Three boats were assigned to mine different ports along the East Coast: Delaware Bay, Boston Harbor, and the Chesapeake Bay. Meanwhile, two other U-boats landed Abwehr agents (German equivalent to a Central Inteligence Agency operative) on United States soil in Long Island and in North Florida. These two groups of agents intended to meet in Cincinnati, Ohio and coordinate sabotage on aircraft, tank factories and shipyards. The five boats diverted for these special missions were to converge on the Cape Hatteras area following their completion (Döenitz 1945: 76; Blair 1996: 602).

The *U-701* was assigned to mine the Chesapeake Bay area. On 12 June 1942, Degen arrived off the entrance to the Chesapeake and proceeded to strategically lay fifteen delayed action TMB mines, a type of ground mine that was detonated by the magnetic or acoustic signature of a

passing vessel. Cape Henry and Cape Charles lights were bright and visible, which allowed Degen to accurately judge his position (Figure 17). Within 30 minutes *U-701* had deposited all of its mines in 11 m (36 ft) of water directly in the shipping channel (Hickam 1989: 246; Blair 1996: 602; Wynn 1997: 126).

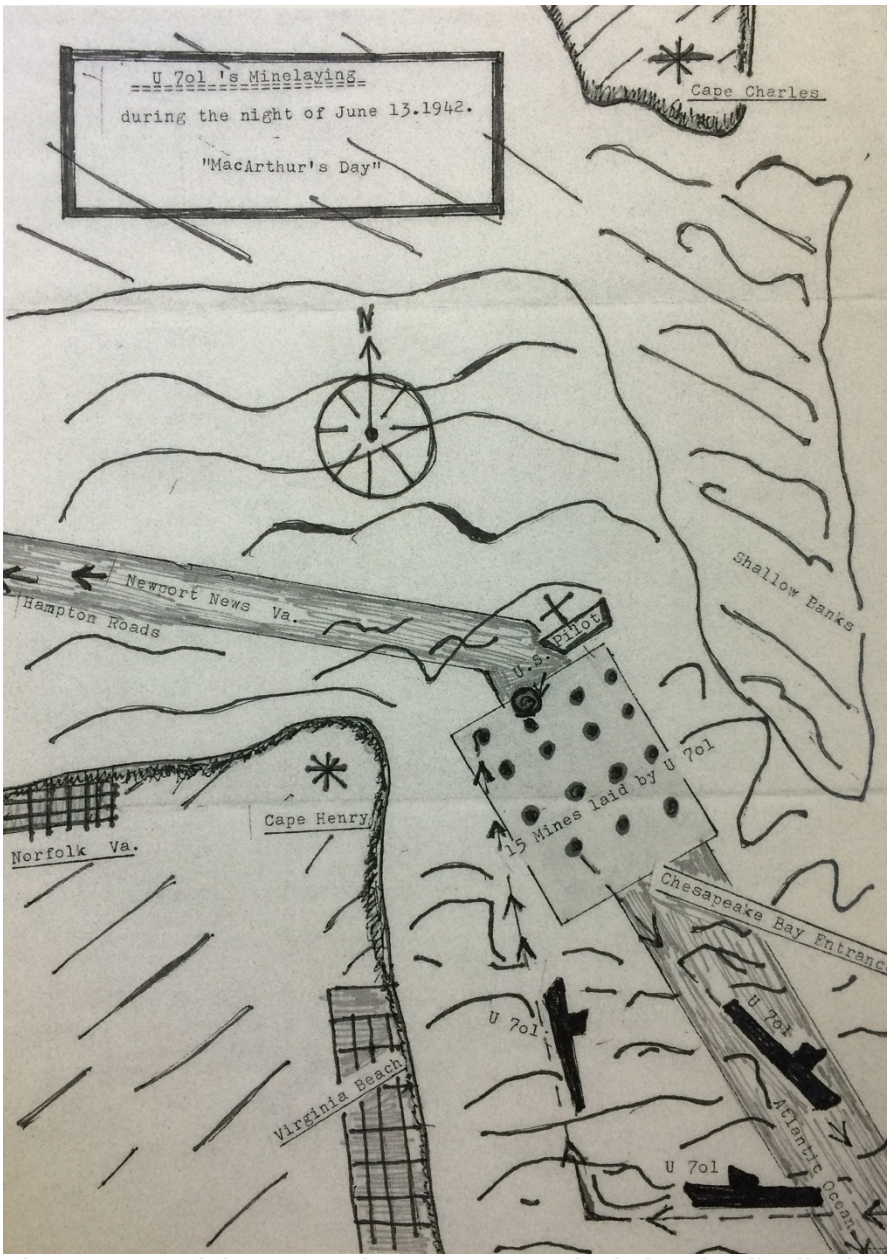

Figure 17. Hand drawn map by Horst Degen depicting the distribution of mines he laid with U-701 (Courtesy of Ed Caram Collection).

This minefield was very productive sinking two ships and severely damaging three more. On 15 June 1942, convoy KN109 from Key West to Norfolk came into contact with the active mine field. The first two ships hit were American, the 11,237 ton *Esso Augusta* and the 11,615 ton *Robert C. Tuttle*. These ships were severely damaged, but were later returned to service. On the same day, the 448 ton British anti-submarine trawler, HMS *Kingston Ceylonite* struck another of

Degen's mines and was destroyed with the loss of 18 out of 32 crew (Figure 18). Additionally, the 1,190 ton 165 foot four stack Coast Guard Cutter, USS *Bainbridge*, was damaged when one of its own depth charges detonated a nearby mine. Following this chaos, the channel was closed until it could be properly swept of mines. After it was believed clear, the channel was reopened. Unfortunately, a remaining mine struck and sunk the 7,117 ton American freighter *Santore* (Figures 19-20) (Hickam 1989: 256; Chewning 1994: 95; Blair 1996: 602; Wynn 1997: 126).

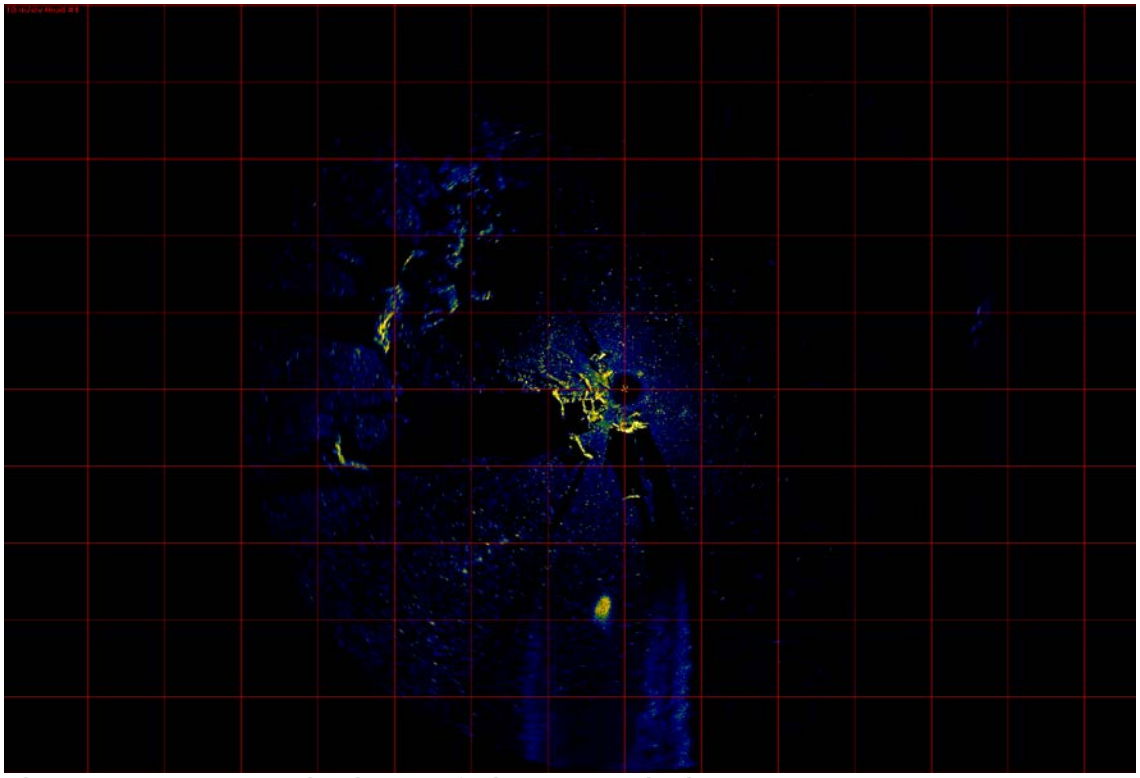

Figure 18. Sector scanning image of *Kingston Ceylonite*.

This was a complete success in the eyes of Admiral Döenitz at U-boat command and afforded Degen a congratulatory radio message. Of each vessel in group Hecht assigned to the special mission, *U-701* was the only boat that achieved its goals. Furthermore, this was the only mining operation with appreciable success in United States waters in the entire war.

The VCAS team conducted diving operations and collected sector scanning sonar imagery of both the *Santore* on 6 August (Figures 21-22) and the *Kingston Ceylonite* on 8 August, in order to record their present conditions and ascertain their integrity. Diving and sonar surveys were conducted, revealing substantially degraded hull structures. Despite the lack of intact structure, these sites represent the reamins of a significant historical event and as such are likely eligible for nomination to the National Register of Historic Places, specifically under the accepted multiple property designation 'World War II Shipwrecks along the East Coast and Gulf of Mexico. Additional focused recording is recommended if the site is to be formally nominated to the National Register, particualary for the Kingston Ceylonite, which, owing to poor dive conditions, only sonar data was able to be collected. Additionally, because of their significance, the *Santore* and *Kingston Ceylonite* should be further monitored for looting and site condition degradation.

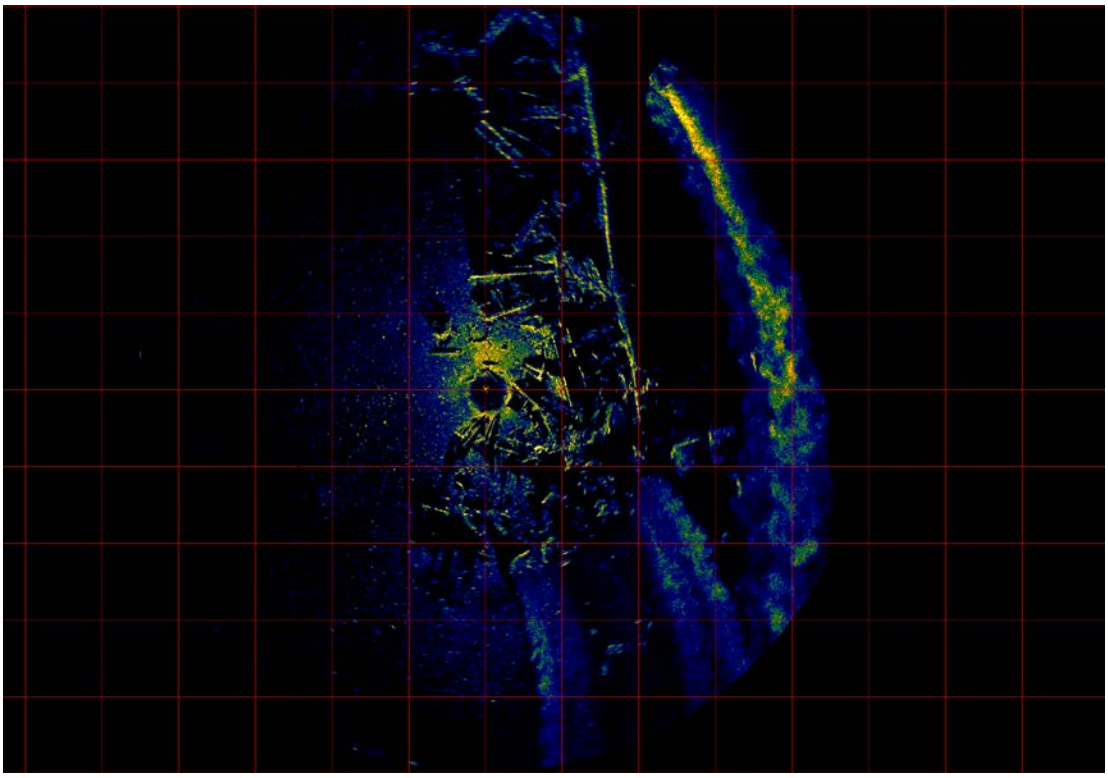

Figure 19. Sector scanning sonar image of *Santore*.

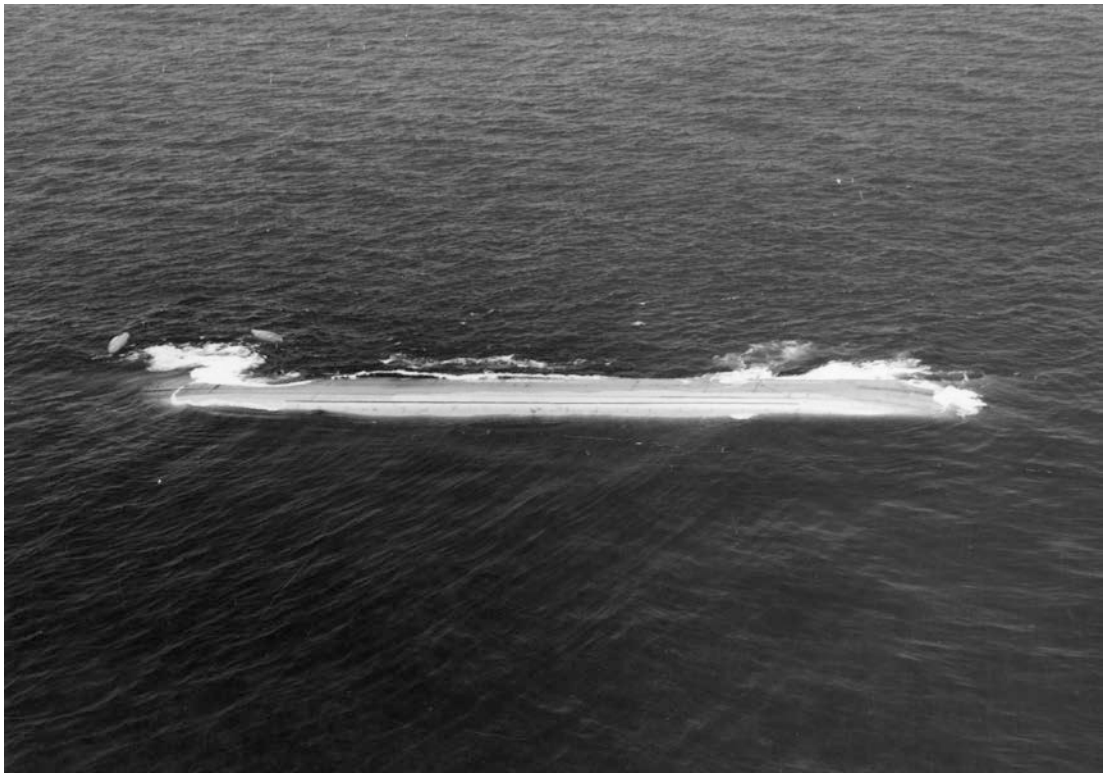

Figure 20. The SS Santore rests on the bottom in shallow water afer striking a mine left by the U-701 (Courtesy of the National Archive).

Figure 21. Photograph depicting one of the boilers on the *Santore*.

Figure 22. Photograph depicting a broken section of the hull of the *Santore*.

USCG *Cuyahoga* Wreck

The USCG *Cuyahoga* (WIX-157) was built in 1927 as an Active-class patrol boat. While designed and constructed for prohibition enforcement, but also saw some duty during WWII in the Carribbean as an escort vessel (Figure 23). Of all Active-class cutters, Cuyahoga had the longest service life and at the time of sinking in 1978 was the oldest commissioned vessel in the Coast Guard. The Cuyahoga was sunk during a training cruise on the Chesapeake in a collision with a coal freighter, the *Santa Cruz II* with a loss of eleven crew. The remains were salvaged and towed into this final position and sunk in deeper water off the Virgina Capes (USCG History Web).

The site is listed both on the charts and in BOEM's Atlantic Shipwreck Database, but was located approximately equidistant between the regional study's survey lines within the Virginia Commercial Wind Energy Area (McNeilan, Smith, and Fisher 2013). As a result, no data was collected here previously. Side scan sonar imagery of this location, collected on 4 August, clearly reveals an image of an intact shipwreck site (Figure 24). Additionally, the large acoustic shadow indicated high relief amidships. (Figures 25-26). Diving operations conducted on 5 August confirmed the presence of the Active-class cutter *Cayuhoga* in about 30 m (100 ft) of water. The vessel is intact, upright and in excellent condition. The site measures 37 m (120 ft) in length and 7 m (24 ft) abeam.

Figure 23. Photograph of USCG Cuyahoga. Image courtesy of USCG

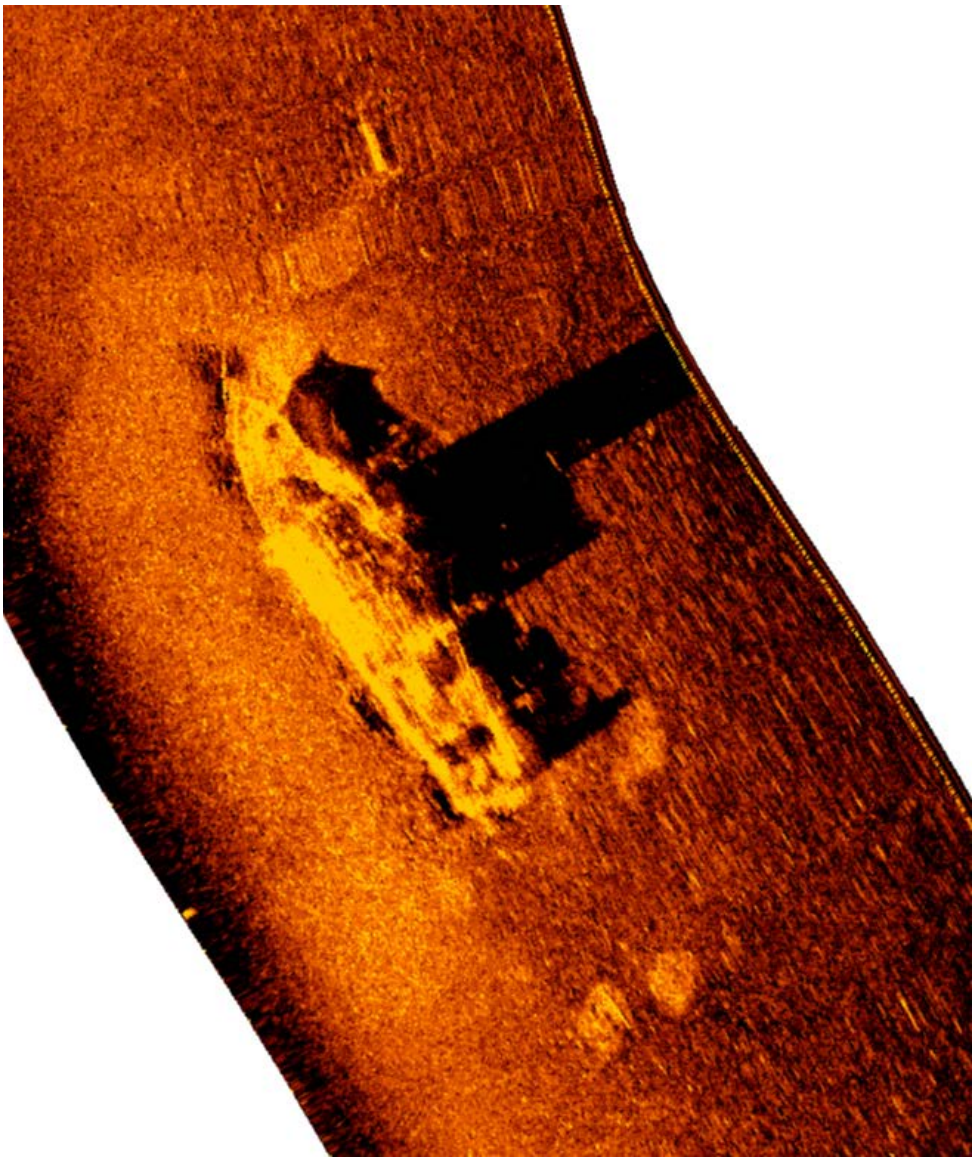

Figure 24. Side scan sonar image of USCG *Cutter Cuyahoga* Wreck.

Given the vessels connection to significant historical events and the high degree of site integrity, it is likely eligible for nomination to the National Register of Historic Places. Additionally, this site lies close-by to the *John Morgan*, as well as other vessels intentionally sunk as artificial reefs by the Virginia Marine Resources Commision. Avoidance of 50 m (164 ft) is recommended. Additional focused recording is recommended if the site is to be formally nominated to the National Register.

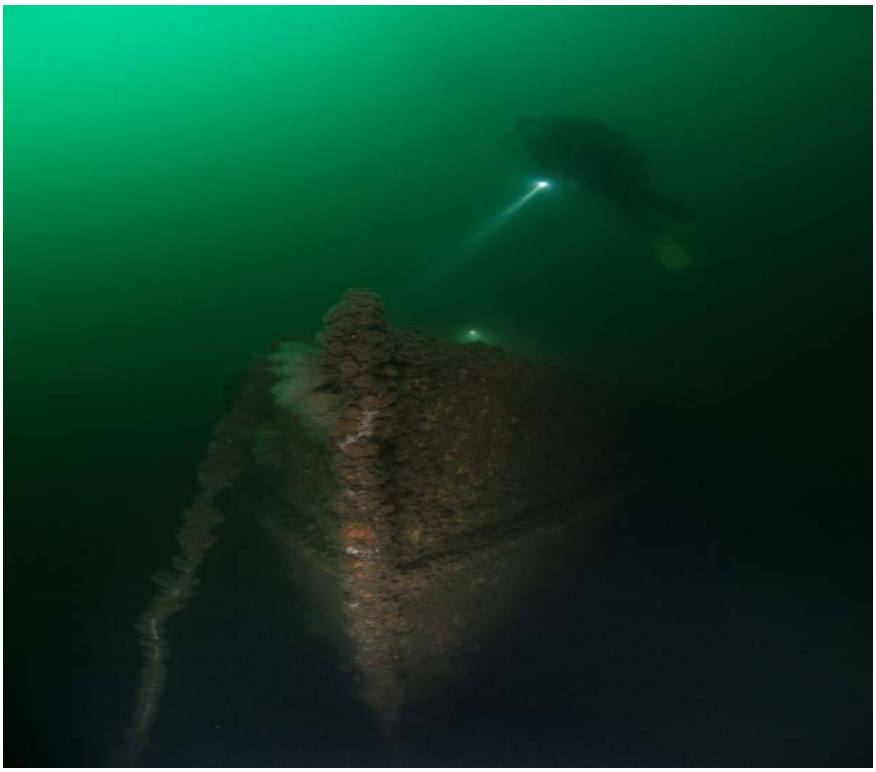

Figure 25. Photograph depicting diver illuminating the bow sections of *Cuyahoga* Wreck.

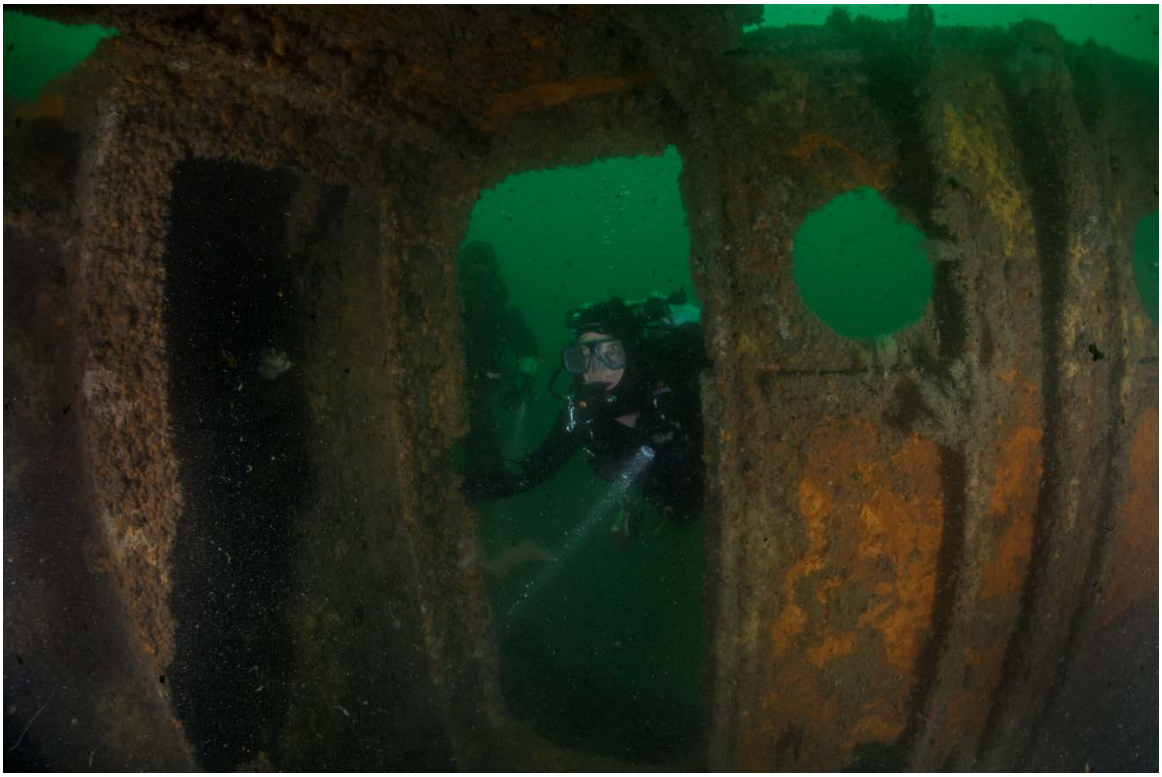

Figure 26. Photograph depicting diver exploring superstructure section of *Cuyahoga* Wreck.

OCS Site

As discussed above, NOAA's Office of Coast Survey (OCS) previously identified an uncharted seabed protrusion that appeared to be a shipwreck site and reported this find to NOAA and BOEM archaeologists (Figures 27-29). The OCS site was reacquired and extensively resurveyed and assessed by the VCAS team. The side scan and sector scanning sonar imagery clearly depict a shipwreck (Figures 30 and 31) and diving operations were conducted to collect basic measurements, photo imagery, and video.

The site was steel in construction and largely buried in sediment. The site's boundaries were roughly defined by the port and starboard gunwales protruding on average 0.6 to 0.9 m (2 to 3 ft) above the seabed creating the outline of the hull. Upperworks including decking and sections of hull were observed to be broken and scattered about. The remains of bites and a large windlass were present on the site. Within the boundaries of the hull, divers observed a preponderance of dead clamshells filling the gaps between each frame (Figure 32). At the stern, a large steel rod is attached running athwartships (Figure 33). Given the size and observed equipment on board, and with the presence of such a large number of clamshells, it is suspected that this site is likely the remains of a clam dredge. Based on observable machinery, this site likely dates to the late-nineteenth or early twentieth century. The shellfish fishery was an important historical industry in this region and this vessels association with it may constitute eligibility for the National Register. More work is needed on site to determine the identity of the vessel which would allow for an accurate determination to be made. It is recommended that 50 m (164 ft) avoidance be observed until such time that a more comprehensive assessment of the site determines significance.

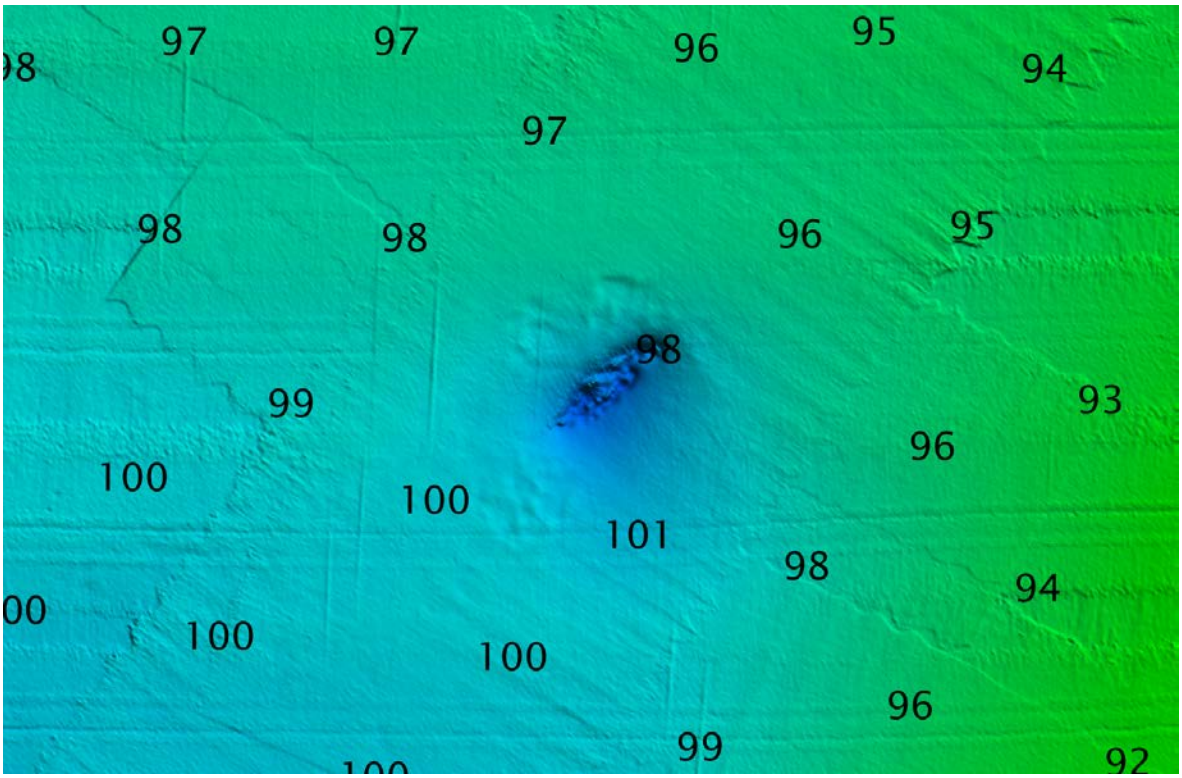

Figure 27. Original bathymetric of the area surrounding OCS Site conducted by NOAA OCS.

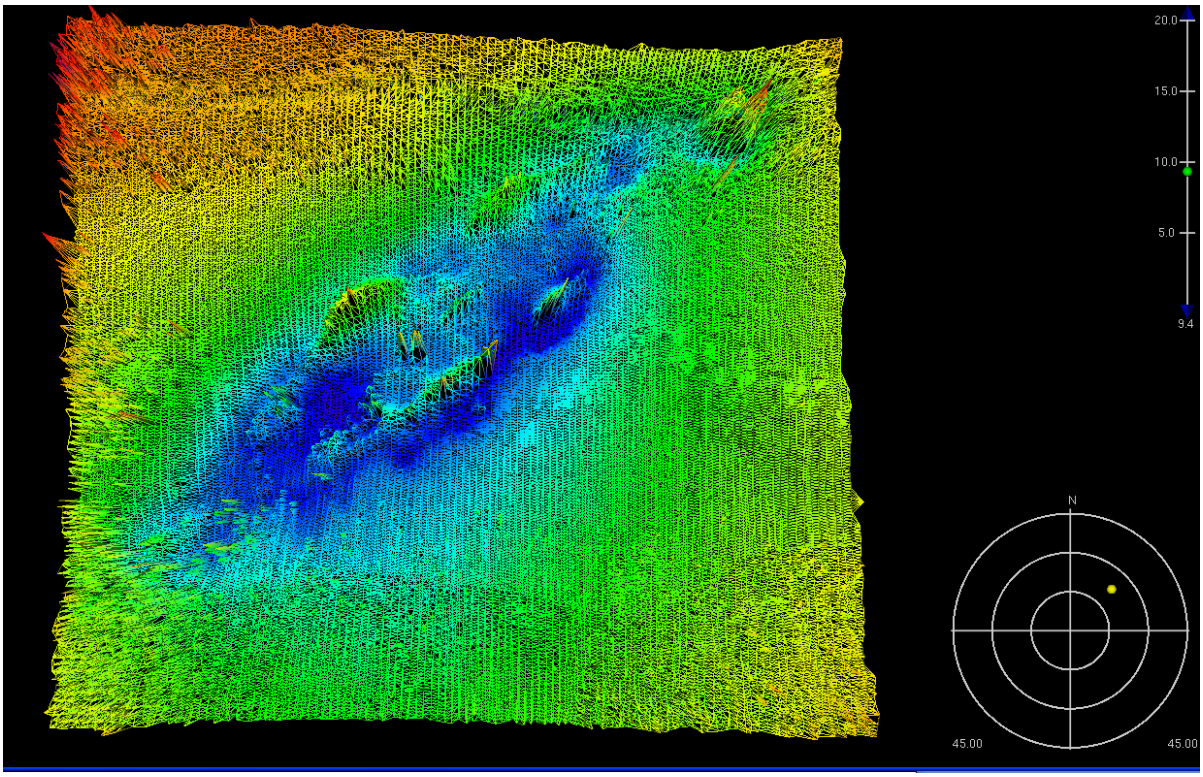

Figure 28. Detailed point cloud model of OCS Site collected by NOAA OCS showing relief pattern.

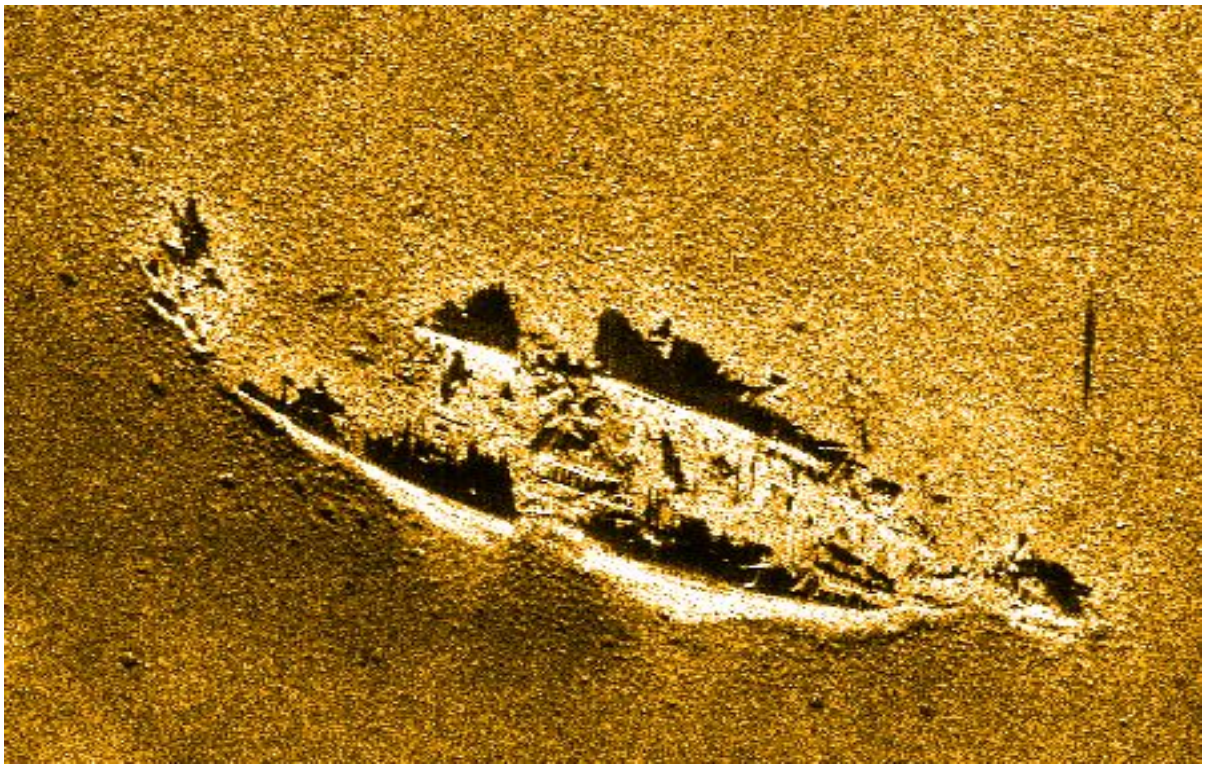

Figure 29. Original side scan sonar image of OCS Site collected by NOAA OCS.

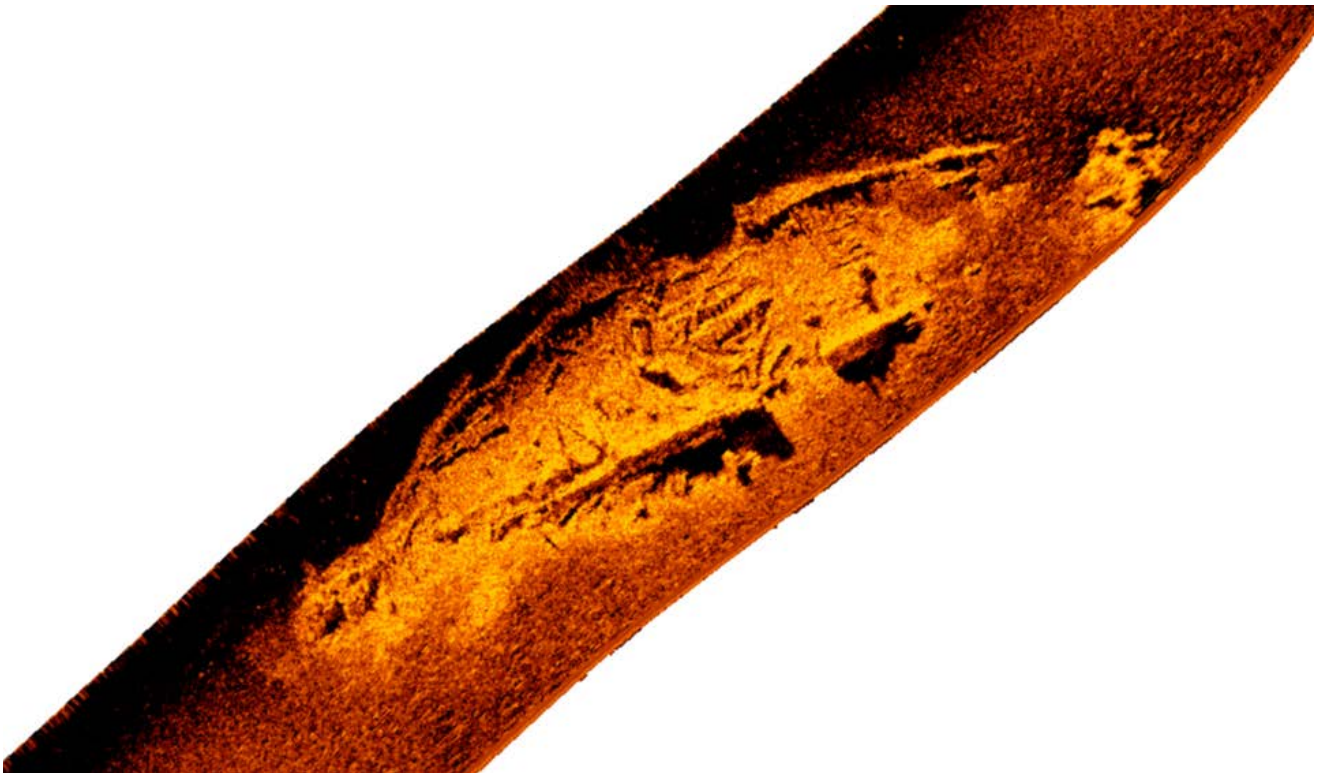

Figure 30. Side scan sonar image of OCS Site.

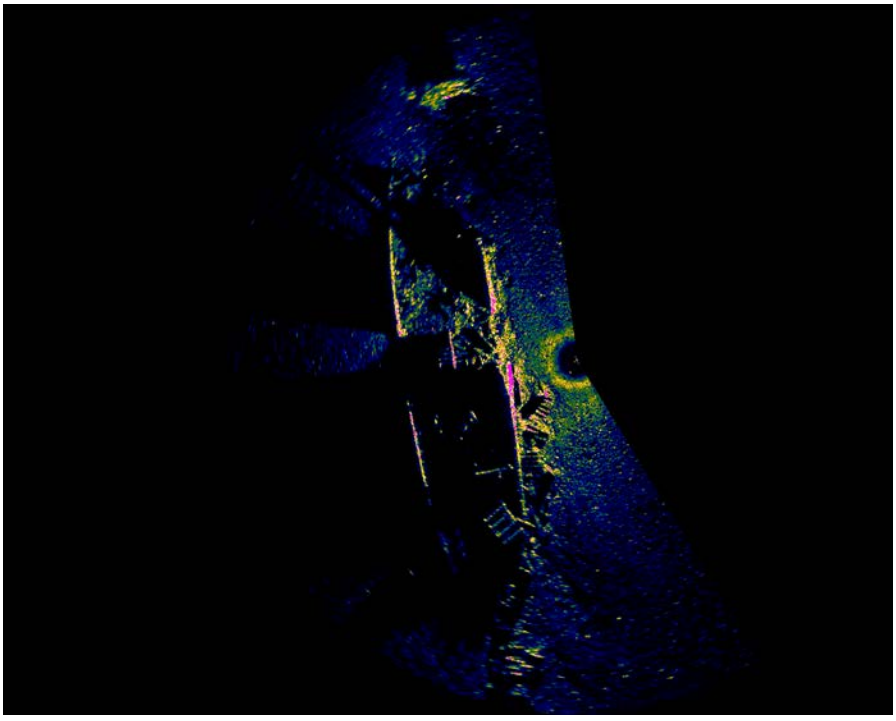

Figure 31. Sector scanning sonar image of OCS Site.

Figure 32. Photograph depicting amidships section of the OCS Site. Clamshells, clearly visible amid the wreckage, likely represent the cargo being carried at the time of loss.

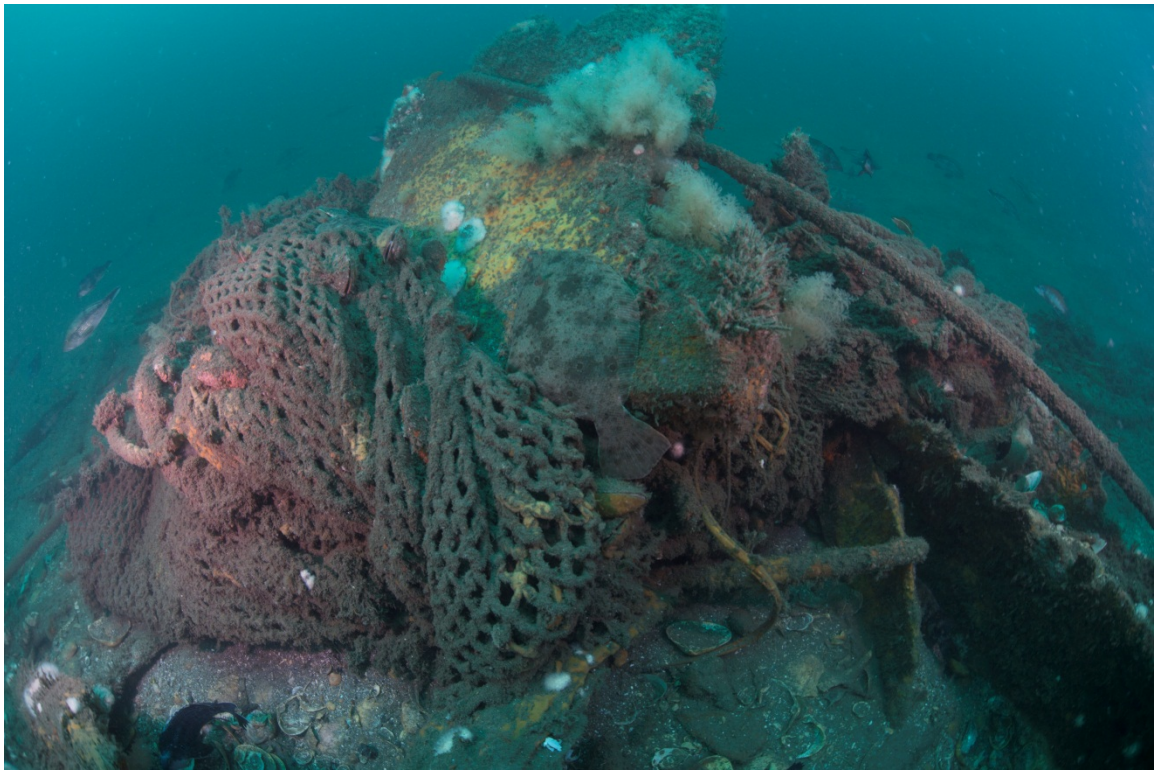

Figure 33. Photograph depicting steel rods entangled in nets near the stern of OCS Site. This may represent some of the dredge or rake equipment used for clam harvesting.

Schooner Site (*Hattie Dunn)*

Remains of a schooner were listed in BOEM's Atlantic Shipwreck Database at a location slightly north of the Virginia Commercial Wind Energy Area, providing a convenient opportunity to investigate the listing. A sector scan of the coordinates collected on 3 August revealed a low, ship-shaped object on the seabed (Figure 34). Divers conducted a series of reconnaissance dives on the Schooner Site, focusing on photo and video documentation.

The Schooner Site is constructed from wood and is contiguous from bow to stern (Figure 35). There is only a small portion of the wooden hull structure extending beyond the seafloor. Approximately 1-3 strakes of the sides of the hull are present above the seabed; it is likely the preserved wooden sections are periodically obscured by sediment. All wooden elements exposed to the sea have long since been consumed by wood boring organisms. The main features of the site are a large windlass at the bow section and a large anchor off the port side of the bow with one fluke in the sediment and the other vertical in the water column (Figures 36-37).

There also is some evidence of recent salvage attempts on site by modern artifact looters. Large sections of canvas fire hose were observed wrapped around features (Figure 38). This is a known, low-cost method of recovering materials, wherein the woven structure of the fire hose acts as a lifting strap. Once secured around an object, the hose is secured to the surface vessel, which uses its mass to dislodge objects.

Evidence suggests a possible identification of this site as the remains of the *Hattie Dunn*. The general layout and dimensions coupled with anecdotal evidence reported from the diving community concerning looted artifacts make it likely these are the remains of the *Dunn*. The location of the site is further south than would be expected for the historical narrative, but the time period and nature of the loss make the location of this wreck within a reasonable margin of error. If the site is in fact the *Hattie Dunn*, lost during a World War I naval engagement (Figure 39), this location has a great deal of historical significance. Additional investigations of the Schooner Site are warranted to confirm the identity, but should the identity be definitively proven, a National Register Nomination should be prepared for this target. While the wooden hull of this vessel is almost completely disintegrated with the exception of what lies beneath the seabed, the shape of the hull is maintained and other large artifacts such as the anchor, this site could not be described as a'best example' for a vessel type or builder as defined by the National Register guidelines. However, if the site is later determined to be the Hattie Dunn, the first vessel sunk by a foreign entity in U.S. waters since the war of 1812, it would be associated with a very historical event, and as a result, be eligible for nomination. Avoidance of 50 m (164 ft) is recommended as well as further site investigation to focus on identification.

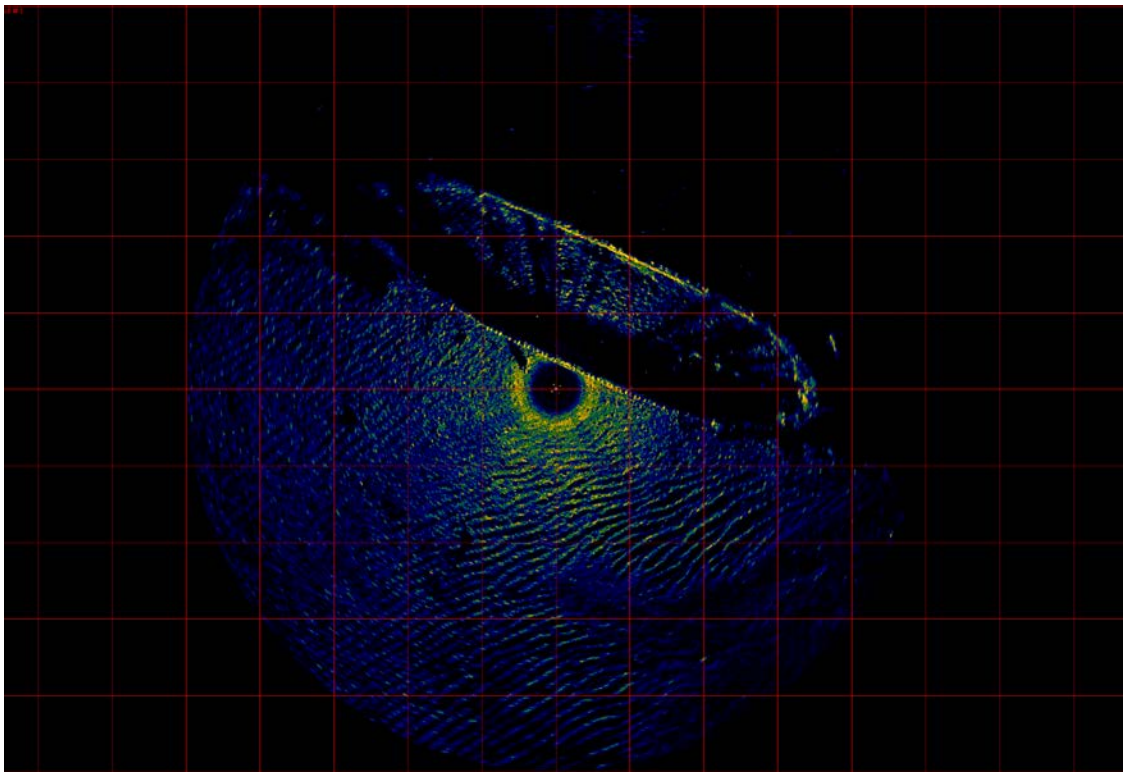

Figure 34. Sector scanning sonar image of Schooner Site.

Figure 35. Photograph depicting the amidships section of the wooden hull of the Schooner Site. This is representative of the general layout of the site.

Figure 36. Photograph depicting the winch at the bow of the Schooner Site.

Figure 37. Photograph depicting a diver observing the large anchor encrusted with marine growth on the Schooner Site

Figure 38. Photograph depicting a large tangle of modern canvas fire hose wrapped around a feature of the Schooner Site. This is a known salvage method used to loot artifacts from submerged archaeological sites.

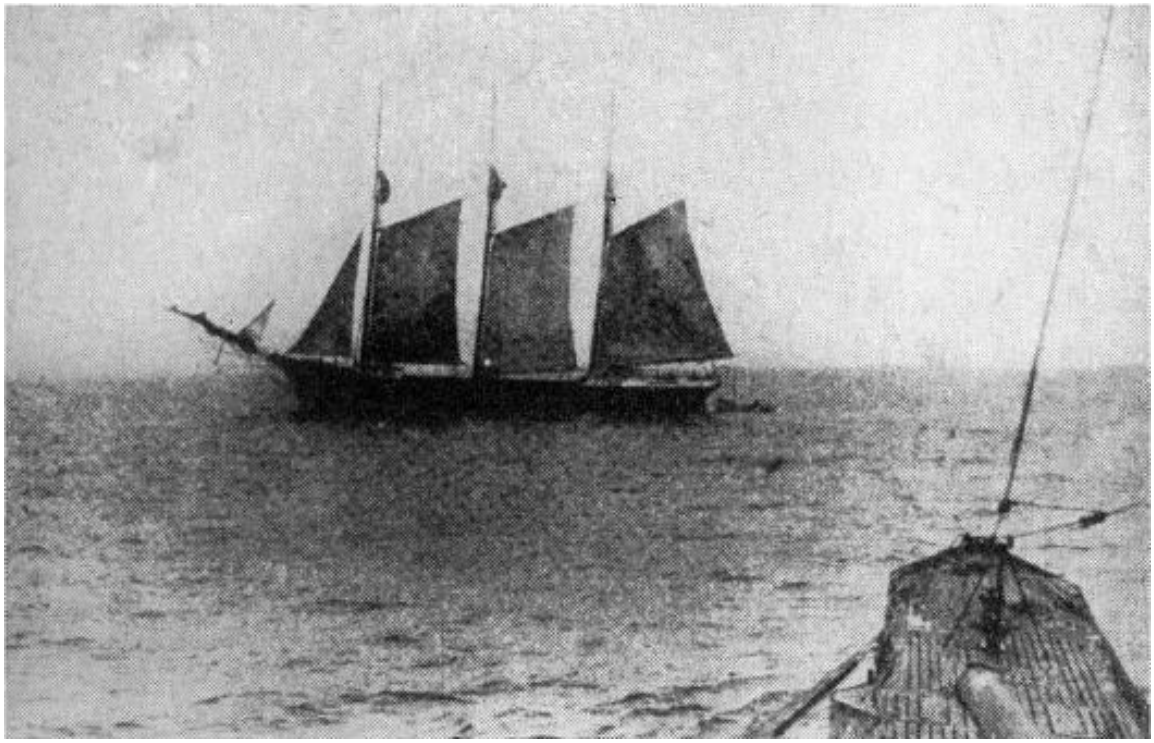

Figure 39. Schooner Hattie Dunn as seen from the conning tower of *U-151* just before sinking (Higgins 2014:148).

The American sailing schooner *Hattie Dunn* was built in 1884 by Dunn & Elliot Shipbuilding Company of Thomaston, Maine. Dunn & Elliot originally began as a sailing loft on the Georges River waterfront of Thomaston. However, by 1880 the budding company had grown into an actual shipping and shipbuilding firm, producing as many as thirty various types of sailing schooners (Higgins 2014:148).

Hattie Dunn was an unarmed three-masted sailing schooner of 414 gross tons. Records show that the vessel was originally constructed with oak and yellow pine with iron and copper fastenings. The vessel included one deck with an additional poop deck. The schooner was 44.2 m (145.1 ft) long, with a 10.7 m (35.1 ft) beam, and a 3.6 m (11.8 ft) draft. It was reported that the schooner housed up to seven crewmembers (Office of Naval Records 1920:26).

On 23 May, 1918, *Hattie Dunn* sailed from New York bound for Charleston, South Carolina. The schooner was recorded to be sailing "in ballast," without cargo or radio capabilities. On 25 May 1918, at approximately 10:10 am, the crew of *Hattie Dunn* heard a cannon go off in the near vicinity. Upon the detection of an unknown vessel on the horizon, *Hattie Dunn* turned the ship full speed westward. However, the unknown vessel fired again, and came alongside the schooner (Office of Naval Records 1920:26).

This unknown vessel was later found to be *U-151*, a *Deutcschland* type of converted mercantile submarine, with a complement of eight officers and 65 enlisted crew members. The "U-converted mercantile type" was 65.0 m (213.3 ft) long, with a beam of 8.9 m (29.2 ft), and a draft of 4.5 m (14.9 ft). Upon chasing down and stopping the sailing schooner, *Hattie Dunn* crew members were directed to evacuate the schooner and board the U-boat. Crew members from *U-151* then boarded the schooner and deployed several bombs throughout the deck. The bombs were then detonated and the schooner sank bow first, approximately 24 to 40 km (13 to 22 nm [15 to 25 mi]) off *Winter Quarter Lightship*. The entire crew remained captives of U-*151* until 2 June 1918, when the men were released into lifeboats and U-*151* submerged beneath the waves and transited safely back to Germany (Higgins 2014:147-148; Office of Naval Records 1920:26).

During World War I, U-*151* was the first German submarine to operate in American waters. The U-boat went on to sink a total of 23 vessels. Furthermore, *Hattie Dunn* was known at that time as the first American ship to be sunk in American waters by hostile action since the war of 1812 (Higgins 2014:148).

Targets Not Located

During the course of this investigation, there were several targets that the survey team attempted but was unable to relocate. This is likely due to a variety of reasons. Some targets may be episodically buried by shifting sediments. This area is fairly dynamic and is subject to relatively high tidal currents. Likewise, the sites are all located in waters shallow enough to be affected by storm events. These factors can create a great deal of scour or deposition, which can cover even large objects. This phenomenon is a possible reason why some small targets were unobservable. Another possibility is that small objects observed in past surveys may have been transitory. This simply means that at the time of the initial survey there was an object there that is no longer present. This is uncommon for wrecks outside of the surf zone, but for smaller objects that are not permanently embedded in the seafloor, this can happen both naturally or as the result of human activity (i.e. dredging/trawling). The sites visited that had no observable

signature were: Targets CR049, CR001, and LA001 (Schmidt et al 2014), and Targets 144, 160, 86, 87, and 88 (McNeilan, Smith, and Fisher 2013). The absence of side scan data at these locations during this particular time does not mean that an object is not obscured beneath the seafloor.

SUMMARY AND CONCLUSIONS

The study investigated thirteen archaeological sites in and near the Virginia Commercial Wind Energy Area (Table 1). Avoidance or additional investigations were recommended for nine sites on the basis of possible eligibility to the National Register of Historic Places. No further investigations were recommended for the remaining four sites.

The thirteen archaeological sites investigated during the course of this study represent a wide range of materials and resources. The methodological approach maximized assessment time and allowed the VCAS survey team to collect a great deal of data to aid in the preliminarly interpretation and evaluation of sites. Several sites that have clearly defined identities, including *John Morgan, Kingston Ceylonite*, and *Santore* are connected to significant historical events and are likely eligible for nomination to the National Register. These sites also may be included under an established multiple property designation for Battle of the Atlantic associated resources.

Other sites, which have no known or tenuous identities, may also represent historic resources worthy of further investigation and condition monitoring. The site of the suspected *Hattie Dunn*, if proven definitively, represents a very historic event and should be considered potentially eligible for the National Register. Further research would be required to demonstrate the identity conclusively. Until that time, the potential of this target is such that avoidance is recommended should future development be anticipated in the vicinity. Likewise other shipwreck sites such as the suspected clam dredge may also represent significant national or regional heritage sites and should be avoided until identities can be assigned or further assessments conducted.

As this was a preliminary investigation, only a general description of the sites' environment was conducted. Depending on future management strategies, it may be valuable to establish more concrete scientific descriptions of the environment and ecosystems present at each site. Water quality and characteristics at each site would aid in the study of corrosion potential and help researchers understand more accurately the various site formation processes acting on these sites. Additionally, subsequent efforts should be made to monitor impacts of nearby construction activities on ongoing site formation processes.

Finally, this study was highly efficient at ground-truthing possible targets of archaeological interest in order to verify true sites and reject false positives identified in developer datasets. It is recommended that the methods herein employed (ground truthing, documenting, and monitoring) be applied for other areas. Based on lessons learned in Europe concerning knowledge lost when possible anomalies are given avoidance buffers but not investigated, it may be valuable to take this initiative for other wind energy areas.

Table 1. Results and Recommendations

Target	General Vicinity in Relation to Proposed Activities	Tentative Identification and Description	Recommendation
CR001	VOWTAP Cable Route	Magnetic anomaly only	Avoidance by a distance of 50.0 m (164 ft) or additional investigations to confirm the absence of sub-seabed archaeological resources.
CR002	VOWTAP Cable Route	Large concrete channel marker mooring block and chain	No further investigations.
CR049	VOWTAP Cable Route	Natural undulating sand dune	No further investigations.
LA001	VOWTAP Lease Area	Magnetic anomaly only	Avoidance by a distance of 50.0 m (164 ft) or additional investigations to confirm the absence of sub-seabed archaeological resources.
92	Northwest section of Commercial Wind Energy Area	Shipwreck site with a large crane-like structure	Avoidance of this target by a distance of 50.0 m (164 ft) until additional investigations may be conducted to assess the resource's eligibility for listing on the National Register.
143	Southeast section of Commercial Wind Energy Area	Small pleasure craft	No further investigations.
159	Southeast section of Commercial Wind Energy Area	Modern sailing craft with auxiliary mechanical propulsion	No further investigations.
John Morgan	North of Commercial Wind Energy Area	Liberty EC2-S-C1 transport vessel	Avoidance by a distance of 50.0 m (164 ft) Nominate to NRHP
Kingston Ceylonite	North of VOWTAP Cable Route	448 ton British anti-submarine trawler	Avoidance by a distance of 50.0 m (164 ft) Nominate to NRHP
Santore	North of VOWTAP Cable Route	7,117 ton American freighter	Avoidance by a distance of 50.0 m (164 ft) Nominate to NRHP
USCG *Cuyahoga*	Northwest section of Commercial Wind Energy Area	Artificial reef of Active-class Coast Guard cutter.	Avoidance by a distance of 50.0 m (164 ft)
OCS Site	North of Commercial Wind Energy Area	Late 19th or early 20th century clam dredge	Avoidance by a distance of 50.0 m (164 ft) or additional investigations to confirm the absence of sub-seabed archaeological resources.
Schooner Site (*Hattie Dunn)*	North of Commercial Wind Energy Area	Wooden-hulled schooner, likely the 414 ton, three-masted sailing schooner *Hattie Dunn*	Avoidance by a distance of 50.0 m (164 ft) or additional investigations to confirm the absence of sub-seabed archaeological resources.

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