***QUEEN ANNE'S REVENGE* Shipwreck Project Archaeological Recovery Plan**
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1.0 INTRODUCTION

1.1 Purpose

This recovery plan addresses the reasons for undertaking the May 2005 expedition at North Carolina archaeological site 31CR314 and describes the archaeological objectives, methodology, and protocols that will guide the work. Supplementing the recovery plan are operations plans written by field supervisor Chris Southerly (2005b) and project conservator Sarah Watkins-Kenney (2005).

1.2 BACKGROUND

A shipwreck, designated 31CR314, located in Beaufort Inlet has been identified as an early 18th century ship, the pirate Blackbeard's flagship *Queen Anne's Revenge*, which is known to have been lost at that location in 1718. As such the shipwreck, commonly referred to as the *QAR* site, is a significant cultural resource lying within North Carolina waters. The site has been declared a State protected area and listed in the National Register of Historic Places. It is the oldest shipwreck discovered in the state, holds a wealth of information concerning early eighteenth-century seafaring, and provides a rare glimpse of activities associated with North Carolina's early development during the Proprietary Period.

Soon after its discovery in 1996, Intersal, Inc. relinquished their salvage rights as part of a cooperative agreement with the North Carolina Department of Cultural Resources. Since 1997, under the direction of the Underwater Archaeology Branch (UAB), archaeologists undertook a series of field expeditions to examine the shipwreck and assess its environmental setting, specifically looking at the condition, age and nature of the site as well as the conditions affecting preservation. Environmental review procedures developed in the 1980's by UAB provided a phased approach for the state's submerged cultural resource management, which was adopted for the *QAR* site (Wilde-Ramsing and Lawrence 1984). The recovery of a limited number of diagnostic artifacts, including six cannon and a variety of small objects, aided in the assessment process but artifact recovery has been restricted due to the lack of conservation capabilities. Emergency recovery was undertaken during two expeditions in 2000 to remove a section of the ship's hull structure and associated artifacts that become exposed during catastrophic storms and placed them in fresh water storage.

At the completion of the initial assessment phase, a management plan provided a preliminary review of findings (Wilde-Ramsing and Lusardi 1999). Due to the shipwreck's significance and exposure from destructive storm currents, the plan determined that total recovery was the preferred management option. Site managers, however, recommended that artifact recovery not commence until adequate conservation facilities were in place and professionally staffed and data base systems were developed to handle the recovery of what was projected to exceed one million individual artifacts from this single shipwreck. After several years of development by the beginning of 2005 a professionally staffed *QAR*

artifact conservation laboratory had been established on the campus of East Carolina University (ECU), the North Carolina Maritime Museum's (NCMM) Gallant Channel *QAR* Artifact Repository was receiving restored artifacts and open for public tours, an extensive data management program was in place, and most importantly the majority of artifacts recovered to date were conserved and analyzed and on their way to NCMM paving the way to resume efforts toward full recovery. In the fall of 2004 a major grant from the Golden LEAF Foundation was received to support a twelve-month recovery project beginning in January 2005.

2.0 RESEARCH GOALS AND OBJECTIVES

2.1 Research and Analysis

Additional excavation is aimed at sampling artifacts and gathering data from across the site to refine current understanding of the projected site layout, the nature of the remains with regard to material culture, and past environmental conditions affecting site formation.

2.2 Management and Mitigation

Information gathered during the expedition will be used to clarify research questions and collection strategies from which to develop a research plan in the event of full-scale recovery.

3.0 METHODS

3.1 Research and Analysis

3.1.1 Sampling Strategy [Site Layout]

Based on observations to date is reasonable to assume that cultural remains at the *QAR* site retain spatial integrity upon which to delineate and observe historic shipboard activities. It has been demonstrated at many shipwreck sites that a close analysis of seabed distributions can detect distinct ship features and activity areas and consequently, provide a means to examine cultural expressions tied to the floating vessel.

Southerly's (2005a) analysis places the *QAR* site into Class 2/Class 3 using Keith Muckeroy's (1978) classification system for wreck sites. Characteristics include the survival of fragmented elements of structural members, some organic remains, and the presence of many other artifacts. Spatial distribution of the artifact assemblage is scattered but ordered. Southerly continues his assessment of the wreck site by placing it within the Buoyant Hull Fracture Category developed by Delgado (1997: 57 - 59). While the system is typically used for beach wrecks it can be applied to shipwrecks lying within an inlet's ebb-tidal delta. The events creating this type of archaeological shipwreck site are described in the following fashion. An intact or nearly intact vessel is run aground and then breaks up, during which structural components and artifacts scatter to varying degrees before sanding up and becoming buried. Subsequently, portions of the site may become

re-exposed during periods of sediment erosion and during exposure items may further deteriorate and be broken up into smaller components. Artifacts will be redistributed during exposure and eventually the site may be entirely lost. (Delgado 1997: 57-59)

The above scenario may very well describe events at the *QAR* site based on multi-disciplinary observations (McNinch *et al* 2001; 2005; Trembanis *et al* 2003; Wells and McNinch 2001; Suggs 2004; Lindquist 1998). Given it's historic location, the doomed vessel was immediately subjected to both offshore and inlet currents, and therefore it's lower portions likely buried quickly while the upper works weakened and broke off depositing the heavier, more resilient artifacts to the seabed. Dispersion of the upper works would be dependent on the force of surface winds and current, inlet flow, and nature and weight of materials. Historic charts indicate several episodes when the inlet migrated across the shipwreck site during the 19th century and early 20th century (Wells and McNinch 2001). During times when inlet currents flowed directly over the site, the wreckage became re-exposed and the site likely suffered further deterioration. The last inlet migration event took place in 1927 when channel depths were 20 feet at the site. Judging from this episode, historic exposure to inlet currents may have been relatively short in duration, measured in terms of months rather than years. In 1928 water depths were 15' and by 1930 the site was completely shoaled with only 6' of water over the site (Suggs 2004).

Since that time charts show a shift from the occasional impacts of natural migration to the long-term effects of inlet stabilization and progressive deepening and widening of the shipping channel by the US Army Corps of Engineers beginning in 1936. Nautical charts over the past 70 years show the slow and steady loss of sediment at the *QAR* site (Suggs 2004). This is symptomatic of an the overall erosion of the ebb-tidal delta due to channel dredging, which takes large amounts of sand out of the littoral system (Cleary 1999). Nautical charts and age dating of the most mature coral growing on the exposed wreckage at the QAR site (Lindquist 1998) indicate that around 1980 water depths reached 20 feet and the site became exposed. Over the past 25 years, scouring wave generated currents, predominantly hurricanes, has continuously affected the archaeological remains. The primary reason for this exposure is a scour resistant sand layer, which lies beneath the wreck site and restricts the burial process (McNinch 2005). Recent studies by project archaeologists show a five-inch net sediment loss relative to exposed portions of the site over the past four years, thus demonstrating an increasingly exposed condition (Southerly 2005).

Beyond the natural conditions surrounding site formation, a review of archaeological site for their cultural similarities found that HMS *Dartmouth* (Martin 1978) as discussed in *Maritime Archaeology* (Muckleroy 1978: 188 – 188) was particularly relevant for interpretation of the *QAR* site. In the case of the *Dartmouth* (1690), indicator artifacts such as instruments, tableware and pistols were tied to stern activities while items related to the bosun's were placed in the bow. Similarly, on QAR instruments and tableware are concentrated at the southern end and thus suspected to be the stern. Archaeological evidence also suggested that the *Dartmouth* lay over on its starboard side and in the process its

cannons fell from the deck and were distributed along the northern edge of the site. Analysis of artifact classes from the *Dartmouth* supported horizontal distribution of lower to upper hull layout resulting from it's laying over on its side. Bricks, tiles, and faunal remains related to the galley area were separated by a sterile band from lead shot (armory) and rope and rigging elements (bosun's locker) originally located in the lower part of the hull. At the *QAR* site, cannon are distributed along its western margin suggesting that, in this case, the ship heeled to port and spilled objects from its deck. The distribution of additional lower to upper hull related artifacts has yet to be examined.

In order to gather comparative data, a maximum of sixteen 5' x 5' excavation units have been placed across the site to bring overall site recovery to approximately 7%. The logic behind unit placement was to provide general data regarding site layout and specific information to address a number of research questions regarding artifact distribution and site formation. They include the following:

- ***Fore and Aft Zones*** - Taking into account previous excavations, a stratified sampling system guides the placement of three units within each of five distinct zones (stern, aft, midship, forward, bow) that dissect the site from the south (stern) to north (bow); a few units will sample the extremities on either end of the site [see site plan with zones and excavation units]. Site layout is based on the projected length of an early 18^{th} century vessel of 90' – 100' overall length, which is based on anchor size and hull planking thickness documented from the site [see site plan with vessel on keel]. Projections of the vessel's original position on the seabed is further refined by examining artifact variation across the site, principally the location of a greater predominance of pewter plates, scientific and medical instruments, and gold dust found in the southern portion are taken to represent the stern. A large anchor on the north end is thought to be one the ship's bower anchors.

- ***Athwartship Sections*** - Unit location within each zone has been selected to address research inquiries beyond simply stern to bow site stratification. The primary factor is to insure that each zone is sampled from east to west. If indeed evidence of cannon scattered along the west side of the *QAR* site indicates that the vessel heeled over after wrecking, as with the HMS *Dartmouth*, there may be horizontal stratification between the lower bilge and deck level [site plan with vessel on port side]. This would be in contrast to a vessel that deteriorated on level keel, where artifacts lying on east to west would represent starboard to port and exhibit few discernable differences.

- ***Site Formation*** - The placement of systematic units across the site allows archaeologists to examine potential impacts from natural elements. Based on previous observations, dominant current flow during periods of exposure is in a northerly direction (McNinch et al 2001). Marine

geologists using sub-bottom sonar have revealed the presence of scour marks from submerged shipwrecks, which act as obstructions to alter current flow and enhance scour and deposition (Caston 1979; Quin *et al* 1997). This phenomena is also report at the QAR site, "The concretions of the artifacts create a strong backscatter signal, inverted and expressed as white, and can be seen elevated above the surrounding seafloor with a linear depression visible in the background immediately behind the mound" (McNinch *et al* (2005:17). Based on predominant current flow, artifacts with less specific gravity are more likely to migrate to the northern portion of the site and overall artifact distribution should extend further from the main wreckage. Preliminary observations examining ballast recovered from 31CR314 have shown a proportionally greater number of smaller, lighter stones in forward of the midship area (Craig 2005 personal communication). Artifact distributions observed during exploratory excavations, which need substantiation, hint that the southern margins of the site may be more defined relative to the northern end where artifacts appear to thin out presumably due to scour.

To gain a better understanding concerning localized movement of small artifacts horizontally across the site, excavation units may be expanded on either side of at least one large object, presumably a cannon prior to its recovery. The purpose is to determine if there is a detectable snowdrift effect whereby heavier artifacts concentrate or pile up on the side from which the predominant current flows (south) compared with the lee side (north) where small artifacts may be less abundant due to obstruction from the larger object and subsequent scour and dispersal.

- ***Activity Areas and Diagnostic Artifacts*** – Several units will also be placed predicated on the possibility that they will confirm locations of specific activity areas. These are the galley area and position of the foremast rigging in the bow zone and the locations of the rudder/stern post and mizzenmast of the stern. Some excavation units are designed to investigate gradiometer targets that are likely to represent undocumented cannon. Ship's cannon have proved among the most chronologically diagnostic type of artifact, providing dates of manufacture through their styles and in one case an absolute casting date. They also provide a better understanding of overall ship size and armament, as well as gunnery practices distinguishing military from non-military practices. Perhaps most importantly, individual cannon often bring with them a wealth of attached, well-preserved artifacts as part of the overall concretion. Cannon C4 with over 700 hundred intact, hand-wrought nails and the Baby Ruth concretion containing Cannon C19 and Cannon C21 along with tobacco pipes and animal bone both amply illustrate the reason for seeking out cannons as items to recover. Other artifacts, particularly pewterware and scientific instruments, may contain marks related to manufacture or ownership and will be recovered as the occasion arises.

- ***Stratigraphic Examination*** – The recording of elevations within each excavation unit will be tied to the central datum located north of the main mound and established at 98 feet above the projected primary datum. Using string and line levels, a temporary datum will be established on each of the baseline stakes, which will in turn provide a means to establish vertical reference points at each of the excavation units (southwest corner post). By keeping distances to a minimum of 30 feet when pulling vertical references and cross checking, three-inch accuracy will be maintained throughout the site.

  Excavation units located at the four extremities of the site will serve as areas to further investigate the stratigraphic record. While standard observations will record the thickness of the sediment overburden and cultural layer, the scour-resistant and culturally sterile sediment layer underlying the site will be further examined. Sediment coring and excavation will help advance geological understanding and predictive modeling for storm impact studies.

3.1.2 Excavation Unit Positioning and Order of Excavation

Selection of each 5' X 5' excavation unit, which are designated by the position of their southwest corner stake, will be predicated on a staggered approach from one end of the site to the other beginning at the north end. This will keep units reasonably close to each other for topside logistics and potential backfilling a previously dug unit while working on the next. An east-west separation between consecutive units will minimize the impacts of dredging activities by allowing the dredge outflow to exit the site without coming across areas and reducing visibility where mapping and artifact recovery are taking place. On a broader scale, the staggered approach provides a basic north-south and east-west sampling of the site. At the end of the project, should only 1/3 third of the work be accomplished during the expedition due to adverse weather, researchers will still have recovered useful information (see primary track below) with which to accomplish their goals.

During the course of the expedition, the placement of excavation units or recovery methods may be altered. One scenario would be expanding a unit to explore and recover a diagnostic artifact that extends outside the designated unit. Some units may be more complex and require adjusting documentation strategies to complete excavation. With that said, the order of unit excavation will commence as follows:

- ***Primary Track***
  1). E 90/N130, Front zone – Examine extent of artifacts north*.
  2). E75/N110, Bow zone - Check large anomaly target as potential cannon and investigate galley/above deck section**.
  3). E105/N95, Forward zone - Check small anomaly target and lower deck section.
  4). E65/N75, Midship zone – Examine extent of artifacts west and upper deck; record measurements on C15**.

5). E85/N50, Aft zone - Check small anomaly target and mid deck; examine evidence of previous excavations 1997 TUI and artifact migration.
6). E70/N20, Stern zone – Examine extent of artifacts south*.

- ***Secondary Track***

7). E85/N35, Stern zone - Check negative anomaly area and investigate rudder and stern post/bilge section.
8). E65/N35, Stern zone - Examine extent of artifacts west and upper deck section.
9). E105/N50, Aft zone- Check small anomaly target and lower deck section*.
10). E65/N60, Aft zone - Check large anomaly target as potential cannon and investigate upper deck section**.
11). E110/N75, Midship zone – Examine lower deck section.
12). E65/N95, Forward zone -Check negative anomaly area and upper deck section; also look at snowdrift affect on current side of C23*.
13). E105/N110, Bow – Examine extent of artifacts east and lower deck section.
14). E70/N125, Bow – Examine extent of artifacts west and upper deck section.

- ***Tertiary***

15). E80/N120, Bow -Examine condition of previously explored area (102' trench) and recover deadeye.
16). Excavate north side of C23 in preparation for recover and examine current flow lee side**.

* - Inspection and sampling of scour resistant layer; ** - Potential cannon recovery

3.1.3 Recovery Methods

After establishing unit location and placing mapping frame over the site, excavation will proceed. Dredge operators will be experienced archaeologists and technicians and coordinated by the supervising archaeologist. Recovery will proceed as follows:

- Removal of overburden down to the tops of the artifacts, which may be as little as a few inches to nearly 4 feet, will be accomplished with a 6" induction dredge and the unscreened outfall will be directed toward the margins of the site and noted on the site plan. The dredge operator will be directed to stop operations and report the situation in the event that cultural materials are detected.
- Once the artifact layer is encountered, the 6" dredge will continue until the tops of artifacts are defined. During this stage excavation will be extended on each side to attain side slopes that minimize slumping of sand during the completion of the excavation.
- The artifact-bearing layer is known to be 9" to 15" based on past observations. Once the tops of artifacts are defined, physical mapping,

recording the elevations of major artifacts and sediment levels, and if possible, photo-documentation will be undertaken.

- Excavation will then commence with a 3" dredge system that brings the outfall to the surface and through an artifact containment system using a sluice and ¼" sluice system to insure that all but the very smallest size objects are captured. The captured spoils from an excavation unit will then be culled by hand for artifacts on a sorting table and again run through screen mesh.
- Once artifacts within a unit are sufficiently exposed, each unit will be documented using a combination of physical mapping and photography.
- Archaeologists will determine elevations from positions taken from the datum post. Heights will be recorded for the seabed height, elevations of prominent artifacts, and bottom of the cultural layer (top or scour resistant layer.
- Artifacts measuring greater than 6 inches on at least one side or exhibiting a notable diagnostic features will be tagged, and recovered as a single feature.
- After removing all 6 inch artifacts and prior to reaching the lowest level of the cultural layer, a scoop sample will be taken from the lower level of the cultural layer and processed to determine the potential for small flakes of gold or minute lead shot. Since artifact resorting has been observed throughout the site based on the presence of intrusive modern materials, tiny lead shot and flakes of gold are likely to be the only significant cultural materials surviving in context and they would have migrated to the lowest portion of the cultural layer.

  If the scoop sample test is positive, excavation outfall will be run through a gold sluice system located on the recovery vessel. The system is designed to recover minute artifacts, such as gold dust. Otherwise, final cleaning of the unit will continue by running the dredge outfall through the screen wire box containment system.
- Artifacts smaller than 6" will be placed in mass in recover buckets and brought to the surface for further inspection and processing. Smaller artifacts will be captured through the screen/sluice system..
- At four unit locations (E90/N130, E70/N20, E105/N50, E65/N95), excavations will continue below the cultural layer to sample and document the nature and depth of the scour resistant layer and underlying strata. 36-inch push cores will be used in an attempt to penetrate the layer; otherwise, grab sampling and excavation will be employed.
- Operations plans have been developed to provide procedure and protocol during all phases of data and artifact recovery planned for the 2005 expedition. See the attached Field Operations Plan (Southerly 2005b) and Conservation Recovery Plan (Watkins-Kenney 2005).

3.1.4 Artifact and Site Analysis

The investigation of anomaly targets and major features related to suspected activity areas, such as evidence of bricks and tiles from the galley stove, will

generally be answered during excavation. Since grant funding supports artifact cataloguing, basic documentation, and placement of unclean artifacts into interim storage, with the exception of ballast stones and the few artifacts that are free of concretion and observable, most artifacts will not be readily available for analysis. It is hoped that prior to storage, services of an X-ray facility will enable conservators the opportunity to diagnose many of the concretions and obtain an understanding of their content. In terms of research and analysis, X-rays would be important for several reasons. First, they would help catalog and store items, and secondarily, they would provide greater information for preliminary site interpretation. Radiographs taken of previously recovered concretions have provided the means to determine the size and numbers of lead shot and iron objects, for example cannon balls and cask hoops, without cleaning. Recent X-rays conducted at the Maryland Archaeological Laboratory showed even greater detail. In one instance, a wooden ruler was detected within a bar shot concretion. Finally, at such time that disassembly and cleaning takes place, X-rays provide the conservator a valuable clues on how best to clean and break apart concretions mechanically.

Classifying artifacts within each excavation unit, whether they are obvious to the naked eye or observed through radiographs, sets the stage for an examination of their frequency and relationship between units and across the site. The use of Geographic Information Systems (GIS) allows archaeologists the means to analyze artifacts in context with the spatial aspects of the archaeological site and its associated features, which is critical to understanding cultural and environmental processes. Development and entering of new data includes the following GIS data layers as described by Turner (2000:14):

Site Grid – This data set has been created at the onset and represents the five-foot by five-foot excavation grid. Each grid polygon can contain text attributes, artifact information and links to images.

Site Plan – This data set is created from AutoCAD based on field drawings and contains text attributes that reference vessel features and artifact information.

Vessel Features – This data set represents major and minor construction features. The features will be denoted as points that reference a generalized feature location. The point can contain text attributes and also contain a link to a scanned image that represents greater detail.

Artifacts – This data set will represent the artifacts and their location in relation to the wreck site. The points/polygons can contain text attributes as well as links to the specimen catalogue and conservation database.

Comparative analysis of certain types or classes of artifacts and their quantities within respective unit zones and sections will help address many of the research questions raised in this recovery plan prior to entering the field.

3.2 Management and Mitigation

Beyond recovery operations, Golden LEAF Foundation funding, which extends to the end of 2005, will permit cataloguing and preliminary examination of recovered artifacts prior to placing them into wet storage. This will effectively retrieve and save a portion of the shipwreck site for future analysis and study. The collection will be

particularly important should a catastrophic storm event impact the site and in that event can serve as baseline data to observe changes that occur due to severe current-driven artifact movement.

During the 2005 recovery project, site managers seek to excavate and process approximately 5% of the shipwreck site, which can be used to project future needs should partial or full recovery become necessary to mitigate loss. While multiplying the field recovery efforts and raw artifact numbers committed during 2005 operations by a factor of 20 to project total recovery is a bit simplistic, it can be used to test earlier estimates based on limited excavation and exploration (Wilde-Ramsing 2005) and provide new estimates for planning purposes. For example, is it reasonable to expect full recovery can be accomplished in a 20-month period at funding levels of approximately 1 million dollars to support field operations, artifact cataloguing, preliminary analysis, and interim storage.

Site managers should also be able to refine excavation and artifact collection strategies based on work conducted in 2005. Using this information, a research plan should be completed to guide full-scale recovery, regardless of pace. This document will further identify and prioritize research questions and determine methods of recovery that will collect relevant data and expedite the process in a cost-effective manner.

What is not within the scope of the Golden LEAF Foundation funded project is subsequent cleaning, analysis, conservation and long-term storage and display of artifacts recovered during 2005. Based on previous work on QAR artifacts, at the current level of $100,000 per year, conservation will take 5 years to complete (Watkins-Kenney and Nordgren 2005). Should twice the funding be available the length of processing time would be significantly reduced, although larger artifacts, specifically cannon, will require additional time to complete conservation. Once processing of the 2005 collection is completed, managers will be able to review current estimates of time, personnel, equipment and facilities needed to complete conservation and analysis of the total artifact assemblage from the *QAR* site.

4.0 Expected Outcome and Evaluation

The accomplishment of goals and objectives as laid out in this document will be evaluated by December 2005. In the event that fieldwork conducted in May falls short, additional work may be scheduled for two weeks in late August/early September to complete excavation and recovery. This will allow enough time to catalogue, document, and place into temporary storage recovered artifacts. At the end of the funding period a report to Golden LEAF Foundation will provide an accounting of the work completed, preliminary analysis of materials recovered, and projections on future needs, both in terms of recovered artifacts and full-scale recovery. Preliminary results will be used to develop an overall research plan for the shipwreck site and projections for equipment, personnel, and funding to conduct additional site recovery. The final outcome of work undertaken during 2005 will be dependent on the completion of concretion cleaning and analysis, which will take several years given the best scenario. At that time, an interim report will be produced as an addendum to the interim project report scheduled for completion later this year.

While not covered within the recovery plan, a primary goal of the Golden LEAF Foundation grant is to heighten public awareness during renewed recovery operations. This, in turn, will lead to an increase in traveler visitation and spending in coastal North Carolina. This economic boast may clearly demonstrate the public's interest in the project and willingness to support the cleaning and conservation of artifacts recovered during 2005. If funding is successfully obtained for artifact processing, research and interpretive data will be greatly expanded since many more artifacts will be available for display at the NC Maritime Museum and other venues around the state and country, and the conservation laboratory will reduce its backlog in preparation for additional recovery. Evidence of public support can be measured through attendance at museums, exhibits, and programs featuring the *QAR* site, website hits, media coverage, and public inquiries. Ultimately, the final measure of success will come when funding is received not only to complete the 2005 archaeological research but the financial means are secured to adequately manage and protect the shipwreck for years to come. Given current understanding of the site situation and predictions of heighten storm activities in the immediate future, the full-scale rescue of all items lying on the seabed to safety of conservation and curatorial facilities of the state of North Carolina is likely an important and necessary final goal for the *QAR* site.

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