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Underwater Cultural Resources Management

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for
Naval Historical Center
Washington Navy Yard

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**A Historic Archaeological Resources Protection Plan
and
Geographic Information System
for
Shipwrecks in Virginia Waters Under the
Jurisdiction of the United States Navy**

Submitted to:

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Washington Navy Yard
Washington, D. C.

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Abstract

The State of Virginia is the cradle of English civilization in North America. As a consequence of maritime and naval activities associated with almost 400 years of continuous occupation and development, the territorial waters of the State of Virginia have become a repository for several thousand historically significant shipwrecks. Two hundred and eleven of those shipwrecks have been identified and included in a database developed by the Naval Historical Center (NHC) and the Institute for International Maritime Research (I²MR). Those wrecks and derelicts are the remains of United States navy ships, Confederate navy vessels, prize vessels and warships of foreign powers that fall under the management responsibility of the NHC. In order to more effectively manage those submerged cultural resources, the NHC contracted with I²MR of Washington, North Carolina to develop a Geographic Information System (GIS) and Historic Archaeological Resources Protection (HARP) Plan based on vessels in Virginia waters included in the United States Navy Shipwreck Database Inventory. The GIS and HARP plan will provide the NHC with effective tools to protect and to manage those resources. The products of this research will provide a historical and cultural background for the Virginia shipwrecks under the NHC's management authority. The GIS will provide an expandable inventory of those historic and archaeological resources and identify priorities and methodologies for historical and archaeological research. Both the GIS and the HARP plan have been designed to locate and assess submerged shipwreck resources that could be impacted by development and other activities. The Virginia shipwreck GIS provides an active geographically-based data storage and recovery program that can be updated and expanded to serve both present and future submerged cultural resource management activities of the NHC.

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Introduction

The Naval Historical Center (NHC) is the United States government management authority for the remains of thousands of United States navy vessels and other United States and foreign government-owned vessels and aircraft that have been sunk or lost in American, international and foreign waters. To facilitate management of those historic submerged cultural resources, the NHC developed a database that identifies historically and archaeologically documented vessels and aircraft. In 1998, the NHC contracted with the Institute for International Maritime Research, Inc. of Washington, North Carolina (I²MR) to develop a Historic Archaeological Resources Protection (HARP) Plan and Geographic Information System (GIS) for NHC-managed shipwreck resources in the territorial and offshore waters of the Commonwealth of Virginia. The Virginia HARP plan has been designed to identify protection and research priorities and to identify legislation and regulations that impact management policies and the agencies responsible for supervision and enforcement. The GIS will serve as an electronic mechanism to store and recover data associated with the resources in, and offshore of Virginia waters.

The GIS for shipwrecks in Virginia and offshore waters under NHC jurisdiction has been designed to facilitate management of those submerged cultural resources. Because the first step in effective management is to define the nature and scope of the resources, I²MR has categorized shipwrecks by historical period and identified priorities for research and protection based on National Register of Historic Places (NRHP) significance. The HARP plan also identifies the legislation and agencies that play instrumental roles in submerged cultural resource management and protection in Virginia. It also identifies personnel responsible for submerged cultural resource related management activities and protocols for interagency cooperation in activities that could impact properties for which NHC has management authority. Finally, the HARP identifies priorities for survey, investigation and preservation of NHC managed shipwrecks and cultural material associated with those resources.

The GIS for shipwrecks in Virginia and offshore waters was developed to store, sort and recover geographical-related research and to manage critical shipwreck resource data. The system provides immediate spatial-related access to historical, cartographic, archaeological, photographic and video records generated by research. After selecting sites, the end user can query information contained in the NHC database. In addition, the program can be expanded to include new data, identify priorities for future research and provide control for on-site data collection.

The GIS and HARP plan for shipwrecks in Virginia waters were developed using a number of software packages. ArcView 3.2b, produced by Environmental Systems Research Institute (ESRI), served as the principle means of displaying GIS data in a user-friendly environment. Microsoft Office was used to create and edit databases, spreadsheets and text

documents. Corpscon was used to convert site locations between different coordinate systems. Adobe Photoshop 6.0 was used to acquire and enhance images. Adobe Acrobat 5.0 was used to construct reports and to hotlink to other sources of information.

The computerized shipwreck database assembled by NHC and expanded by I²MR serves as the basis for the GIS and HARP plan for shipwrecks in Virginia waters under the jurisdiction of the U. S. Navy. That database included more than 3,000 vessels that fall under the management authority of the U. S. Navy. One of the largest concentrations of navy-managed shipwreck resources lies in Virginia. With the inclusion of vessels identified by I²MR, the Virginia database now includes citations for 211 shipwrecks and derelicts.

Both the GIS and HARP plan for shipwrecks in Virginia waters were developed under the direction of Gordon P. Watts, Jr., who served as the principal investigator. Research and development activities associated with the project were carried out between September 1998 and December 2002. Project personnel included Dr. Ian Roderick Mather, Commander David Whall, Mr. Mark Padover and Dr. Gordon Watts who jointly developed the GIS. Dr. Watts, Mr. Raymond Tubby, Mr. Doug Jones, Commander Whall, Mr. Padover, Ms. Robin Arnold and Mr. Gary Gaddy carried out historical and cartographic research. Dr. Watts and Mr. Padover refined and integrated the NHC database with the GIS. The report document was written by Dr. Watts, Dr. Mather, Mr. Padover and Mr. Tubby. Editing responsibilities were carried out by Mr. Tubby and Ms. Arnold.

Project Location and Geographic Extent

The NHC/VA GIS project focused on navy-managed shipwrecks in the territorial and offshore waters of the State of Virginia (Figure 1). To the north, the geographical area covered by the NHC VA/GIS is defined by Virginia's border with Maryland. The actual boundary is the southern shore of the Potomac River. From the confluence of the Potomac River and Chesapeake Bay, that border extends east across the Chesapeake and the Eastern Shore of Virginia to the Atlantic limits of the United States territorial waters. The southern extremity of the GIS limit is the border with North Carolina and the Atlantic limits of the United States territorial waters. The western extremity of the project area is defined by the fall line of the Potomac River and Virginia rivers, like the Rappahannock, York and James that empty into Chesapeake Bay. The eastern extremity of the project area is physically defined by the offshore locations of U.S. Navy vessels sunk as a consequence of post-World War II weapons systems testing. The NHC VA/GIS covers an area of approximately 38,400 square miles of land and water.

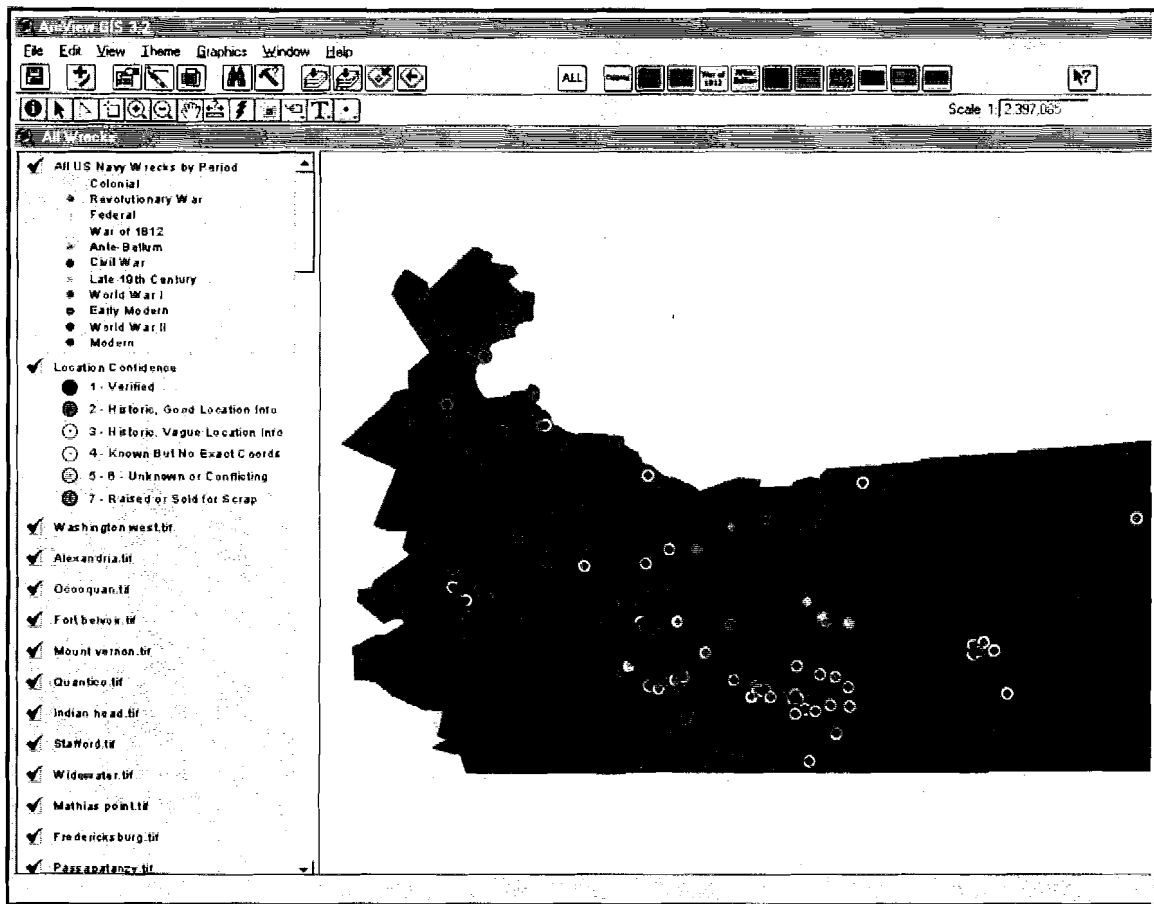


Figure 1. NHC/VA GIS project location map.

Shipwreck Ownership and Management Authority

Ownership of submerged cultural resources in Virginia has been addressed by state and federal law. In the first instance, ownership of resources like shipwrecks is dependent upon whether the vessels in question are located within a state's boundaries. Virginia claims ownership of any cultural material located within the state's navigable water and territorial boundaries that include a zone extending three miles offshore.

Three legislative acts, the *Abandoned Shipwreck Act*, 43 USC S 2105, the *Historic Preservation Act* and the *Submerged Lands Act* provide states with rights to submerged materials within their waters. For example, under the *Abandoned Shipwreck Act*, a shipwreck belongs to the State of Virginia if it is: 1) embedded in submerged lands of the state or, 2) included in or determined eligible for inclusion in the NRHP. The *Historic Preservation Act* established a State Historic Preservation Officer (SHPO) to help protect each state's historical and archaeological resources.

Under the *Abandoned Shipwreck Act*, the United States Department of the Interior (USDI) and the National Park Service (NPS) issued a set of final guidelines to help states manage shipwrecks in their waters. Those advisory guidelines state the following:

Abandoned shipwreck means any shipwreck to which title voluntarily has been given up by the owner with the intent of never claiming a right or interest in the future and without vesting ownership in any other person. By not taking any action after a wreck incident either to mark and subsequently remove the wrecked vessel and its cargo or to provide legal notice of abandonment to the U. S. Coast Guard and U. S. Army Corps of Engineers, as is required under provisions in the *Rivers and Harbors Act* (33 U.S.C. 409), an owner shows intent to give up title. Such shipwrecks ordinarily are treated as being abandoned after the expiration of 30 days from the sinking.

When the owner of a sunken vessel is paid the full value of the vessel (such as receiving payment from an insurance underwriter) the shipwreck is not considered to be abandoned. In such cases, title to the wrecked vessel is passed to the party who paid the owner.

An additional level of protection is afforded submerged cultural resources that qualify for inclusion on the NRHP. Sites determined eligible or included on the NRHP are specifically protected by federal legislation. Site-disturbing activities that are related to state and federal agency responsibilities, or are permitted by state and federal agencies are specifically regulated.

Not all shipwrecks in Virginia waters fall under the jurisdiction of the Commonwealth of Virginia. Warships and vessels with sovereign immunity and the remains of federally owned vessels (e.g., U. S. Navy vessels and vessels owned by the Confederate States of America) do not meet the criteria of abandonment as established in the *Abandoned Shipwreck Act* of 1987. Those wrecks remain the property of the United States government in accordance with the "property clause of the U. S. Constitution, Articles 95 and 96 of the United Nations Convention on the Law of the Sea (1982) and established principles of international maritime law" (Neyland 2001:2). Warships and vessels of the Confederate States are the property of the United States government according to the Supreme Court's doctrine of succession. While U. S. Navy vessels captured by foreign governments are no longer considered United States government property, ownership of naval vessels that have been "decommissioned" and "stricken" from active duty remains with the United States government (Neyland 2001:5). The remains of many U. S. and C. S. Navy, U. S. and C. S. Army, United States Coast Guard (USCG) vessels and military transports can also be considered as war graves. As such, access to those sites may be restricted in honor of those sailors, soldiers and marines who served and died aboard ship (Neyland 2001:6).

Federal law and Virginia state law have established ownership of shipwrecks in Virginia waters and it is the responsibility of both federal and state agencies to administer those laws and promulgate regulations. In Virginia, the responsibility for abandoned property on submerged state land is placed under the auspices of the Virginia Division of Historic

Resources (VDHR). Vessels determined eligible for nomination to the NRHP are also a management responsibility of the USDI under 43 U.S.C., Section 2105(b). Procedures for nominating a site to the NRHP are found within the regulations of 36 CFR Part 63 (U. S. Department of the Interior 1987). No single agency administers complete regulatory control for submerged cultural resource management. The VDHR provides data and guidance for historic preservation in the Commonwealth and the Virginia Marine Resources Commission (VMRC) issues permits for shipwreck surveys and investigation. Another function of VMRC is to coordinate interests between citizens of Virginia and the federal government.

By interagency agreement, those shipwrecks fall under the authority of the U. S. Navy and are managed by NHC personnel in Washington, D. C. The U. S. Navy and General Services Administration (GSA) require that federal and state agencies, organizations and individuals coordinate potential project activities which might impact those resources through *Section 106* of the *National Historic Preservation Act* and the *Archaeological Resources Protection Act*. Project activities in areas that do or could contain shipwrecks owned and managed by the federal government should be coordinated with the appropriate agency. When identified, the appropriate agency should issue permits for all activities that are planned in areas where federally owned shipwrecks are located.

The single most important element of a submerged cultural resource management program is the *Section 106 Review Process*. Sections 106 and 110(f) of the *National Historic Preservation Act of 1966* (as amended) require that agencies assess the effects of federal, federally assisted or federally licensed projects on properties included in, or eligible for inclusion in the NRHP. The *Section 106* process has been designed to address historic preservation priorities. Information assessment is the initial step in the *Section 106* review process.

Following a determination by federal or state agency officials that a project may adversely affect cultural resources, a designated official initiates an assessment of information needed to complete the *Section 106* review. Next, the government representative seeks to locate historic properties in the project area. The agency official and the SHPO then evaluate whether properties found are "historic" and potentially eligible for nomination to the NRHP. If there are no NRHP or NRHP-eligible properties within the project area, the agency official is not required to take further action in the *Section 106* process. When historic properties are found, the agency official must assess the project's effects upon the historic property. By providing easily accessible site-specific and regional information, GIS facilitates a more effective, project specific *Section 106* compliance process.

All federal, federally assisted and federally licensed projects that impact the submerged bottomlands of Virginia are reviewed through the *Section 106* process. Where the potential for submerged cultural resources appears to be high, or there are known submerged cultural resources in the area, the SHPO may require a Phase I survey. Phase I surveys are generally designed to employ remote sensing equipment such as side scan sonar, sub-bottom profilers and proton precession magnetometers to identify submerged cultural resources. Where magnetic and/or acoustic signatures that are determined to be suggestive of potentially

significant targets are identified, additional investigation may be required. That Phase II investigation is generally designed to identify material generating the target signature, collect sufficient historical and archaeological data to support a determination of NRHP eligibility and to assess the impact of project related activities.

Where NRHP-eligible submerged cultural resources are identified and proposed, or project activities would have adverse impact on the site, Phase III data recovery may be required. Phase III projects are designed to preserve, by documentation, those aspects of the archaeological record that make the site eligible to the NRHP. In cases where the resource is particularly valuable, Phase III research may also be designed to preserve the surviving vessel fabric and/or other cultural material. With occasional exceptions for highly significant resources that require a unique approach to preservation, Phase III activity usually clears the way for project-related activities. All submerged cultural resource-related research activity must be conducted by trained personnel that meet the professional standards adopted by the Secretary of Interior, and are identified in the *Federal Register* (Department of the Interior 1983). The USDI standards for professional personnel were also adopted by VDHR (VDHR 2001:78).

Coordination of management and protection activities, associated with NHC-managed shipwrecks in Virginia waters, is defined by a 1998 cooperative agreement between the U. S. Navy and the VDHR. In accordance with that agreement, VDHR agreed to provide access to data in its records associated with shipwrecks included in, or eligible for inclusion in the NHC VA/GIS database. VDHR also agreed to protect sensitive information regarding U. S. Navy-managed shipwrecks and coordinate with NHC to manage and to protect those resources. The NHC, likewise, agreed to provide similar information, protect access to the data and to coordinate with VDHR in the management and protection of U. S. Navy-managed shipwrecks (*Memorandum of Agreement*, Appendix A).

NHC/VA GIS and HARP Plan Goal and Objectives

The goal of the NHC/VA GIS project is to produce a comprehensive and innovative GIS-based management tool and HARP plan for NHC-managed shipwrecks in the territorial and offshore waters of the Commonwealth of Virginia. To accomplish that goal, I²MR personnel identified a number of critical objectives. One of the most important elements was historical and literary research designed to identify shipwrecks meeting management criteria for inclusion in the NHC database. Wherever possible, a brief ship history was identified or developed. Of equal importance, the conduct of historical and cartographic research proved essential to establish geographical coordinates for the location of each vessel in the database. The historical and literary context also supported assessments of shipwreck significance.

Another important project objective was to define the nature and scope of the resource base. At present, those resources consist of the 212 shipwrecks on the NHC database. While only six are currently listed on the NRHP, all of the surviving wrecks should be considered potentially eligible. The significance of those vessels can be interpreted in relationship to

their vessel-specific historical context and a historical background synopsis has been included in the HARP plan. To facilitate identification of management priorities, the HARP plan contains a general assessment of significance, research potential, research priorities and threats to the resources. To facilitate resource protection, the HARP document includes a treatment of legislation, agency regulations, the *Section 106* process and channels of authority and enforcement.

Equally important objectives were associated with construction of the NHC/VA GIS. The system was developed using multiple software packages and is accessible through programs produced by ESRI. Following identification of the most versatile and functional software, research focused on system design and construction. Constructing the cartographic basis of the NHC/VA GIS was accomplished using available data files and United States Geological Survey (USGS) quadrangle maps. I²MR researchers used a combination of vector and raster maps as the cartographic foundation for the NHC/VA GIS. This foundation provided the geographic context data against which end-users can access site-specific information.

Shipwreck data access was tied to cartographic coverages through symbols that identified historical periods and levels of locational accuracy. By selecting individual sites, NHC personnel can query corresponding database records and access additional information about each wreck. Database information was tied to each wreck-specific symbol and hot links provided access to additional archaeological, historical and cartographical information. Coverages and themes developed for the NHC VA/GIS can be transferred to other GIS packages as management prerogatives are developed.

Collectively, the NHC VA/GIS and HARP plan provide inventory, assessment and management tools to facilitate identification, investigation, protection and preservation of NHC-managed resources. In addition, and perhaps most importantly, the NHC/VA GIS can be expanded to include new sites, more accurate site locations, additional site-specific data, priorities for future research and support the development of individual site management plans.

NHC-Computerized Shipwreck Database

The NHC/VA GIS and HARP plan prepared by I²MR is based on the shipwreck database compiled by the NHC. That wreck inventory included more than 3,000 vessels that are the property of the United States government or fall under the management responsibility of the NHC as a consequence of agreements with foreign powers. Virginia waters contain one of the highest concentrations of U. S. Navy-managed shipwrecks in the United States. At present, the database includes 212 vessels lost in, or offshore of Virginia. The NHC VA/GIS and HARP plan addresses each of those vessels.

The NHC database was one of the initial priorities for the underwater archaeology program created in 1993. That program was developed to comply with the cultural resource identification and protection requirements placed on federal agencies by *Section 110* of the

National Historic Preservation Act. The current NHC database was created by merging one, developed by the NPSs National Maritime Initiative (NMI), with a preliminary list compiled by NHC personnel. Initial criteria for inclusion in the database was limited to “all submerged vessels owned or managed by the U. S. Navy” and “lost through war or peacetime operations in U. S. or foreign waters from the colonial-era to the present” (Voulgaris 2001:2). Those wrecks remain the property of the United States government in accordance with the “property clause of the U. S. Constitution, Articles 95 and 96 of the United Nations Convention on the Law of the Sea (1982), and established principles of international maritime law” (Neyland 2001:2).

Ultimately, additional classifications of vessels were also included. Although jurisdiction over some vessels on the database remains to be established, those that meet the following criteria were included:

USN vessels sunk while temporarily transferred to foreign control or under Lend-Lease.

Privateers and blockade runners.

USCG vessels transferred to the navy during wartime.

Some captured prize vessels.

Older vessels described as sunk and raised, sold or permanently transferred but with no available subsequent history of non-USN service.

Significant hulks or vessels donated or transferred to foreign governments.

Partially salvaged vessels where significant remains may exist.

World War II Era Japanese vessels in United States or Allied forces' waters.

German U-boats in United States waters (Voulgaris 2001:2)

Access to the NHC VA/GIS database information is limited. Because those data could be used for purposes other than research and management, requests for information can be limited or denied by the NHC. Section 304(a)(2) of the *National Historic Preservation Act* (with 1992 amendments) provides NHC with that authority. *Freedom of Information Act* requests can also be denied under 32 CFR 701.25 Exemption 3: Limited by Statute (Voulgaris 2001:5).

Shipwreck Specific Locations

During the development of the NHC VA/GIS and HARP plan, I²MR personnel researched each database vessel in Virginia waters. The principal objective of that research was to better define the geographic location for each wreck. In most cases research generated more specific information on each vessel's geographical location than was included in the NHC database. Historical, archaeological and cartographical data on site locations were converted to latitude and longitude, Universal Transverse Mercator (UTM) and state plane coordinates for inclusion in the NHC VA/GIS.

Highly accurate positions have been identified for most previously located shipwrecks where there has been site-specific archaeological research. However, archaeologically investigated shipwreck sites in the NHC VA/GIS database are limited to the remains of Revolutionary War vessels at Yorktown and Civil War vessels at Hampton Roads and in the James River. For many, yet uninvestigated shipwrecks, GIS coordinates are based on historical and cartographic research. In certain cases, historical data identifies the location of a wreck by coordinates. In others, the location of a wreck might be tied to a geographical feature like a shoal, a bend in a river, the mouth of a creek or other similar reference. Historical features such as mills, landings, bridges, houses or less specific sites such as towns, identify some wreck locations.

Cartographic research identified a number of historic maps and charts that contain the locations of shipwrecks on the NHC database. Some, like a post-Civil War chart of Drewrys Bluff [James River], plot the exact locations of wrecks. In that case, the wrecks were associated with the James River Squadron [C. S. Navy]. Unlike most cartographic references, that chart contained the names of each of the scuttled ships (Figure 2). Other charts, like one of the Pamunkey River [above West Point], identify the locations for several Confederate transport vessels scuttled in 1862.

Vessel Illustrations

Literature and historical investigations associated with the database shipwrecks identified images of a number of the vessels. Those images include plans, contemporary photographs (Figure 3), paintings, drawings and lithographs. Some illustrations are modern drawings based on historical descriptions and others represent lithographs and engravings from contemporary newspapers and publications. In the event that a vessel was one of a class or can be illustrated by a similar ship type, images of other vessels may be included. Where information from the wreck site is available as a consequence of archaeological research, sonar images and/or site plans are included (Figure 4).

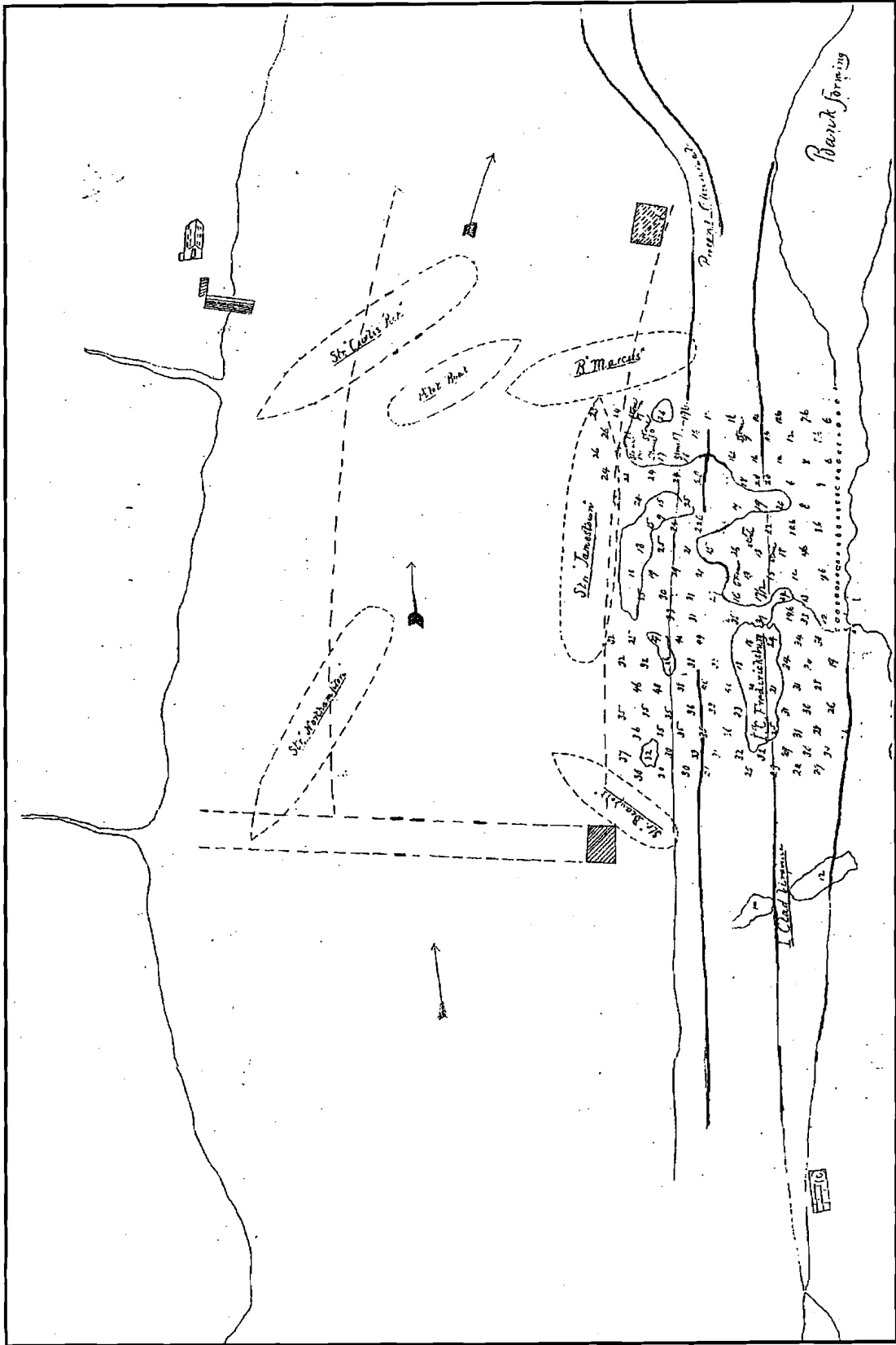


Figure 2. 1881 Maillfert map depicting obstructions and wreck locations at Drewrys Bluff (United States Army Corps of Engineers (USACE), Norfolk District).

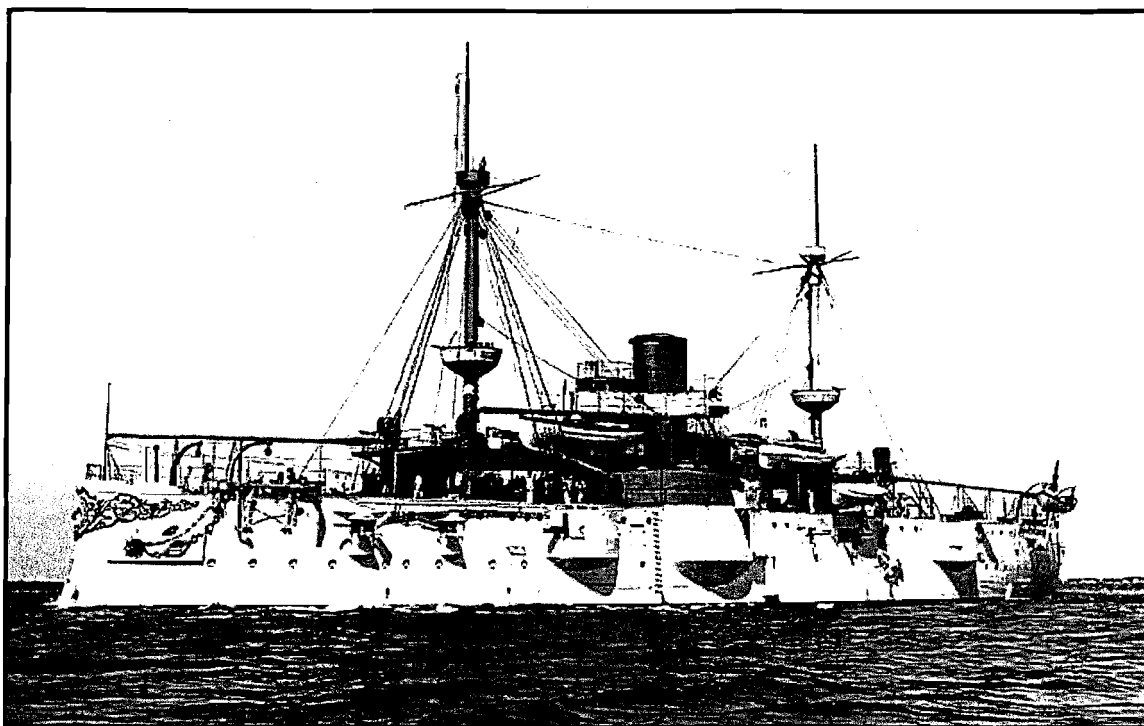


Figure 3. Photograph of USS *Texas* pre 1898 (Photo NH63506, Naval Historical Center).

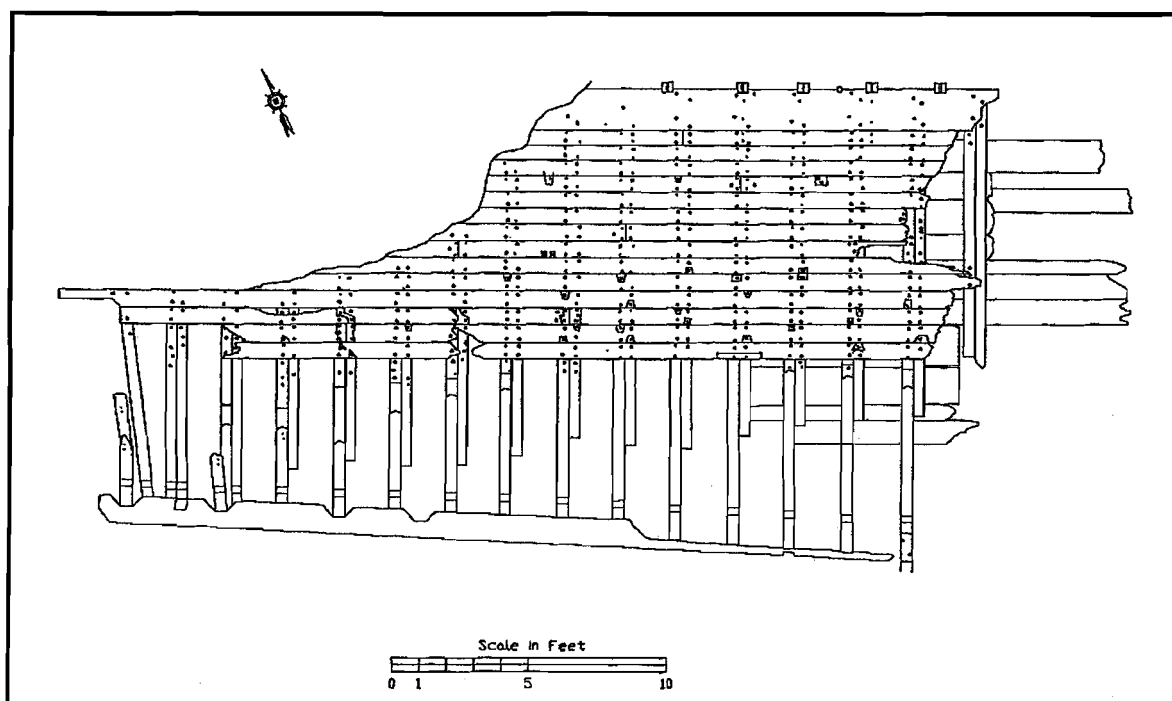


Figure 4. Plan of the surviving remains of the *Northampton*, Drewrys Bluff (Watts 1999:20).

Vessel Histories

Where possible, a background synopsis for each vessel in the database is included in the NHC VA/GIS. In many cases, that information originated from the *Dictionary of American Naval Fighting Ships*; *Register of Ships of the U. S. Navy, 1775-1990* (Bauer and Roberts 1991); *Civil War Naval Chronology 1861-1865* (Navy Department (ND) 1971); and *Warships of the Civil War Navies* (Silverstone 1989). Data on vessels operated by the U. S. Army came from sources including three publications from *The Army's Navy Series* (Gibson and Gibson 1995a, 1995b, 1995c).

British Royal Navy vessel data came from sources like *Ships of the Royal Navy* (Colledge 2003) and *The Lost Ships of the Royal Navy 1793-1900* (Gosset 1986). Information on merchant steam vessels came from sources like the *Merchant Steam Vessels of the United States 1790-1868* (Lytle and Holdcamper 1975) and *Early American Steamers* (Heyl, 6 volumes, 1953-1969). Merchant sailing vessels and small coastal steamers were more difficult to identify, and available information was compiled from enrollments port records and newspapers.

Literature, Historical and Cartographic Research Methodology

The first objective of literature, historical and cartographic research was a survey of historical literature associated with the maritime history of Virginia. That survey generated information necessary to develop an historical context for the both GIS and the HARP plan. The survey focused on identifying and documenting military activities that contributed to the submerged archaeological record in the area of the GIS. A similar literature survey focused on archaeological publications and reports to identify documented wreck sites. More focused historical research was designed to collect vessel specific information to support accurately establishing loss location and assessing historical and archaeological significance. Historic map collections were investigated for clues to historic geographical features and wreck site locations.

Preliminary wreck-specific information was collected from secondary sources including the *Encyclopedia of American Shipwrecks* (Berman 1972), *Merchant Steam Vessels of the United States 1790-1868* (Lytle and Holdcamper 1975), *Shipwrecks of the Americas* (Marx 1983), *Ships and Shipwrecks of the Americas* (Bass 1988), *Shipwrecks of the Civil War* (Shomette 1973), *Shipwrecks on the Chesapeake* (Shomette 1982a), *Shipwrecks of Virginia* (Gentile 1992), *The Official Records of the Union and Confederate Navies in the War of the Rebellion* (National Historical Society [NHS], 31 volumes, 1987), *Official Records of the Union and Confederate Armies* (Broadfoot Publishing Company, 128 volumes, 1997) and other published material. Additional information was generated by a survey of selected Virginia newspapers, the *Northern Shipwrecks Database* (Northern Maritime Research 2002), the *Wreck Information List of the U. S. Hydrographic Office*, the *National Oceanic and Atmospheric Administration Snag Log* and maritime records associated with the ports of Richmond, Norfolk and Newport News.

Relevant sources of shipwreck data preserved in the Library of Virginia, Richmond; the Virginia Historical Society, Richmond; the Mariners Museum, Newport News, Virginia; the Eastern Shore Library, Accomac, Virginia; the Eastern Shore of Virginia Historical Society [Kerr Place], Onancock, Virginia; the Steamship Historical Society of America, Baltimore, Maryland and the National Archives (NA) [Washington, D. C., and College Park, Maryland] were surveyed for site-specific data. The submerged cultural resource site-file inventories of VDHR, Richmond, Virginia and the Program in Maritime History and Nautical Archaeology at East Carolina University in Greenville, North Carolina were also reviewed for underwater sites in the study area.

At each repository, the collections were examined for specific references to the study area and Virginia shipwrecks. I²MR personnel contacted the SHPO office, local archaeologists, historians and other individuals knowledgeable in maritime history and shipwreck research to solicit their assistance in generating wreck data. Investigators conferred with VDHR personnel in regards to recorded archaeological sites in Virginia, as well as discussing the possibilities of encountering evidence of prehistoric or historic cultural activities in state waters. I²MR staff examined the archaeological site files and research reports at VDHR to ensure that all relevant site surveys were consulted.

Cartographic research identified a variety of maps and charts that illustrated naval and associated maritime activities in Virginia waters. During the survey, maps and charts were systematically examined for data related to shipwreck sites. I²MR personnel checked map indexes for shipwrecks, navigational reference data and to locate known and potential areas of historic military land use. Historic maps and charts preserved in the collections of the USACE Library, Norfolk, Virginia; the NA Cartographic Branch, College Park, Maryland; the United States Geodetic Survey, Washington, D.C.; Chartifacts Inc., Richmond, the Library of Virginia, Richmond, Virginia and the Mariners Museum Library, Newport News, Virginia were examined.

The earliest maps were associated with the settlement of Jamestown and surrounding plantations. Maps from the seventeenth and eighteenth centuries produced information about settlement, navigation and warfare (Figure 5). Without question, the most comprehensive and informative maps dated from the nineteenth century, when improved cartography made maps and charts more accurate. Those maps and charts provided detailed hydrographic information for navigation as well as locations for known shipwreck sites (Figure 6). Maps produced in the twentieth century provided further insight, and confirmed some data preserved on previous cartographic documents.

References such as *United States Coastal Charts 1783-1861* (Guthorn 1984), *Virginia in Maps* (Stephenson and McKee 2000), *The Southeast in Early Maps* (Cumming 1998), *Campaigns of the American Revolution: An Atlas of Manuscript Maps* (Marshall and Peckham), *Maps and Mapmakers of the Civil War* (McElfresh 1999) and *The Official Military Atlas of the Civil War* (Davis et al. 1983) also provided useful cartographic information about historical development, naval activities and navigation in Virginia waters.

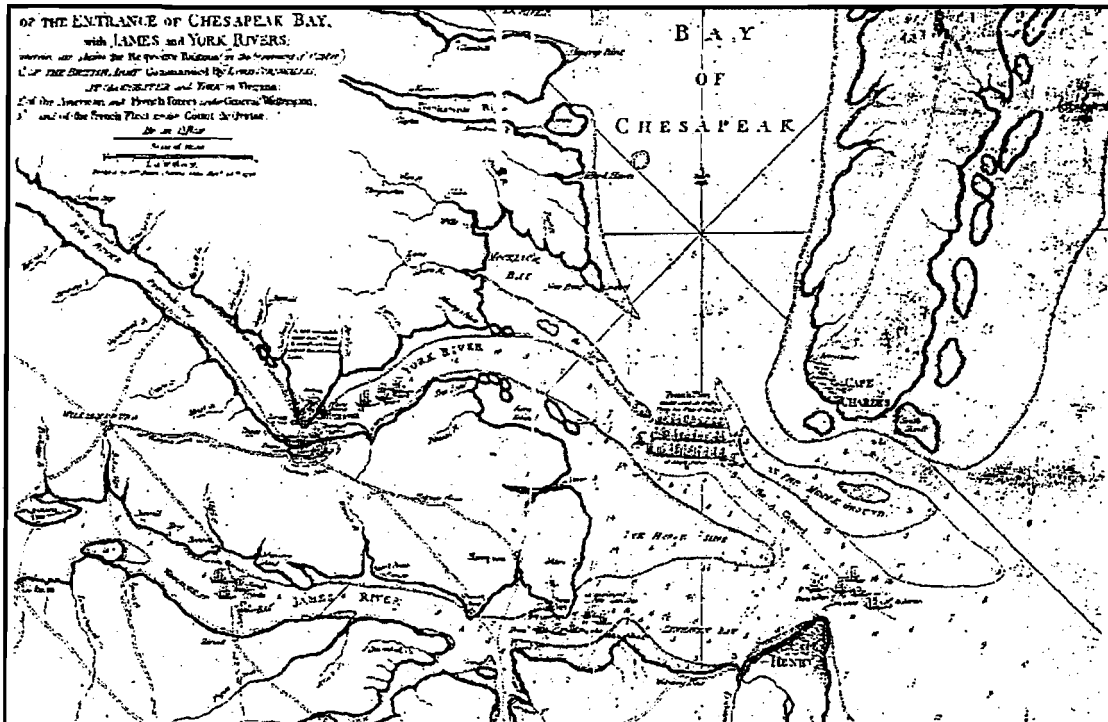


Figure 5. Plan of the Entrance of Chesapeake Bay with James and York Rivers, 1781 (Map 15, NA 1781).

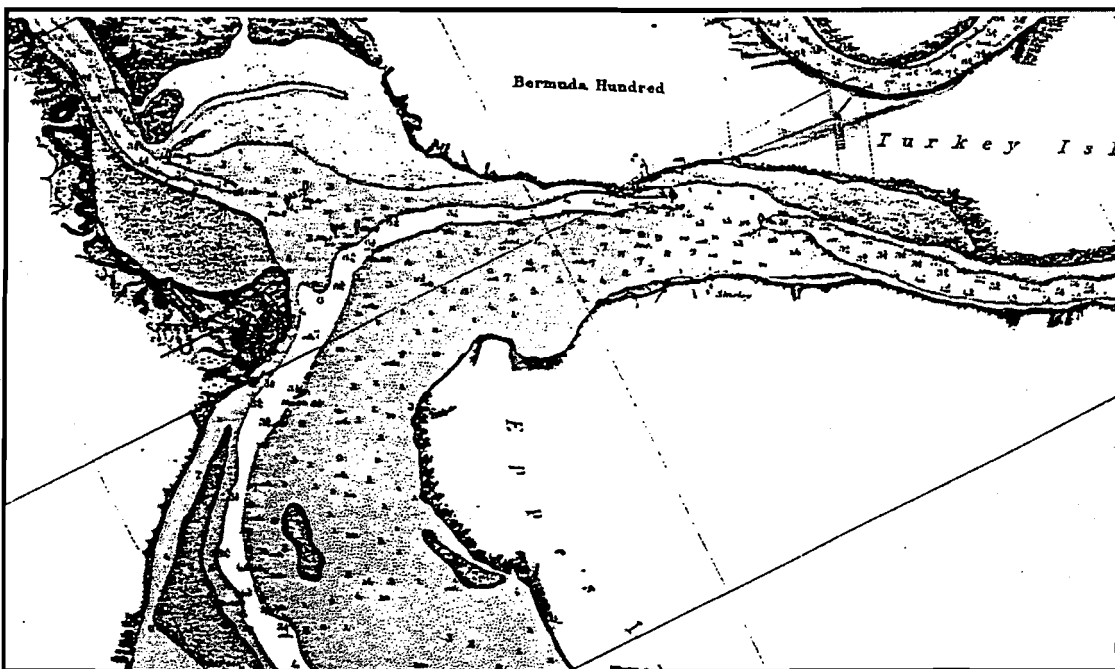


Figure 6. Section of the Richmond to City Point Including the Appomattox River from Petersburg to the Junction, James River, Virginia, 1855 (Map 402, NA 1855).

Historical Background Synopsis

Shipwrecks in the territorial and offshore waters of Virginia that are managed by the NHC are associated with almost 400 years of maritime and naval activity. The earliest documented naval vessels lost in Virginia waters were English warships dispatched to North America to protect the Virginia and Chesapeake Bay colonies. Those wrecks are both rare and valuable because of the architectural and construction record that the hull remains preserve as well as their historical association with early Virginia. Several ships of the Spanish crown may have been lost in Virginia waters during the Colonial Period as a consequence of weather. The Spanish ship *La Galga*, lost off the Eastern Shore in 1750, has been the subject of recent litigation that confirmed Spain's continued ownership of that vessel's remains.

Naval activities associated with the American Revolutionary War were responsible for a dramatic increase in both military and merchant vessel losses. One major concentration of Virginia State Navy vessels is in the James River at Osborne's Landing. A second concentration of Revolutionary War shipwrecks has been identified in the York River between Yorktown and Gloucester. Those vessels were associated with the British occupation of Yorktown and surrender of Lord Cornwallis in 1781. The largest category of shipwrecks in Virginia waters is associated with the naval and military activities of the American Civil War. More than 140 ships and gunboats of the United States and Confederate States navies and merchant vessels associated with both governments were sunk during that conflict. The remaining database shipwrecks represent modern vessels. Most of those were lost due to accidents, the military activities of World War I and World War II or were used as targets for testing ordnance. In all, 212 wrecks have been identified and documented.

Exploration Period

The earliest European account of a reconnaissance of the lower Chesapeake Bay occurred in 1524. Giovanni da Verrazano may have made landfall in what is now Accomack County, Virginia. Sponsored by the French crown, Verrazano surveyed the area, traded with aboriginals and named the area Arcadia (Lowery 2001:91, 95). At about the same time as Verrazano's voyage, a Spanish expedition under the command of Lucas Vázquez de Ayllón attempted to establish a settlement on the Atlantic seaboard. Although the exact location of that settlement is unknown, some historical sources have suggested that the site may have been in southeastern Virginia (Sauer 1971:73; Blanton and Margolin 1994:17). Other Europeans reconnoitered the Chesapeake Bay region during the mid-sixteenth century. In 1561, the bay was christened *Bahia de Santa Maria* by Spanish explorer Pedro Menéndez de Avilés (Tazewell and Friddell 2000:17). Within four years, Avilés wrote King Philip II to describe the natives living near the bay, and to relate his plans to colonize the area (Lowery 2001:92). Another Spanish captain, Simon Fernandez, also related accounts about his voyages to the Chesapeake area from 1561 to 1566 and the hostile disposition of natives found there (Hulton 1984:13).

In 1570, a Jesuit delegation established a small mission on the York River. Shortly after their arrival, the Catholic priests were brutally massacred by Chiskiatic Indians and their mission was razed. During August 1572, Spanish soldiers exacted retribution for the murders by executing responsible members of the Indian tribe (Hoffman 1986, LXIII:201-202; Turman 1988:2). Like so much of the New World, the Chesapeake region did not produce the precious metals that Spain sought, so Spanish efforts to establish a settlement on the Chesapeake Bay were abandoned. The last, documented Spanish survey of *Bahia de Santa Maria* was carried out by Vincente Gonzalez circa 1588. Gonzalez was dispatched from St. Augustine, Florida to look for and eliminate “the Virginia colony” established on Roanoke Island by Sir Walter Raleigh (Hoffman 1986, LXIII:199).

There is no historical evidence of vessel losses in Virginia waters during the sixteenth-century period of Spanish exploration. However, material recovered from a wreck near Tangier Island in 1926 suggested that an early vessel may have been lost during early-seventeenth-century exploration of the lower Chesapeake Bay. Artifacts recovered from the wreck by a Tangier waterman indicated the vessel could be the wreck of a Spanish ship lost in 1611 (Blanton and Margolin 1994:17).

Colonial Period

Although the Spanish explored the lower Chesapeake Bay and attempted to establish a mission on the York River in 1570, the English established the first permanent colony in North America in present-day Virginia (Tazewell and Friddell 2000:17). In late April 1607, three vessels commanded by Captain Christopher Newport sailed up the Powhatan River [James River]. The *Susan Constant*, *Godspeed* and *Discovery* had departed from London during December 1606. Under the auspices of the Virginia Company of London, 144 Englishmen established a colony on Jamestown Island (Noël Hume 1994:124; Bruce 1938, 1:16-17). The colony’s infrastructure almost collapsed before John Rolfe’s 1612 experiments with tobacco identified a product that would become the staple of the colonial Virginia economy. The Spanish first made smoking fashionable in Europe after bringing tobacco back from the Americas. Tobacco grew naturally in the Chesapeake region, but the indigenous variety was more harsh-tasting than that grown in the Caribbean. John Rolfe’s experiments included cultivating the Caribbean variety of tobacco in the Virginia colony (Middleton 1984:105). The tests proved successful, and by 1617, the Virginia colony shipped 20,000 pounds to England (Blum et al. 1963:17). From new settlements and plantations along the James River, Virginians and slaves brought to the colony in 1619, began to produce and ship tobacco to ready markets in England. By the end of the seventeenth century, Virginia planters shipped 20 million pounds annually (Middleton 1984:105-107). Vessels outbound from Virginia were loaded with tobacco and those that returned brought manufactured goods, and transported indentured servants, prisoners and convicts to populate expanding plantations and settlements (Middleton 1984:161-162).

The earliest naval vessel sunk in Virginia waters was lost during one of the Dutch raids on the English tobacco fleet. During the early to mid-seventeenth century, tobacco was shipped to England by vessels that usually traveled alone, or in small convoys. This practice,

however, began to worry planters and tobacco merchants alike as tobacco shipments became more valuable. By 1662, tobacco merchants and ship owners had petitioned King Charles II of England to order vessels sailing from the colonies during the summer to sail in groups for mutual protection (Middleton 1984:314). The second Dutch War, however, provided Dutch privateers with the opportunity to capture many tobacco ships coming from the colonies. As a result of the war, the king's privy council instructed the governors of Virginia and Maryland to order all tobacco ships to sail for England in convoys only on specified dates (Middleton 1984:314).

The "convoy system," as it became known, provided the tobacco fleets of Virginia and Maryland with mutual defense in case of attack by foreign ships. While the system gradually evolved to include two convoys a year, escorted by the English Navy, it remained fundamentally unchanged from its formal inception in 1666. The tobacco ships would first congregate at Hampton Roads and usually sailed in June when winds were still favorable for departing from the Chesapeake. The "roadstead" was located just west of the mouth of Chesapeake Bay, where the James, Elizabeth and Nansemond Rivers converged to create a deep anchorage (Wise 1988:15). Once the departure date arrived, a military escort ship would issue sailing and convoy instructions that included day and night signals, as well as battle plans should the convoy be attacked (Middleton 1984:332-335).

From 1665 to 1667, England and the United Provinces of the Netherlands were at war (Second Anglo-Dutch War). During the conflict, Dutch privateers entered the Chesapeake Bay and captured and destroyed several tobacco ships (Middleton 1984:314). In response to those attacks, the English government dispatched the 32-gun frigate HMS *Elizabeth* to defend the bay (Shomette and Haslach 1988:126; Colledge 2003:112). However, the 474-ton *Elizabeth* was in such a bad state of repair, that when it arrived in the Chesapeake it was declared unfit for service. When the Dutch attacked a second time in June 1667, the *Elizabeth* was still in the James River undergoing repairs and was not ready for service.

After sailing into Hampton Roads under the ruse of English flags, the Dutch proceeded up the James River where they found the weakly guarded *Elizabeth* and burned it. Under the command of Captain Abraham Crijnssen, the Dutch then returned to Hampton Roads where they took several prizes and torched five or six ships in the tobacco fleet. Governor Berkeley attempted to arm nine merchantmen in the James and York Rivers for a retaliatory attack, but the captains of those vessels backed out before any action could be taken. Unmolested, the Dutch sailed out of the Chesapeake on 11 June 1667 (Shomette and Haslach 1988:127).

Dutch raids on the James River tobacco fleets during the Second Anglo-Dutch War impressed upon the English government the need to establish an adequate naval force in the colonies to protect shipping. During the Third Anglo-Dutch War that commenced in 1672, two English men-of-war were dispatched to protect the Chesapeake. While the men-of-war were stationed in the mouth of the James River in July 1673, nine Dutch warships sailed into the mouth of the Chesapeake. A fleet of eight Maryland tobacco ships appeared at the entrance to Hampton Roads at the same time and were surprised by the Dutch. English naval commanders on station at Hampton Roads responded by fitting out an additional six

merchant vessels and sailed out of Hampton Roads to meet the enemy. Although English forces hindered the Dutch advance, the enemy was still able to capture one Maryland and nine Virginian tobacco ships (Middleton 1984:338-339).

After the conclusion of the Third Anglo-Dutch War, the English kept a man-of-war on station at the mouth of the Chesapeake. That action proved inadequate and the warships usually limited their patrols to times of trouble. As a result, there were many intervals in which no vessel defended the Chesapeake (Middleton 1984:339-346). Colonial militias responded by stationing lookouts along the shores near the mouth of the Chesapeake to warn of foreign invaders, privateers and pirates but those measures proved to be only minimally effective (Middleton 1984:344). As a result, the Virginia Capes and lower Chesapeake were periodically subjected to assault from the sea.

While tobacco was the principal product of the Virginia colony in the seventeenth century, it was not the only export. Virginia planters also grew sufficient wheat and corn for shipment to other North American colonies and the West Indies. They raised cattle and swine for consumption and trade (Middleton 1984:201). Although not as important a commodity as in the Carolinas and Georgia, timber and naval stores were important sources of revenue for Virginia colonists. While the construction of small vessels like perriaugers, pinnaces and shallops for local transportation, trade and fishing was one of the first priorities of Virginia colonists, demand for larger vessels was almost entirely satisfied by New England and Bermudian shipwrights. The construction of larger vessels such as sloops, ketches, brigs and schooners began to interest Virginia shipwrights as the demand for and cost of vessels rose in the eighteenth century. By 1730, vessels owned and/or built in Virginia carried almost all of the colony's commerce (Blanton and Margolin 1994:22). Along with the construction of vessels, Virginians also produced hemp for cordage (Goldenberg 1976:118-119).

American Revolutionary War

During the eighteenth century, English warships were dispatched to Virginia to enforce the British navigation acts. Beginning in 1763, Parliament passed a series of acts designed to raise additional revenues for the British crown. The acts, although implemented to cover escalating costs associated with governing American colonies, violated several key principles that those colonists valued. Those principles included the right of representation in Parliament and the right to trial by a jury of peers. The acts restricted trade, dictated and imposed taxes on items imported into the colonies. After severe protest from the American colonies, Parliament repealed most of the taxes. Parliament, however, further aggravated the situation by instituting military force and martial law. The colonists initially responded with further protesting, but eventually chose to separate themselves from England. The result was the Declaration of Independence that was issued 4 July 1776.

In Virginia, events that climaxed in revolution began more than a year before the Declaration of Independence. In April 1775, Lord Dunmore [Governor John Murray] anticipated a rebel uprising and captured the provincial powder magazine at Williamsburg (Marshall and

Peckham 1976:10). Following this action, Dunmore relocated to the Norfolk region, where there was still a relatively large group of loyalists. At Norfolk, Dunmore re-established the colony's government at the Gosport Shipyard (Cross 1976:4).

On 24 August 1775, the Virginia Convention appointed a Committee of Safety to establish rules and regulations concerning the colony's defense. The committee was expressly ordained to "obtain the most authentick [*sic*] intelligence in all matters of importance, and to avoid false alarms...and shall have full power to appoint a sufficient number of look-outs and advice boats, at proper stations and to engage necessary expresses, in different parts of the Country, to be in constant readiness to set out on the shortest notice" (USN 1964, I:1229). On the previous day, unbeknownst to the Virginians, King George III had proclaimed that any form of rebellion and/or sedition represented treasonous offenses (Figure 7).

In September, shortly after the appointment of the Committee of Safety, the sloop HMS *Otter* and the tender *Liberty* were caught in a storm in Hampton Roads. HMS *Otter* was blown ashore near the town of Hampton and *Liberty* was forced into Back River. After spotting *Liberty* stranded in the creek, colonial forces plundered and set fire to the vessel (Cross 1976:5). In retaliation, Lord Dunmore sent several small boats to attack the port of Hampton. Finding the entrance to the creek blocked by sunken vessels, the loyalists positioned themselves off the town and commenced a bombardment. The townspeople, however, grew weary of Dunmore and his band of loyalists and fired back forcing the governor's troops to withdraw (Cross 1976:6).

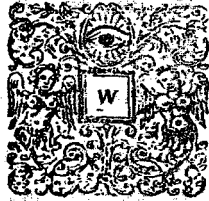
While at Norfolk, Dunmore received British reinforcements to help re-establish control of the area, to build fortifications and to organize a loyalist militia to raid plantations and boat landings. Dunmore also offered freedom to slaves and indentured servants who would join the loyalist cause. This offer, however, further eroded Dunmore's support in Norfolk (Marshall and Peckham 1976:10; Selby 1988:68). On 9 December 1775, British forces attacked Great Bridge after hearing from a runaway slave that colonial forces there numbered only 300 men. The colonists repulsed this attack and forced the British to retreat to their fort on the north bank of the Elizabeth River (Selby 1988:63-73). Governor Dunmore realized that the British position in Norfolk was untenable and fled to a ship anchored in Hampton Roads. Colonial forces occupied Norfolk on 14 December 1775 (Selby 1988:74). At Norfolk Flats, Dunmore had seven to eight merchant vessels burned or scuttled, as he did not have sufficient crew to man them. Several additional commercial vessels were wrecked near the Virginia Capes for the same reason (Shomette 1982a:41-48; Foss 1984:13-14).

Under the command of Lord Dunmore, British troops and loyalists continued to harass the colonists from their vessels in Norfolk Harbor. Although there were several verbal exchanges between opposition forces, the atmosphere remained peaceful until New Year's Day. During the afternoon on New Year's Day, British ships opened fire on colonial troops as they paraded, and several landing parties were sent ashore to torch Norfolk (Selby 1988:82). In order to frustrate the British, patriots set fire to parts of the city under their own



By the KING,
A PROCLAMATION,
 For suppressing Rebellion and Sedition.

GEORGE R.



WHEREAS many of Our Subjects in divers Parts of Our Colonies and Plantations in *North America*, misled by dangerous and ill-designing Men, and forgetting the Allegiance which they owe to the Power that has protected and sustained them, after various disorderly Acts committed in Disturbance of the Publick Peace, to the Obstruction of lawful Commerce, and to the Oppression of Our loyal Subjects carrying on the same, have at length proceeded to an open and avowed Rebellion, by arraying themselves in hostile Manner to withstand the Execution of the Law, and traitorously preparing, ordering, and levying War against Us. And whereas there is Reason to apprehend that such Rebellion hath been much promoted and encouraged by the traitorous Correspondence, Counsels, and Comfort of divers wicked and desperate Persons within this Realm: To the End therefore that none of Our Subjects may neglect or violate their Duty through Ignorance thereof, or through any Doubt of the Protection which the Law will afford to their Loyalty and Zeal: We have thought fit, by and with the Advice of Our Privy Council, to issue this Our Royal Proclamation, hereby declaring that not only all Our Officers Civil and Military are obliged to exert their utmost Endeavours to suppress such Rebellion, and to bring the Traitors to Justice; but that all Our Subjects of this Realm and the Dominions thereunto belonging are bound by Law to be aiding and assisting in the Suppression of such Rebellion, and to disclose and make known all traitorous Conspiracies and Attempts against Us, Our Crown and Dignity, And We do accordingly strictly charge and command all Our Officers as well Civil as Military, and all other Our obedient and loyal Subjects, to use their utmost Endeavours to withstand and suppress such Rebellion, and to disclose and make known all Treasons and traitorous Conspiracies which they shall know to be against Us, Our Crown and Dignity; and for that Purpose that they transmit to One of Our Principal Secretaries of State, or other proper Officer, due and full Information of all Persons who shall be found carrying on Correspondence with, or in any Manner or Degree aiding or abetting the Persons now in open Arms and Rebellion against Our Government within any of Our Colonies and Plantations in *North America*, in order to bring to condign Punishment the Authors, Perpetrators, and Abettors of such traitorous Designs.

Given at Our Court at *St. James's*, the Twenty-third Day of *August*, One thousand seven hundred and seventy-five, in the Fifteenth Year of Our Reign.

God save the King.

L O N D O N :

Printed by *Charles Eyre and William Strahan*, Printers to the King's most Excellent Majesty. 1775.

Figure 7. Royal Proclamation "For suppressing Rebellion and Sedition" (USN 1964, I:1216).

control. Colonial strategists believed that once those areas were razed, the British would retreat. As a consequence of those activities, the city burned for three days and was almost completely destroyed (Selby 1988:82).

Minor skirmishes between the British and American forces continued through the end of January and into early February when colonial forces finished destroying the city and departed. In spring 1776, after several attempts to solicit aid from other British commanders to re-establish a foothold at Norfolk failed, Lord Dunmore left the Norfolk area, sailing first to New York and then to England (Eller 1981:97).

Meanwhile, colonial forces in Virginia were beginning to take other actions to protect the colony from further assaults. In a December 1775 letter written by Francis Lightfoot Lee, he suggested to Robert Wormsley Carter that the State Convention fit out "small vessels, to prevent small tenders from infesting the bays & rivers" (USN 1964, I:1229). In early January 1776, members of the Virginia Convention realized that Continental forces could not protect them at all times, and passed a resolution to "raise an additional number of forces for the defense and protection of this colony." Part of this resolution empowered the Virginia Committee to establish a navy for coastal defense (USN 1968, I:736-37).

The Virginia State Navy quickly developed by purchasing used merchant vessels and fitting them with guns (Eller 1981:199). In addition, the colony established a shipbuilding program to produce vessels for river and coastline defense. The first two vessels to sail under the flag of the Virginia State Navy were the pilot-boat schooners *Liberty* and *Patriot*. Commissioned in December 1775, the *Liberty* and *Patriot* patrolled the Hampton Roads area and captured a number of enemy vessels early in the war (Eller 1981:171).

After the burning of Norfolk, colonial forces in Virginia concentrated on building vessels for defense. Andrew Sprowle's Shipyard at Gosport was taken over as a state shipyard and waterfront enterprises on the Elizabeth River refocused their efforts to produce military provisions. Privateers also became important participants in Virginia's fight for independence. Nearly 100 Virginia vessels were granted letters of marque between 1776 and 1783. This force of privateers greatly added to the 77 vessels commissioned into the State Navy and smuggled most of the goods that arrived in the colony from the West Indies during the war (King 1993:64).

From its founding, the Norfolk area had grown substantially as a port. The merchants and sea captains of Norfolk for a long time conducted a brisk trade with Great Britain and the West Indies. During the war, several vessel types built in the region proved very effective at running the British blockade of the Chesapeake. These vessels were simple in construction and very fast, and made them suitable for smuggling. The island port of St. Eustatius in the West Indies was the primary destination of these ships and the main source of supplies to Virginia traders during the war (Selby 1988:170).

With Lord Dunmore gone, there was little immediate military threat to the James River region. Building a respectable naval fleet and defense force, however, remained vitally important to Virginians. The colonial convention recognized the strategic importance of the Norfolk vicinity and knew that as long as the war continued, the area could be the subject of a British offensive.

From 1776 through May 1779, the Virginia State Navy focused on harassing and capturing British naval and merchant ships in the Hampton Roads area. Although the vessels of the Virginia State Navy were too small to engage British warships, they successfully preyed on British supply, dispatch and merchant vessels. In 1776, Lord Dunmore, in a letter to Lord George Germain [1st Viscount Sackville], stated that the colonists “have actually drove all our Tenders up to the Fleet and Captn Hammond does not...trust one of his Majesty’s Sloops alone in the Bay” (Eller 1981:176).

The British, under the command of Commodore George Collier, returned to the Norfolk area in May 1779 with a force of 28 ships. Collier had convinced Sir Henry Clinton that a surprise assault on Virginia would draw the attention of colonial forces away from New England and allow the British to gain an advantage in the northeast (Selby 1988:204). Collier and Major General Edward Matthew, aboard the HMS *Rainbow*, conducted a raid up the Elizabeth River on 10 May 1779 (Selby 1988:204). Their sailors led a successful amphibious assault on Fort Nelson that guarded Portsmouth. Collier and Matthew then struck at the Gosport Shipyard where they destroyed the 28-gun *Virginia*, two French merchantmen and six other vessels under construction and considerable ship timber (Foss 1984:16). In several small boats, the British continued the attack pursuing vessels that tried to escape up the Southern Branch of the Elizabeth River, capturing or burning them as they went (Selby 1988:205).

After wrecking havoc along the Elizabeth River, the British focused on destroying arms and supply centers. Suffolk and Kemp’s Landing were attacked during one of such raids. Meanwhile, the colonial forces that were initially caught off guard by the speed of the assault, mobilized and waited to see where the British would turn next (Selby 1988:206). The British, however, departed the region on 24 May 1779. In all, the British destroyed, captured or burned 137 vessels during the raid in the Norfolk vicinity (Shomette 1982a:31; Eller 1981:446).

Colonial forces in Virginia were unprepared when the British initiated the southern campaign in December 1779. The devastation that the British exacted in the James River region forced the Virginia Colonial Convention to augment their defensive measures. After the attack, several acts were passed to improve the militia’s mustering speed, and a detailed defensive plan was drafted (Selby 1988:209-210).

Due to their failure to quell resistance in the northern colonies, the British had devised a tactic in 1778 to overpower the southern colonies. Implementation of the strategy required occupation and control of areas still loyal to the Crown, and secondary measures to attack and subdue the colonies with large loyalist populations, and to prevent those colonists from engaging in trade (Morris 1991:29). The city of Charleston was the initial target of the southern campaign. Lord Charles Cornwallis arrived in Charleston in December 1779 to lead the assault, and by May 1780, Charleston surrendered to British forces. With Charleston captured, the British once again focused on Virginia. That strategy called for establishing a foothold in Virginia and controlling the sea lanes, while Cornwallis and his troops marched north from Charleston, capturing everything in their path (Morris 1991:31-2).

Once Charleston was taken, Sir Henry Clinton returned to New York and prepared his forces for the next stage of the operation. Commodore George Gayton and Major General Alexander Leslie, with a fleet of 54 vessels and an army of 2,200 men, reached the Virginia Capes on 20 October 1780 (Selby 1988:216; Eller 1981:190). Gayton and Leslie were given instructions to install forces in Virginia and to harass enemy shipping in the area. The first objective they accomplished without delay, by dividing their forces and landing at Portsmouth, Newport News and Hampton (Selby 1988:216). Shortly after their arrival, however, the British forces were recalled and ordered to Charleston to give aid to General Cornwallis. Knowing that the British would be returning shortly, Gayton and Leslie failed to destroy any of their captured vessels or their recently constructed fortifications (Selby 1988:221).

Virginia's navy had largely deteriorated by the end of 1780 and was unable to resist the British warships sent against the colony. In addition, manpower and equipment shortages began to plague the Virginia State Navy. For example, seamen were often enticed away from serving on a state military vessel by the chance to earn prize money aboard privateers. With the departure of Gayton and Leslie, Governor Thomas Jefferson attempted to rebuild the navy by ordering many of the vessels repaired and offering seamen additional incentives (Eller 1981:191). Those incentives, however, proved insufficient, leaving the Virginia State Navy heavily undermanned.

On 30 December 1780, Brigadier General Benedict Arnold sailed into the Chesapeake Bay with 27 vessels. On hearing that the British had arrived again, Governor Jefferson hesitated to muster his Virginia troops. Realizing that he completely surprised the Americans, Arnold decided to sail directly up the James River without stopping at Portsmouth (Selby 1988:222-223). By 2 January, Arnold's forces reached Jamestown Island and his purpose became clear. Arnold landed at Westover plantation with 800 men and marched towards Richmond. Governor Jefferson assumed that Richmond was Arnold's objective, and evacuated most of the city and removed the arms that Arnold sought. Arnold entered Richmond unopposed on 5 January destroying private property and the Westham foundry, but found little in the way of military supplies (Selby 1988:223). After realizing that his offensive on Richmond was expected and prepared for, Arnold withdrew his troops and continued raiding plantations as he moved back down the James River. Arnold's troops arrived back at Portsmouth on 19 January to establish a base of operations (Selby 1988:224).

While Arnold was busy building fortifications at Portsmouth, Jefferson and the Virginia Navy prepared for an assault on the British forces. The schooner *Patriot* and the galley *Lewis* were put on patrol duty in the lower James River to observe British activity at Portsmouth, while the rest of the state's available ships were sent upriver toward Richmond (Eller 1981:193). At Osborne's Landing on the James River, the colonial fleet prepared for an attack on Arnold's Portsmouth base, but before an offensive could be initiated, reinforcements arrived to bolster the British forces. The newly arrived British regulars dispelled all hope of a successful attack on Arnold (Selby 1988:269).

On 18 April, the galley *Lewis* sent word that Arnold's fleet was once again maneuvering up the James River (Eller 1981:193-194). Jefferson ordered that all naval stores and vessels not in the James River be relocated to places of safety, and he moved the public records again from Richmond to a safer location. Since the vessels that Jefferson had organized to attack Arnold's position at Portsmouth had nowhere to go, they were ordered to prepare for naval action. Artillery emplacements were also established on shore to aid in the upcoming battle (Cross 1976:74).

Arnold's second campaign conducted up the James River was designed to eliminate all American forces in the area so that the British could establish a firm foothold in the southern colonies. The fleet used for this campaign consisted of four ships, eight flat boats and one gunboat (Simcoe n.d.:190-191). On 20 April, Arnold sent a force ashore at Burwell's Ferry to march on Williamsburg, while a second force was sent up the Chickahominy River on 21 April to destroy the state shipyard. After destroying the shipyard and three vessels, and driving the colonial forces from Williamsburg, Arnold's men regrouped and continued upriver.

On 24 April, British forces landed at City Point and destroyed one ship and several smaller vessels. The British then divided their forces into two groups. One detachment under Arnold's command proceeded overland to Osborne's Landing, while a second under Major General William Phillips advanced inland towards Petersburg and the Chesterfield County Courthouse (Cross 1981:73; Selby 1988:272).

On receiving intelligence that the British were marching on Petersburg, Jefferson sent Major General Friedrich von Steuben's forces to counter them. British and Colonial forces met at Blandford, east of Petersburg on 25 April. The superior British army forced the Americans to retreat across the Appomattox River. Arnold's forces, meanwhile, prepared for an assault on the fleet gathered at Osborne's Landing (Figure 8). Positioning his artillery on the river's southern bluffs that overlooked the fleet, Arnold took the Colonial forces by surprise. Seeing that the outgunned Americans were in a desperate situation, Arnold ordered a ceasefire and offered a truce. The Americans accepted, but as Arnold sent a boat out to accept the surrender, the crews of several American vessels panicked and began to scuttle and torch their vessels. The British responded by firing on the Americans again, and then attempted to save the vessels. When the hostilities concluded, the bulk of the Virginia State Navy was destroyed or captured. The Americans had scuttled four vessels, five brigs including the *Jefferson* and a host of smaller vessels. The British, however, had been able to save two ships, the *Tempest* and *Renown*, three brigs, five sloops and two schooners (Shomette 1982a:60-61; Selby 1988:273; Eller 1981:194-195).

While Arnold was at Osborne's Landing, Phillips proceeded to the Chesterfield County Courthouse where his troops destroyed the barracks and supplies that General Steuben had brought to prepare for the assault on Portsmouth. After completing the destruction, Phillips rendezvoused with Arnold and the combined forces marched toward Manchester and arrived on 30 April. Marquis de Lafayette, however, had reached Manchester the night before and established defensive positions around the city. The British aborted the planned attack after

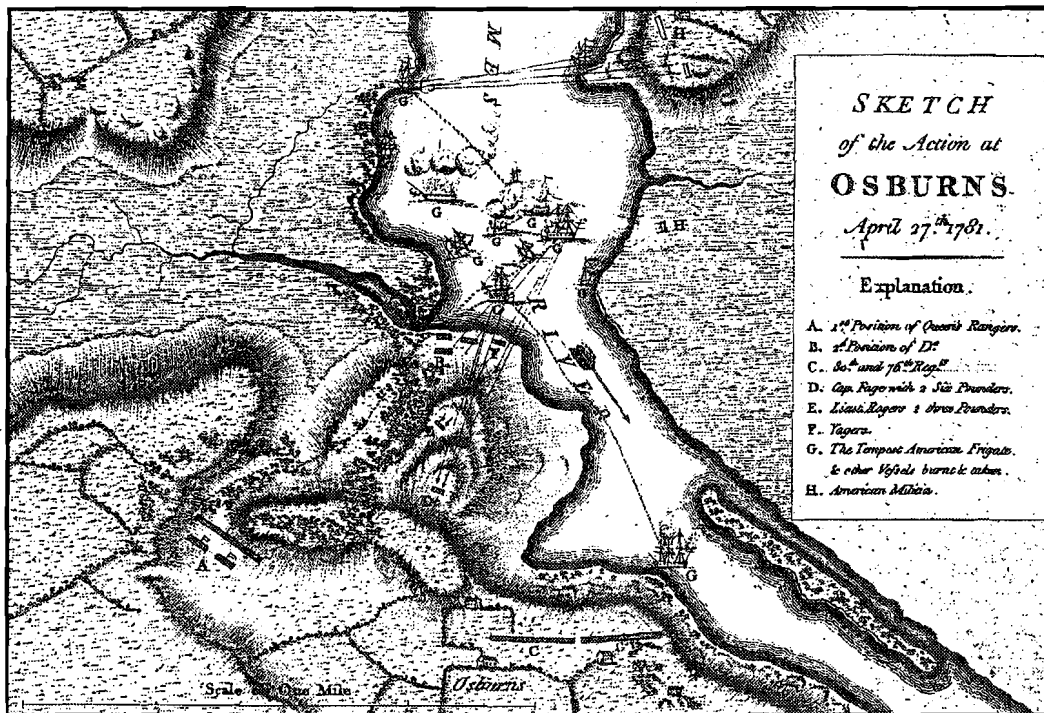


Figure 8. Sketch of the action at Osburns Landing on 27 April 1781 (Map 37, NA 1781).

receiving intelligence that Von Steuben was also in route to reinforce Lafayette's entrenched forces. Although the British destroyed a large quantity of tobacco, colonial forces prevented them from entering Richmond (Selby 1988:273).

Unable to accomplish their objectives at Manchester, the British fell back along the James River. At Warwick, the British destroyed the tanning yard, the ropewalk, three vessels under construction and a merchant ship and brig in the river. After returning to City Point and provisioning their vessels at Bermuda Hundred, the British embarked for Portsmouth on 2 May 1781 (Selby 1988:273, 274).

On 20 May 1781, General Cornwallis assumed command at Portsmouth and used this base until August, when he destroyed the fortifications and repositioned his army to Yorktown (Eller 1981:494, 504). As long as the British retained control of the Chesapeake Bay, Cornwallis's position at Yorktown remained secure. With the destruction of the Virginia State Navy, the British had assumed that their control was unchallenged. On 28 August, a French Fleet commanded by the Comte de Grasse arrived from the West Indies and took up station in Lynnhaven Bay in an attempt to trap the British at Yorktown. On 5 September, the Royal Navy engaged this French fleet outside the entrance of the bay and although neither side received significant damage, the British retired and surrendered control of the Chesapeake to the French.

Following this battle, the French sent a squadron to the mouth of the York River while the main body of the fleet remained at Lynnhaven. This effectively cut off Cornwallis's force and ended the possibility of relief or escape by water (Lewis 1945:149-170). By late September, further British advance by land was precluded by American forces. George Washington's command had arrived from New York and joined with French troops that had disembarked from Admiral de Grasse's fleet. The French also provided heavy artillery and expertise in siege warfare. Completely encircled and with no chance of escape by sea, Cornwallis stripped the weapons and ammunition from the warships and armed merchant craft of his fleet and added these weapons to his defensive line ashore (Morris 1991:35-36). Several vessels were also prepared for use as fire ships in the hope that they would drive the French from the mouth of the York River. The incendiary raid was conducted on the night of 22 September and was led by the custom-designed fire ship HMS *Vulcan*. The French ships were able to slip their anchors and drifted out into the bay before the flaming ships reached them. Consequently, the British attack was a failure (Sands 1983:64-67).

Prior to this attack, Cornwallis had ordered the scuttling of merchant supply ships along the beachfront at Yorktown to disrupt a possible French amphibious assault. St. George Tucker, a resident of Yorktown, noted in his journal on 2 October that "the British had sunk several square rigged Vessels near the shore at the distance of one hundred and fifty, or two hundred yards from it" (Figure 9; Sands 1983:63). Five British warships at Yorktown were used to support their defenses on both sides of the river. The HMS *Charon* was positioned above Yorktown when the French and Americans began their bombardment. On 10 October, a heated round of solid shot landed in the sail locker of the *Charon* and set it ablaze. The vessel drifted to the Gloucester side of the river where it smashed into the transport *Shipwright* before burning to the waterline on Tyndall's Point (Broadwater 1996, I:14). Artillery fire continued to damage and sink British ships throughout the siege. After the bombardment commenced, additional ships were scuttled, but the expected assault from the river never materialized (Morris 1991:38).

By mid-October the siege had tightened and numerous outlying British positions were captured. Under constant bombardment and with casualties mounting, Cornwallis made an escape attempt on the night of 16 October. By ferrying troops across the river to the Gloucester side, where the French line was weak, the British hoped to break out and leave their oppressors trapped south of the York. This plan failed when a sudden squall blew down the river capsizing several small boats and drowning dozens of soldiers (Sands 1983:84-85). Due to excessive casualties and dwindling supplies, Cornwallis scuttled the remainder of his fleet and surrendered on 19 October 1781.

Naval and maritime activities of the American Revolution resulted in the loss of at least 3,000 vessels. Many were merchant ships like those destroyed at Norfolk Flats and near the Virginia Capes by Governor Dunsmore following his withdrawal from Norfolk in 1775. Additional commercial and navy vessels were sunk or destroyed in the Elizabeth River in 1779 by a British raiding squadron. During the following year, merchant sail were burned in the Appomattox River before the Virginia Navy squadron was destroyed at Osborne's



Figure 9. “Plan of the Siege of Yorktown in Virginia 1787” showing location of sunken vessels and position of British Warships (Map 78, NA 1787).

Landing by combined British navy and army units under the command of Benedict Arnold (Sands 1983:22; Shomette 1982a:57-60). At Yorktown, British warships and merchant supply vessels were sunk in conjunction with General Cornwallis’s surrender.

Federal Period

When the Revolutionary War ended, the British blockade of the Chesapeake Bay concluded in theory. Although the Chesapeake Bay/James River regions were still harassed by British privateers, tobacco shipments and other colonial goods started to make their way to Europe again. Economic depression, however, continued through the 1780s due to the 1783 Treaty of Paris. That accord forbade American trade with British colonies in the West Indies or Canada (Blum et al. 1963:126). Slowly, as trade relations with other European countries and the West Indies developed, economic prosperity returned. By 1786, Virginia’s tobacco exports returned to their prewar levels (Bauer 1988:52). Shipbuilding contracts in Tidewater Virginia increased due to the growing demands of trade. Shipyards also experienced a business surge due to the reputation Virginia shipbuilders enjoyed as a consequence of the speed and weatherliness of their vessels. Tidewater shipwrights also benefited from an expansion of fishing and shellfish collection on the Chesapeake.

During the Quasi-War between Britain and France, American vessels became prey for French privateers. Negotiations with the French failed to resolve the matter and increased pressure on the United States government to resurrect plans for the construction of several frigates. Under the direction of Benjamin Stoddert, the Navy Department, created by Congress in 1798, initiated a program of expansion that included both purchase and construction. Congress authorized the construction of six frigates. In 1799, one of the six, the 36-gun USS *Chesapeake* was launched at the Gosport Shipyard on the Elizabeth River. One of the first duties of the new U. S. Navy was to protect the American merchant marine from French privateers.

Between June 1796 and June 1797, French warships and privateers captured more than 300 American vessels. In the undeclared naval conflict known as the Quasi-War, U. S. Navy vessels were dispatched to protect American merchants. In February 1799, the frigate USS *Constellation* defeated the French frigate *L' Insurgente* in a battle off the island of Nevis (Tucker 1993:6). By the end of December 1799, 25 French ships had been captured. Many of the French ships were captured in the West Indies where vessels from the Chesapeake Bay traded (Engle and Lott 1975:85).

When difficulties with the French were resolved during the fall of 1800, American attention turned to pirate activity in the Mediterranean. Since the Revolutionary War, American merchant vessels trading in the Mediterranean had done so without protection. With no naval support, American vessels were at the mercy of pirates operating out of the Barbary States which were also extorting money from the Government of the United States. When pirate attacks and demands for tribute finally provoked war, President Thomas Jefferson dispatched a squadron to the Mediterranean. Although the frigate USS *Philadelphia* was lost, the fledgling U. S. Navy and Marine Corps resolved the pirate problem by force of arms (Engle and Lott 1975:86-88).

At the same time the U. S. Navy and Marine Corps were resolving issues of merchant safety in the Mediterranean, President Jefferson was also confronting issues of coastal defense. Although the focus of British Navy attention was on the French, Royal Navy vessels continued to be a threat to the United States. On occasion their pursuit of French warships came close to violating United States territorial waters. The French frigate *Magicienne* was later given a haven in the Elizabeth River near Norfolk when Royal Navy warships blockaded the harbor in 1801 (Parramore et al. 1994:116). Five years later, the 74-gun French warship *Impetueux* was driven ashore by a British squadron. *Impetueux* had been damaged in a storm and separated from other vessels in a squadron under the command of Rear Admiral Jean Baptiste Philibert Willaumez. The British squadron chased *Impetueux* ashore south of Cape Henry and attacked the stranded warship and burned the vessel in United States waters.

During 1807, one of the British warships anchored in Lynnhaven Bay followed the frigate USS *Chesapeake* into the Atlantic. Once the vessels were in international waters, the 50-gun HMS *Leopard* overtook and hailed the *Chesapeake*. HMS *Leopard* had been ordered to search the *Chesapeake* for British deserters. Although Commodore James Barron assured

the British there were no deserters aboard his vessel, the commander of the *Leopard* ordered a warning shot fired that was followed by a broadside. As the *Chesapeake* was completely unprepared for battle, Commodore Barron was compelled to surrender. Although *Leopard's* attack did not immediately provoke war, the citizens of Tidewater Virginia made preparations to protect themselves (Parramore et al. 1994:132-137).

One means of coastal defense supported by President Thomas Jefferson and the United States Congress was the construction of small gunboats. Small row galleys had been used during the Revolutionary War with marginal success and the idea of using that type of vessel received some support during the Quasi-War. Although gunboats were not considered to be a worthwhile investment by such naval authorities as Alfred T. Mahan, Jefferson prevailed and Congress appropriated the necessary funds. The first gunboats were authorized in February 1803 (Tucker 1993:23). During the Tripolitan War small gunboats equipped with sail and oars extended U. S. Navy efforts to carry operations into the Mediterranean. Gunboat *No. 2*, built in Hampton, Virginia was used in the Mediterranean campaign in 1805/1806 (Tucker 1993:181). Before James Madison took office in March 1809, 11 additional gunboats had been launched from yards in Hampton, Portsmouth and Mathews County, Virginia (Engle and Lott 1975:93; Tucker 1993:190-191).

By the spring of 1811, several events had transpired to incite anti-British sentiment in the Hampton Roads region. Earlier that year, the frigate USS *President* had engaged a small British vessel, *Little Belt*, off the Virginia Capes. Although the exchange was the result of a misfired cannon, many Americans viewed the event as retribution for the *Chesapeake-Leopard* incident. Within a few months, the HMS *Tartarus* captured several American vessels off the Virginia coast, including the *Orion* of Portsmouth. The *Tartarus's* commander "brazenly" sailed one American prize vessel into Hampton Roads (Parramore et al. 1994:143; Tucker 1993:119).

The War of 1812

While the James River region was becoming the center of trade in Virginia, its strategic location brought conflict to the area during the War of 1812. When war broke out as a consequence of British impressment of American seamen and Napoleonic politics, the British targeted the Tidewater Virginia area in hopes of cutting off the region's vital waterborne transportation and trade. To carry out this strategy, the British intended to blockade the mouth of the Chesapeake Bay and occupy the port cities of Hampton and Portsmouth (Rubin 1977:92-93; Rouse 1994:66).

The British arrived in the Chesapeake on 5 February 1813 with a fleet of seven warships under the command of Admiral Sir John Warren. When the fleet arrived, the inhabitants of Hampton Roads feared that the British would launch an assault on Norfolk. Instead, the British fleet anchored in Lynnhaven Bay and proceeded to block any commerce from entering or leaving the Chesapeake (Rouse 1994:66).

The British Secretary of War, Lord Bathurst, hoped that offensive action in Chesapeake Bay would compel American troops stationed at the Canadian border to retreat. Canada was the major British interest in North America, and the monarchy was determined to protect that North American possession. Another goal was to intercept and impede international and coastal trade. In addition, the British presence on the Chesapeake would hinder waterborne trade and transportation between the eastern and western shores of Virginia and Maryland (George 2000:37).

Implementation of the British blockade commenced in February 1813, following a London directive dated 26 December 1812. On 4 February, a squadron of Royal Navy warships under the command of Admiral Warren anchored in Lynnhaven Bay. Admiral Warren was joined by a subordinate officer, Rear Admiral Sir George Cockburn. Almost immediately Admiral Cockburn was ordered to assess the strength of U. S. Navy gunboats, ascertain the status of the USS frigate *Constellation*, and disrupt transportation and trade in the upper bay (Figure 10; George 2000:3; Weinert and Arthur 1989:23).

By April 1814, Admiral Cockburn moved his base of operations to Tangier Island. On 30 May, Cockburn's naval forces fired a cannonade up Onancock Creek and launched an attack up the Pungoteague Creek aboard 11 barges. Landing on the north shore, the British marched inland where they fought Major Finney's local militia. Cockburn's marines retreated and soon set sail back to Tangier Island (Turman 1988:163). On 2 April 1813, Captain James Polkinghorne tenaciously pursued four American schooners up the Rappahannock. Before dawn on the following day, he engaged and captured the *Arab*, *Lynx*, *Racer* and *Dolphin*. The American prize vessels were then used by the British to capture other merchant sail on the Chesapeake Bay (George 2000:10). Three days after their capture, these vessels seized two brigs and seven schooners on the bay (George 2000:10).

After several months of disrupting navigation, Admiral Cockburn led an attack on Craney Island and fortifications on the Elizabeth River. His objective was to secure a position from which to attack the Gosport Navy Yard. Control over that strategic site, would offer a vantage point for striking major towns in the Tidewater region. An equally important objective was to capture or destroy the USS *Constellation* lying at anchor in the southern branch of the Elizabeth River. Captain Charles Stewart had moved the *Constellation* into a defensive position adjacent to Craney Island. There, he positioned seven gunboats along each side his vessel, manned by officers and sailors. In addition, he ordered those craft encircled by booms to prevent boarding. To capture the *Constellation* in that protected environment, Admiral Cockburn planned a nocturnal mission. On three successive nights in March, Cockburn launched barge attacks against the frigate. Due to strong winds and tides, each operation was aborted within only two miles of the target (Tucker 1993:121; George 2000:7).

On the morning of 21 June 1813, the British advanced on Craney Island after landing 2,500 infantrymen and marines near the mouth of the Nansemond River. An amphibious force of half that number followed Admiral Warren's barge *Centipede* in similar craft to attack

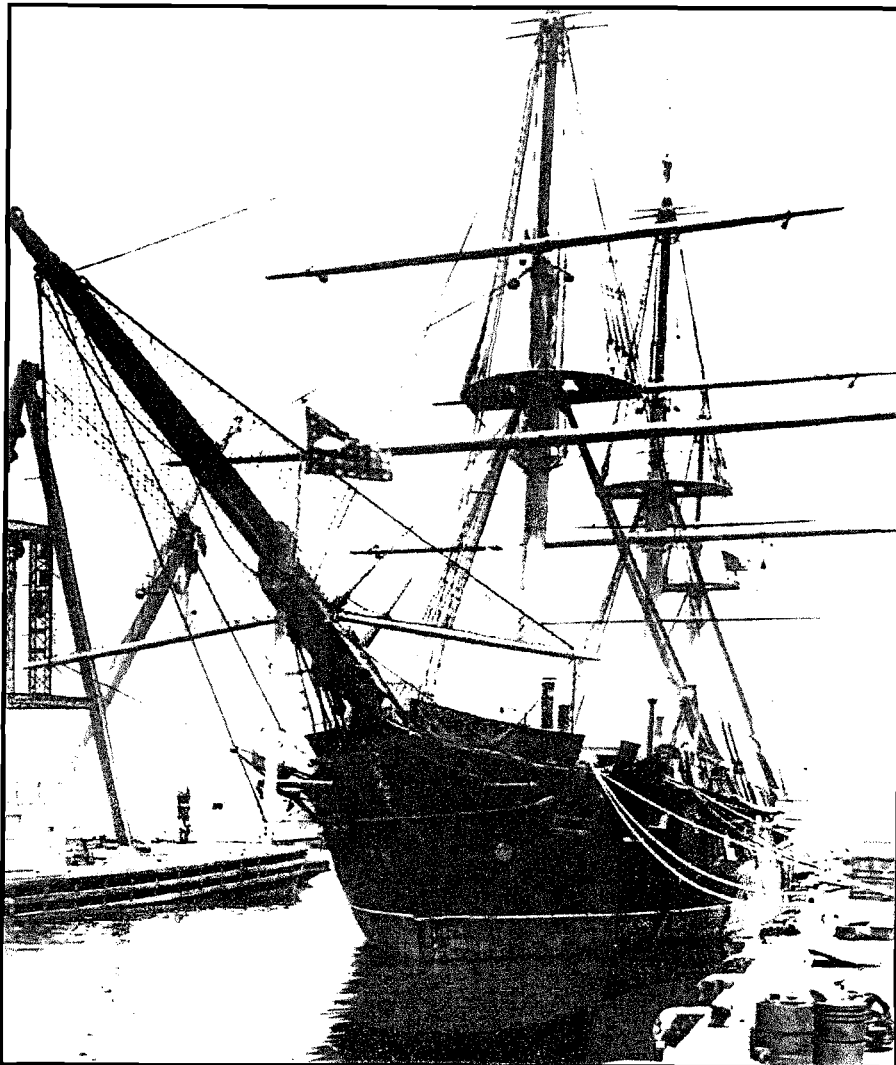


Figure 10. *USS Constellation* Photograph, 1914 (Tazewell and Friddell 2000:59).

Craney Island from the water. Although considerably outnumbered, the Americans occupied well-fortified positions and were reinforced by officers and crew from the *USS Constellation*. Deft artillery fire played an overwhelming role in their successful repulse of the British. By afternoon it was obvious that the American positions could not be overwhelmed without considerable cost and the British withdrew (Rouse 1994:68; George 2000:44-47).

Irritated by the failure at Craney Island, Admiral Cockburn ordered a raid on the more exposed village of Hampton. Three days later, an amphibious force carried aboard 40 barges appeared off Blackbeard's Point. While the flotilla held the American forces's attention, a second unit of approximately 2,400 soldiers and marines landed about two miles further up the James River near Celey's Road. The outnumbered and out maneuvered Virginia militia

were forced to withdraw under fire and left Hampton undefended. The British occupation of Hampton was marked by unrestrained pillage and plunder (Rouse 1994:70-72; George 2000:49-50).

The British occupation of Hampton was brief as military priorities shifted to the north. Although British warships remained in Lynnhaven Bay, Baltimore and Washington became the focus of military operations on the Chesapeake in 1814. The war officially ended in February 1815, with little additional impact in Virginia (Turman 1988:163).

Antebellum Period

The technological advances of the Industrial Revolution helped to transform the Hampton Roads area during the period between the War of 1812 and the Civil War. Steamboats first appeared in May 1815 when the steamer *Washington* visited Norfolk. During the following year, the first steamboat designed for James River service, the *Powhatan*, began regularly scheduled service between Norfolk and Richmond. In 1817, the first Norfolk-built steamer was launched (Emmerson 1949:35). Although most freight and passengers were still carried by locally owned and manned schooners well into the mid-nineteenth century, steamboats quickly became common in the Norfolk and Portsmouth region because of their mobility and dependability. Regular lines were soon established to Baltimore and Richmond (Emmerson 1949:passim). By 1835, an ordinance was necessary to regulate the speed of steamers operating in Norfolk harbor (Tazewell and Friddell 2000:64).

One of the most important facilities in the Hampton Roads area was the Gosport shipyard of Andrew Sprowle. After the yard was burned in 1779, it was seized by the State of Virginia and ultimately purchased by the United States government in 1801. By 1827, Congress authorized construction of a drydock at Gosport to serve U. S. Navy vessels. Five years later, the drydock was placed in service and the USS *Delaware* was brought in for a refit. By 1860, the Gosport Navy Yard was the largest in the United States and contained extensive facilities to construct and to service naval vessels. By 1830, a naval hospital was also in operation in Portsmouth. The cities of Norfolk and Portsmouth benefited considerably by supplying the needs of the yard and naval personnel assigned to facilities and vessels in the area (Tazewell and Friddell 2000:69-70).

To protect American interests in Hampton Roads and the Chesapeake Bay, a series of fortifications were constructed. Shortly after the War of 1812, Secretary of War George Graham ordered a review of the coastline with recommendations from eminent military leaders and engineers (Weinert and Arthur 1989:23). A "Board of Commissioners for Chesapeake Bay" was appointed in February 1817, and surveys of fortification sites in Hampton Roads, the Chesapeake Bay and along the York River were completed by January 1818. One recommendation was for construction of a major fortification at the Old Point Comfort, the site of several previous forts. The Old Point Comfort site clearly remained the key to protect Hampton Roads and the entrance to the Chesapeake (Weinert and Arthur 1989:30).

Construction at Old Point Comfort commenced in March 1819. The design, that materialized as Fort Monroe, was described as a “regular work, with seven fronts, covering about sixty-three acres of ground and surrounded by an eight foot deep moat” (Weinert and Arthur 1989:31). The full armament of the fort was originally conceived to be 380 guns ranging from small 24-pounder howitzers to 42-pounder guns mounted principally in the water battery. Fort Calhoun or “Castle Calhoun,” later called Fort Wool, was added to the area’s defenses by 1830. That fortification was erected on a riprap shoal located a mile from Fort Monroe, and laid directly across the major ship channel leading from Chesapeake Bay into Hampton Roads (Weinert and Arthur 1989:30). At the outbreak of the Mexican War, Fort Monroe was considered one of the most powerful fortifications on the Atlantic seaboard.

By the 1850s, railroads and an extensive network of lines connected the docks around Hampton Roads with Tidewater Virginia and the rest of the eastern United States. Among the first of these was an east-west line connecting Hampton Roads with the trans-Allegheny. These railroads laid the foundation for the rapid growth of the Hampton Roads area during the late nineteenth, and early twentieth centuries. They allowed Newport News to develop from a small farm community into a busy port. Although it was not until 1880 that the Old Dominion Land Company and the Chesapeake and Ohio Railroad Company began to build the infrastructure that made Newport News a prominent marine terminal, it was during the period between the War of 1812 and the Civil War that the first piers were built off Newport News Point. Prior to the growth of the coal shipping industry, these piers were used to ship the region’s produce to market (Cox 1994:8-9; Hagemann 1988:174-75).

The Civil War Period

Hampton Roads and the James River

Hampton Roads became a pivotal battleground during the Civil War and Fort Monroe served as the primary headquarters of Union military activity (Figure 11). On 17 April 1861, the Virginia Secession Convention voted to secede from the Union, only four days after the engagement at Fort Sumter in Charleston Harbor (Robertson 1991:8). During the night of 21 April 1861, Federal forces abandoned Norfolk, and set fire to the U. S. Navy Shipyard at Gosport and a number of ships in the Elizabeth River (Shomette 1982b:12-13). Although they lacked both vessels and facilities, the Confederate naval effort was bolstered considerably by the capture of the partially destroyed Gosport Navy Yard. The Gosport Navy Yard was one of the nation’s finest naval facilities that included a dry dock, ship houses, sail and rigging lofts, gunners lofts, sawmills, carpentry shops, foundries and an ordnance store and laboratory (Still 1971:18). In addition to these extensive facilities, the Confederates acquired a number of naval vessels and over 1,000 pieces of ordnance—most notably 52 Dahlgren guns (Still 1971:9-10).

A number of warships were destroyed at the same time Union forces destroyed the Gosport Navy Yard. One of the most important was the frigate USS *Merrimac*, a 3,200-ton screw steamer. Scuttled by retreating Union forces and burned to the waterline, the Confederates found the *Merrimac*’s bottom and steam engines in sound enough condition to make salvage

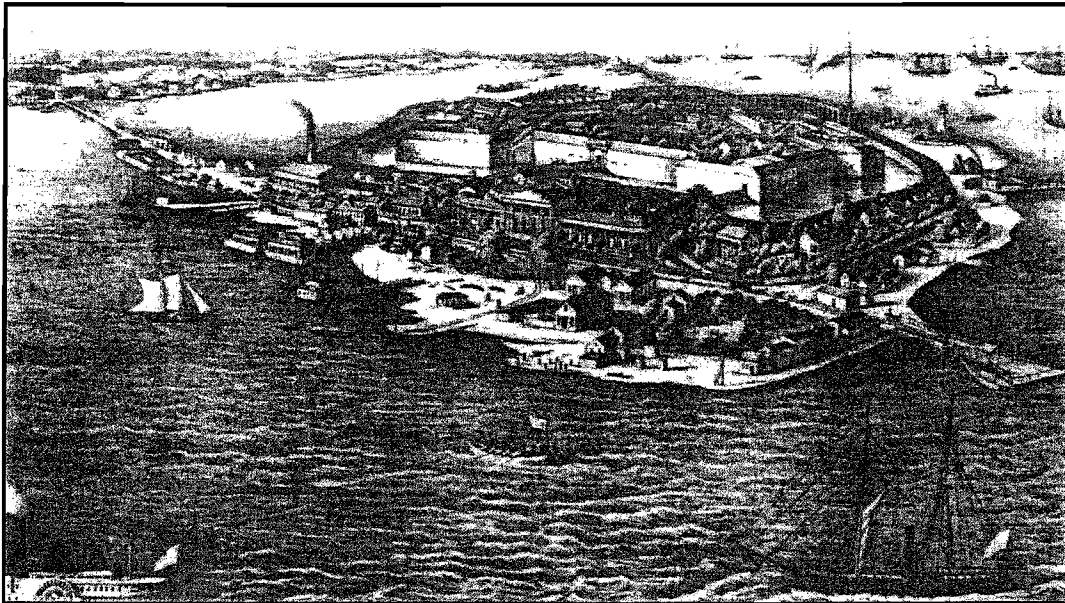


Figure 11. Engraving showing Fort Monroe at about the time Virginia seceded from the Union in 1861 (Weinert and Arthur 1989:96).

possible. The *Merrimac* was raised and converted into the ironclad ram CSS *Virginia*. On 8 March 1862, the *Virginia* proceeded down the Elizabeth River on its maiden voyage. Instead of simply testing the vessel's seaworthiness, Captain Franklin Buchanan attacked the Union fleet anchored at Hampton Roads. The wooden ships of the Federal fleet were no match for the heavily-armored *Virginia* and by day's end the frigates USS *Cumberland* and USS *Congress* had been completely destroyed (ND 1971, II:29).

When the *Virginia* returned to resume its attack on the grounded frigate USS *Minnesota* the following morning, Buchanan found the way blocked by the Union ironclad USS *Monitor*. The resulting battle between the two ironclads was a historical engagement. Lasting for over two hours and often fought at point blank range, it ended inconclusively when the *Virginia* withdrew to avoid being grounded by the outgoing tide (Fowler 1990:84-88). The *Virginia* had destroyed two powerful Union warships and thrown a scare into the North, but ultimately it would prove unable to break the Union hold over Hampton Roads.

Over the next several weeks, the *Virginia* ventured into Hampton Roads with intent to challenge the *Monitor*. The *Monitor*, however, refused to respond to the challenge. It was ordered not to engage the *Virginia* unless the latter began attacking other ships in the harbor. The *Monitor* was seen by the Union as invaluable because it was the only vessel standing between the *Virginia* and the possible destruction of the Union war effort in southern Virginia.

McClellan's Peninsula Campaign was the result of Abraham Lincoln's concern over the general's apparent inability to take action against the Confederate Army. In his "President's General War Order No. I," issued in January 1862, Lincoln stated that a forward movement

of the Union forces should take place on February 22. In issuing this order, Lincoln expected McClellan to make a direct assault against Joseph E. Johnston's army located at Manassas just a few miles from the Union Army's position. Instead of following Lincoln's wishes, McClellan chose to attack the Confederates from a more indirect route, by way of the peninsula that separates the James and York Rivers. McClellan exercised sound reasoning in approaching Richmond via the Peninsula route, versus directly from Washington. To attack Richmond from Washington would mean that several rivers would have to be crossed, thus hindering the troops advancement and the flow of supplies. By following the peninsula route, McClellan could use the main river channels for transportation of men, supplies and equipment, while Union gunboats provided cover. McClellan began the campaign with a huge troop embarkation assisted by the Potomac Flotilla. By 1 May, McClellan, with a force of 112,000 at Fort Monroe, prepared for an advance on Richmond.

When McClellan arrived at Fort Monroe, Flag Officer Goldsborough informed him that the *Virginia* was still in the James River and posed a large threat to the vessels intended to support McClellan's troops. This situation forced McClellan to shift the primary effort of his assault to the York River (Still 1971:35-36). With the support of the navy, Union forces attacked Yorktown. After a months siege Confederate forces evacuated the town. McClellan's forces pursued the Confederate troops as they retreated toward Richmond.

McClellan's move up the peninsula threatened Norfolk's lines of communication with Richmond. In addition, the city faced an attack from the South by Brigadier General Ambrose Burnside. As a result of these circumstances, the Confederate commander General Joseph E. Johnston ordered the evacuation of Norfolk and the Navy Yard destroyed. Unbeknownst to Union forces, two Confederate gunboats traveled down the James River to Norfolk and towed two gunboats and the unfinished ironclad CSS *Richmond* up the James River (Coski 1996:29). To avoid capture, the *Virginia* was ordered to travel as far up the James as its draft would allow.

In anticipation of a great Union victory, Lincoln himself traveled to Hampton Roads to observe the proceedings. On May 7, Lincoln, seeing that things seemed to be going well, sent a note to Goldsborough stating that McClellan had once again requested that gunboats be deployed on the James River to harass the Confederate retreat. Lincoln suggested that USS *Galena*, the second of the ironclads to be built, and two gunboats be sent up the river for this purpose (Figure 12). Furthermore, he wanted the three vessels to proceed up the river that night. Goldsborough ordered the *Galena*, *Aroostook* and *Port Royal* to advance up the James and aid McClellan's troops (Bearss 1995:33-34; NHS 1987, Ser. 1, 7:327). After receiving word that Norfolk was being abandoned, Lincoln ordered Union ships to commence bombardment of the Confederate batteries on Sewell's Point. This action was aimed at drawing the *Virginia* out where specially armored ships could ram and sink the confederate ironclad (Still 1971:39). However, the Federal vessels were ordered back to Fort Monroe when the *Virginia* appeared in Hampton Roads.

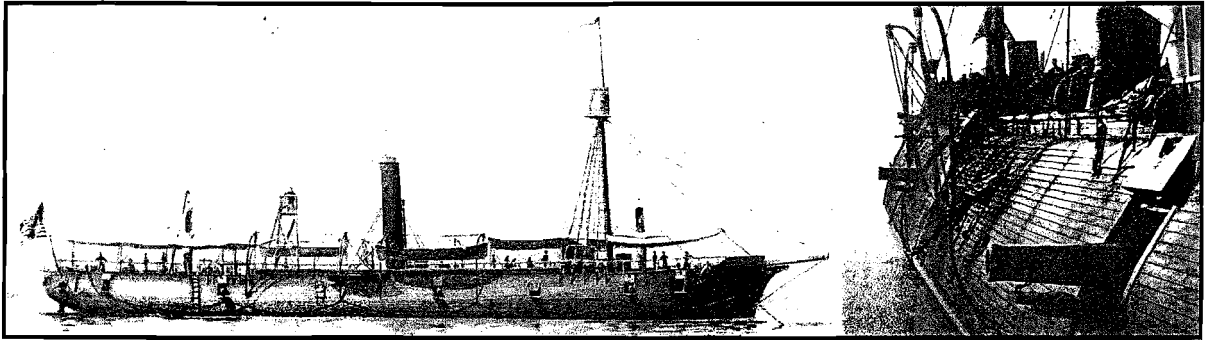


Figure 12. Sketch & Photograph of Ironclad *Galena* (Silverstone 1989:16).

In order to proceed up the James River, the *Virginia's* crew attempted to lighten the vessel so that it would draw only 18 feet. However, western winds on the morning of the retreat made navigation over the James's bar impossible even at 18 feet (Davis 1975:154). With Federal troops quickly approaching the ironclad's position, Commodore Josiah Tattnall grounded and burned the *Virginia* off Craney Island (NHS 1987, Ser. 1, 7:787-798; Shomette 1982a:14-15). The ensuing explosion completely destroyed the South's most powerful warship.

By late spring 1862, the Union army had begun to assume control of Tidewater Virginia. McClellan's forces captured both Yorktown and Norfolk and forced the Confederates to withdraw towards Richmond. With the threat from the *Virginia* gone the Union was now able to move ships more freely on the James. Goldsborough sent the *Monitor* and the gunboat *Naugatuck* up the river. They were ordered to proceed towards Richmond and once there shell the city into submission. The vessels arrived at Jamestown on May 12. That night the *Galena*, *Monitor* and three gunboats, *Port Royal*, *Aroostook* and *Naugatuck*, began to steam upriver toward Richmond. They got within 8 miles of Richmond where they were halted by a series of obstructions in the river and a strong fortification, known as Fort Darling, built on Drewrys Bluff.

These obstructions and fortifications were created to defend Richmond from attack via the James River. The Confederates built Fort Darling on top of Drewrys Bluff for that purpose. In addition, the Confederates placed a line of obstructions in the river from bank to bank at that location. Those obstructions consisted of sunken vessels and cribs of stone that prevented navigation beyond Drewrys Bluff (Bearss 1995:19, 52; National Underwater and Marine Agency (NUMA) and Underwater Archaeological Joint Ventures (UAVJ) 1982a:11).

The *Galena* anchored about 600 yards below the bluff, so that its entire broadside faced the fort. At 7:45 A.M. the following morning, the vessels opened fire on the fort, which answered with its own guns. During the battle, the *Naugatuck's* gun burst removing the vessel from the battle. The gunfire continued for about 3.5 hours until the commander of the *Galena*, which had expended most of its ammunition and was heavily damaged, aborted the mission and signaled the other vessels to break off the engagement (Bearss 1995:64; NHS 1987, Ser. 1, 7:357-358). The Union attempted no further naval assaults on the Drewrys Bluff fortifications until the end of the war (ND 1971, II:64).

In the aftermath of the battle, it was clear to Union and Confederate leaders that the Union assault lacked one essential component that could have assured the latter's success. That ingredient was the presence of Federal ground forces. Confederate officers noted that their own position was actually weak and that had several thousand troops attacked the fort in cooperation with the naval bombardment, the fort would have fallen together with Richmond (Anderson 1962:83). Fort Darling was the only obstacle left on the James River between the Union forces and Richmond. As a consequence, the fort was reinforced to guard against land assaults. Goldsborough also drew this conclusion and asked McClellan to send a ground force to rendezvous with the gunboats in an attempt to seize the fort (Anderson 1962:83). Unfortunately, McClellan did not grasp this opportunity, but chose instead to follow his original plan to assemble the Union army along the Chickahominy to make a move toward Richmond. By strictly adhering to his own strategy, McClellan undoubtedly missed the opportunity to remove the one obstacle between the gunboats and Richmond (Anderson 1962:83).

During the series of engagements known as the Seven Days Battle, Union forces were forced to abandon their assault on Richmond and retreated back along the James River to Harrison's Landing at Malvern Hill. At Harrison's Landing, McClellan's force was protected by Federal gunboats. General Robert E. Lee confirmed the safety of this position when he wrote to Jefferson Davis that he was unwilling to expose his troops to the fire of the gunboats (Bearss 1995:103). This stalemate remained unchanged until August at which time the decision was made to move the troops back to Washington, thus ending the peninsula campaign. The Union did, however, retain City Point as a base of operations for the U. S. Navy throughout the rest of the war in support of its operations against the C. S. Navy on the upper James River (Figure 13).

Since the Union had control of much of the lower James River, the Confederate Navy set about obstructing the Upper James to prevent Union gunboats from reaching Richmond. The obstacles consisted of mining selected portions of the James with electric torpedoes and constructing large obstructions in the river. The navy was also in the process of building a formidable fleet at Richmond. Confederate defenses in the James River hampered the effectiveness of the U. S. Navy throughout the war.

Owing to the importance of protecting Richmond, the James River was the first place the Confederates employed their newest weapon, the electric torpedo. The electric torpedo was the invention of Virginian Matthew Fontaine Maury. While others had experimented with electric mines, Maury was the first to actually employ mines in warfare. Constructed of boiler plate and containing either 70 pounds or 160 pounds of powder each, the mines were designed to be manually detonated from shore by means of an insulated wire (Williams 1963:393). The mines were placed in watertight casks capable of floating and held just below the surface by anchors. Maury personally labored to strategically place the new weapons in the James and by 19 June 1861, the work was complete.



Figure 13. Photograph of Federal supply depot at City Point (Library of Congress).

The mines were placed at narrow and shallow parts of the river and ranges established for estimating when a vessel passed over them. Maury placed 15 mines, arranged in three rows across the river, below the battery at Chaffins Bluff. When detonated, all of the mines in each row or range would explode. Furthermore, he placed two ranges, of two torpedoes each, opposite the battery at Chaffins Bluff (Williams 1963:392). The mines proved to be so effective at keeping the Federal fleet away from Richmond that Secretary of the Navy Mallory, who originally laughed at the concept of torpedoes, was eventually converted to the idea (Williams 1963:415).

Drewrys Bluff became the center of Confederate naval operations on the James River. At the end of 1862, the James River Squadron consisted of seven vessels: the *Richmond*, *Patrick Henry*, *Nansemond*, *Hampton*, *Beaufort*, *Raleigh* and the *Drewry*. All, but the *Richmond*, were wooden gunboats. The ironclad *Richmond* was constructed at the Gosport Navy Yard and towed in an unfinished state to Rocketts to be completed. In 1864, the *Richmond* was joined by two other ironclads, the *Fredericksburg* and the *Virginia II*. The Tredegar Iron Works in Richmond provided machinery and armor for both vessels. In addition to the navy vessels that were built in Richmond and stationed at Drewrys Bluff, the Confederates operated the navy school ship *Patrick Henry* on the James between Drewrys Bluff and Richmond (NUMA and UAJV 1982a:2).

The Confederate evacuation of Hampton Roads signaled the end of open confrontations between Confederate and Union forces there, but the region continued to be involved in the war. Hampton Roads remained a base for Union forces conducting operations against the rebels on the upper James River. In October 1864, the Confederate commerce raider CSS *Florida*, a screw steamer, was captured in a Brazilian port and sent to Hampton Roads. While anchored off Newport News on 28 November 1864, the vessel was “accidentally” rammed by the steam transport *Alliance* and sunk (Shomette 1973:267-69).

In the spring of 1864, Union General Ulysses S. Grant formulated his plan for campaign against Lee’s forces. Included in this plan was the return of Federal gunboats to the James. This plan called for forces under the command of General Benjamin F. Butler to move up the James River and then to move across country with the goal of cutting off the Richmond and Petersburg Railroad line. Once this was accomplished, Butler would attack Petersburg to further ensure that no supplies could reach Lee.

Butler’s forces set out in early May for Richmond, but owing to the threat of the Confederate ironclads and troops, his force was escorted by three monitors, seven gunboats and the captured ironclad *Atlanta*. The troops were landed at Bermuda Hundred on 5 May. It was not until the following day that there was a response from the Confederate Navy, when a mine sank the Union gunboat USS *Commodore Jones* in the James River (ND 1971, IV:56). Butler attempted to drive toward Petersburg, but changed his strategy and attempted to move in behind Lee’s forces. The Confederates pushed him back, however, almost to Drewrys Bluff, where his forces dug in along a line between the Appomattox and James Rivers.

City Point became the base for Union army operations along the James. To protect this position from the Confederate ironclads located upriver, General Grant ordered that obstructions be placed in the river at Trent’s Reach Bar on Butler’s right flank (Coski 1996:163; NHS 1987, Ser. 1, 10:290). Those obstructions were placed in a large loop in the river, where the head of the loop was only about a half mile wide. The situation at this point developed into a naval standoff on the James. The new obstructions would not allow the opposing forces to successfully engage one another. Although they were often close enough to exchange shots, this stalemate would continue into 1865.

On 23 January 1865, the James River Squadron embarked on an ambitious operation. Under the command of John K. Mitchell, the fleet was to move through the obstructions at Trent’s Reach and destroy the Union supply base at City Point. If successful, the attack would disperse the Union fleet and destroy the base of Union army operations. Unfortunately, the Confederate ironclads ran aground at Trent’s Reach and were subjected to Union bombardment until re-floated by the tide (Coski 1996:196-206; ND 1971, V:26). On 19 February 1865, the Confederate steamer *A. H. Schultz* was destroyed at Chaffins Bluff. While returning from transporting 450 Union prisoners to Varina on the James River, the steamer hit a Confederate torpedo that had drifted from its original position. The explosion completely destroyed the vessel (ND 1971, V:46).

Near the end of the war, when it was obvious that Richmond would be abandoned, the obstructions were ordered removed from the river and the Union vessels moved toward Richmond. Rear Admiral Raphael Semmes, who was given command of the James River Squadron the previous month, was ordered to destroy the Confederate fleet to prevent its capture. As Confederate soldiers left their trenches and burned everything of value around Richmond, Semmes led the fleet to the vicinity of Drewrys Bluff where the vessels were scuttled and burned (Coski 1996:219-220; Scharf 1887:747). While it appeared that the *Virginia II* and *Fredericksburg* were destroyed at Drewrys Bluff, the *Richmond* was identified after the war at Chaffins Bluff (NA 1870). The remaining vessels of the James River Squadron were scuttled to obstruct Union navigation of the James River. After Semmes was forced to destroy the C. S. Navys fleet at Drewrys Bluff, he and his men escaped up the James River to Richmond in gunboats. Upon reaching Richmond, Semmes finished the destruction of the James River Squadron by destroying the gunboats and the Confederate Navy school ship *Patrick Henry* in Richmond Harbor (Coski 1996:220; Shomette 1982a:177).

During the war, several other vessels were destroyed on the James River near City Point landing. The first occurred during the night of 31 July 1862, when a Confederate battery at Coggin's Point sank two Union transports between Shirley Plantation and Harrison's Landing. In retaliation, the USS *Cimaron* destroyed the battery (ND 1971, II:88). Confederates were unable to further harm the Union forces at City Point until August 1864. On 9 August, two Confederates, John Maxwell and R.K. Dillard, delivered a 12-pound torpedo with a timer to one of the transports that was tied up at City Point. When the torpedo detonated, it destroyed the transport and several barges, and spread fire to the Union storage and headquarters facilities (ND 1971, IV:102). On 27 November 1864, a third vessel, the USS *Greyhound* was sunk. While traveling from Dutch Gap to Fortress Monroe with Union General Butler and Admiral Porter on board, the vessel exploded a few miles below Bermuda Hundred. Although a Confederate coal torpedo was identified as the source of the explosion, it was not proven (Shomette 1973:65-66).

As the Confederacy collapsed and the James River came under the control of Union forces, efforts were made to recover the machinery, ordnance and armor from the ships destroyed at Drewrys Bluff. As was generally the case, those efforts were limited and focused on material that would be of immediate value. Once the most marketable material had been recovered, vessel salvage was abandoned until government attention focused on improving the James River channel for commercial navigation.

The York River

During the Civil War, the strategic and tactical importance of the York River narrows made Yorktown a focal point of early operations. Recognizing its importance, the Confederates had fortified the town, and constructed many of their defenses atop former British sites. Anxious to strike at Richmond and end the war quickly, Union General McClellan began his Peninsula Campaign early in 1862 with an attack on Yorktown. The Union siege lasted a

month and the Confederate forces abandoned Yorktown on 4 May 1862. On the day of the evacuation, the Confederate vessels CSS *General Scott* and CSS *Champion* were scuttled off Gloucester Point to prevent capture by the USS *Corwin* (NHS 1987, Ser. 1, 7:320).

The Pamunkey River

After the Confederate retreat, the U. S. Navy and Union transports headed up the York River to West Point. To support McClellan's advance on Richmond, a base of operations was to be established at White House on the Pamunkey River. Control of the Pamunkey River was extremely important to facilitate McClellan's plans to capture Richmond. To frustrate Union navigation on the Pamunkey, Confederates, under the command of General Joseph E. Johnston, confiscated a number of commercial vessels and scuttled them in the Pamunkey navigation channel. In all, 56 vessels were sunk at different localities between Cooks Island and Bassett's Landing (NHS 1987, Ser. 1, 7:380-381).

Confederate efforts to use sunken vessels as obstructions or parts of them, were far more extensive than those of the Union. Barricading the waterways fitted in with the Confederacy strategy to defend the nation by blockading the potential routes of invasion. Often the obstructions were created when a particular geographical area with waterways that could be used as arteries of invasion was directly threatened. This was true when General McClellan initiated his Peninsular Campaign in the spring of 1862. Confederate engineers laid down underwater barriers including hulks to blockade the James, Pamunkey and Warwick Rivers. As early as September 1861, four canal barges loaded with rock were sunk across the mouth of the Warwick River, the stream that cut across the Peninsula just west of Newport News, Virginia (NHS 1987, Ser. 1, 6:717, 724).

The Rappahannock River

Confederate use of sunken vessel obstructions was also employed on the Rappahannock River. In April 1862, four vessels were ordered scuttled across the Rappahannock River seven miles below Fredericksburg, Virginia (NHS 1987, Ser. 1, 5:578-579). One or more of those vessels could have been prizes of the Union steamer *St. Nicholas* captured by Confederate Captain George N. Hollis that was used for privateering (Mills 1996:59-62). On 20 April, Union gunboats ascended the Rappahannock under the command of Commander R. H. Wyman. After passing the obstructions, they found the Fredericksburg waterfront littered with the remains of burned vessels, one of which was the *St. Nicholas*.

During the summer of 1863, Lieutenant John Taylor Wood formulated a plan for attacking Union gunboats on the Rappahannock River in eastern Virginia. Lieutenant Wood was a veteran of the CSS *Virginia*'s engagements at Hampton Roads and the subsequent battle at Drewrys Bluff on the James River. In the fall of 1862, Wood had carried out a successful raid on the Potomac River that resulted in the destruction of the United States transport

schooner *Francis Elmore* in early October (Mills 1996:85). Two weeks later, Wood led a raid that resulted in the capture of the 1,400-ton Union merchant ship *Alleganian* off the mouth of the Rappahannock River (Mills 1996:86).

Lieutenant Wood's plan included the capture of one or more of the U. S. Navy gunboats of the Chesapeake Bay Flotilla. By mid-August, Wood headed for the Virginia Tidewater. With a selected compliment of seventy-one seamen and eleven officers, most from the James River Squadron, Wood launched a fleet of small boats in the upper reaches of the Piankatank River. Although the expedition was discovered and attacked by Union sailors in small boats from the USS *General Putnam*, Wood's raiders drove the *General Putnam's* boats off and withdrew to the Rappahannock.

Near Urbana, Wood's men launched their boats in Meachum's Creek. After several uneventful sorties down the Rappahannock, Wood discovered two Union gunboats off Stingray Point. Under cover of a fierce storm, Wood launched his attack. The Confederate raiders boarded both gunboats simultaneously. Although the sleeping Union sailors were warned at the last minute by a lookout, those on one vessel could not obtain weapons as they were locked up under the supervision of the master-at-arms. Under the circumstances, opposition was futile and the vessel was lost in a matter of minutes. Resistance on the second gunboat was more organized and casualties were heavier, but the result was the same.

The success of the Confederate attack left Wood in command of the 217-ton wooden side-wheel steamer USS *Satellite*, armed with 32-pounders and a 12-pounder howitzer, and the 90-ton screw steamer USS *Reliance*, armed with a single rifled 30-pounder and a 24-pounder howitzer (NHS 1987, Ser. 1, 5:344-345; Mills 1996:208-210). Wood immediately got underway and steamed up the Rappahannock to Urbana where he anchored long enough to dispose of his prisoners, divide the limited supply of coal aboard the gunboats and refit the vessels for Confederate service. Although problems with the *Reliance's* machinery prevented her from getting underway again the following night, Wood departed Urbana in the *Satellite* after sunset to search for the gunboat USS *Currituck*.

With a company of Confederate cavalry aboard to act as sharpshooters, *Satellite* cruised the Chesapeake Bay off the mouth of the Rappahannock all night in search of the *Currituck*. After spending the day at Grays Point, Wood resumed his search at dusk on 24 August. Off the mouth of the Piankatank, *Satellite* captured the schooner *Golden Rod* with a cargo of much needed coal. Near the mouth of the Rappahannock, Wood captured the small schooners *Coquette* and *Two Brothers* (NHS 1987, Ser. 1, 5:344-345; Mills 1996:211-212). The *Satellite* towed all three vessels back to Urbana. After taking on coal from the *Golden Rod*, Wood dropped down the Rappahannock to resume his search for the *Currituck*. Later during a storm, Wood sighted three Union gunboats steaming in his direction.

Because conditions in the Chesapeake Bay were too rough for the *Satellite* to escape, Wood steamed back up the Rappahannock to Urbana. There he burned the *Golden Rod*, and with the schooners in tow, steamed up river accompanied by the *Reliance*. Wood brought the steamers and his prizes to anchor at Port Royal. There the vessels were protected by two

Alabama regiments that were accompanying a train of forage wagons. With Union gunboats in the Rappahannock on full alert and a hostile force only 15 miles away at King George Courthouse, Wood was left with limited options. On 27 August, he made the difficult decision to destroy his prizes. Wood's raiders scuttled all of the vessels in the Rappahannock after stripping them of everything of value (Mills 1996:213). After Wood and his men departed for Richmond with their cutters, Lieutenant Edward Hooker confirmed the Confederate raiders had destroyed their prizes.

The Potomac River

The Potomac River was the gateway to the Union capital. It also bordered the Confederacy. On 1 May, Secretary Welles created a flotilla to patrol the river and Chesapeake Bay. Originally, the flotilla consisted of the sloops of war, USS *Pawnee* and USS *Pocahontas* as well as several converted steamers. Throughout the war the flotilla's ships exchanged fire with Confederate batteries and troops on the Potomac and Rappahannock Rivers.

In May 1861, Confederate forces captured the U. S. Army transport *George Page* at Aquia Creek (Shomette 1973:280). The 410-ton side-wheel steamer was quickly armed and moved to Quantico Creek on the Virginia side of the Potomac under the command of Lieutenant Charles C. Simms. The *George Page* carried out limited operations in the vicinity of Quantico and Chopawamsic Creek. Although Simms's operations were of no real strategic value, the presence of a Confederate gunboat on the Potomac was cause for concern. In October 1861, news that the schooner *Mary Washington* was being fitted out to support transporting Confederate troops prompted a raid on Quantico Creek. While Lieutenant Abraham Harrell of the gunboat USS *Resolute* destroyed the schooner, the *George Page* was not damaged. The raid did cause Lieutenant Simms to move the *George Page* to a safer haven in Chopawamsic Creek below Shipping Point. There the vessel remained until 9 March 1862. On the day that the *Monitor* confronted the *Virginia* at Hampton Roads, Confederate forces abandoned their fortifications on the Potomac and retreated. Before abandoning the area, the *George Page* was set afire and blew up (NHS 1987, Ser. 1, 5:23, 25). The only Confederate gunboat on the Potomac was no longer a threat.

No Union vessel was lost to enemy action on the Potomac, although the gunboat USS *Tulip* was sunk in July 1864 as a result of a boiler explosion. The *Tulip*, originally built for the Chinese navy, was purchased shortly after it was completed in 1863. The screw steamer was small, slightly less than 100 feet in length and weighed only 183 tons (Shomette 1973:155-156; Silverstone 1989:104). But with an 8-foot draft, the steamer was ideal for riverine warfare. The *Tulip* carried a small battery of two 24-pound smoothbores and one 20-pound Parrott rifle. Until its destruction in November 1864, the *Tulip* and other units of the flotilla were involved in combined operations, to transport troops and to provide fire support for naval landing parties. The Potomac Flotilla was deactivated in July 1865, and the five vessels that comprised the flotilla at that time were decommissioned.

Late Nineteenth/Early Twentieth Century Period

Like the rest of the South, Tidewater Virginia's economy had been devastated by the war. Following capitulation by the Confederate States of America, the region experienced a sometimes measured, but steady recovery. During the 1870s, the inland coal industry emerged as a chief coastal export. That trade stimulated shipbuilding interests, which then expanded to meet the growing demand for cargo vessels. Those craft were needed to transport increasing amounts of coal down river and on to final destinations (Rubin 1977:148; Blanton and Margolin 1994:42).

Rapid industrialization, in the northeastern United States, also favorably impacted recovery in the Hampton Roads region. Production of steam and gas relied on a constant supply of coal. Eventually, officers of the Chesapeake and Ohio Railroad (C&O) selected a site on Newport News Point to build their deep-water terminus. The decision to channel their massive shipments of West Virginia coal to that area was based on sound motives. The founder of C&O, Collis P. Huntington, recognized the logistical merit of the site, and remarked: "[Newport News Point is] a point so designed and adapted by Nature, that it will require comparatively little at the hands of man to fit it for our purposes. The Roadstead (Hampton), well-known to all maritime circles, is large enough to float the ocean commerce of the world" (Blanton and Margolin 1994:42).

A competitor service, the Norfolk and Western Railroad (N&W), also transshipped coal from western mines to depots at Hampton Roads. During the late nineteenth and early twentieth centuries, northern factories also contracted with coastwise schooners or colliers to load coal from wharves at Newport News and Norfolk. Other support-related commerce evolved at Hampton Roads, manufacturing everything needed to bring coal from the mountains to terminals located at the port cities.

Railroads also brought cotton to Hampton Roads. While the annual shipments of cotton prior to the Civil War were less than 10,000 bales, more than 100,000 bales were shipped in 1869. That figure increased to 400,000 bales in 1874 (Tazewell and Friddell 2000:101). While eclipsed by coal and cotton, lumber was also a major export commodity during the revival of that industry late in the nineteenth century. The seafood industry also achieved commercial prominence in the Chesapeake Bay during the post-Civil War period. By the early 1880s, oyster boats in the Norfolk area alone amounted to over 500 craft, with "thousands involved in 'catching' them with tongs and dredges" (Parramore et al. 1994:249). Nearly one-half million bushels of the popular shellfish were shipped to the west coast, and to Europe during the same period (Parramore et al. 1994:249). By 1884, a Hampton business owner was packing nearly 200,000 bushels per year. That operation, managed by J. S. Darling, became the "world's largest oyster concern" (Parramore et al. 1994:250).

In addition to developing the Virginia coal industry, Collis Huntington established a shipyard in Newport News. The Chesapeake Dry Dock and Construction Company was founded in 1886, and the first dry dock was opened in 1889. The monitor USS *Puritan* was the first vessel brought in for service. The following year Huntington changed the name of the

shipyard to the Newport News Shipbuilding and Dry Dock Company [NNS&DDC]. Within twelve months the tug *Dorothy* was launched and a year later NNS&DDC received a contract for constructing three gunboats, *Nashville*, *Helena* and *Wilmington*. In January 1896, two additional contracts were obtained for the USS *Kearsarge* and USS *Kentucky*. By 1898, more than 3,300 shipbuilders were employed in the yard (Tazewell and Friddell 2000:104). At the Norfolk Navy Yard in Portsmouth, the battleship USS *Texas* was launched in 1892 (Foss 1984:48).

While the Spanish American War only marginally impacted Hampton Roads, the naval buildup that followed brought significant changes in the U. S. Navy presence in the area. The "Flying Squadron" composed of battleships, cruisers and support ships sailed from Hampton Roads for Cuba and Puerto Rico. Naval victories associated with the war with Spain stimulated support for rebuilding United States naval strength. Within two years of the 1898 peace treaty between the United States and Spain, the Norfolk Navy Yard had expanded to employ more than 2,000 civilians. The expanding United States presence in the Pacific following the war made naval strength a priority. In 1907, the U. S. Navys "Great White Fleet" departed Hampton Roads on a two-year cruise that circumnavigated the earth (Tazewell and Friddell 2000:109).

By the time the fleet returned to Hampton Roads, most of the vessels were obsolete. The launch of England's HMS *Dreadnought* in 1906 had revolutionized warship construction. NNS&DDC benefited from additional contracts to build modern warships including "dreadnoughts." Experiments with naval ordnance that followed the return of the Great White Fleet were carried out in 1909 on the USS *Katahdin* off Rappahannock Spit. In 1911, the USS *Texas* was renamed *San Marcos* and was towed to a location off Tangier Island for gunnery experiments (Burgess 1994:26-29). The *Katahdin* and *Texas* experiments initiated trials that resulted in the sinking of many obsolete naval vessels in Virginia waters.

As the U. S. Navy shifted entirely to coal fueled vessels, Norfolk also became the most important coaling station on the North Atlantic seaboard. The area also served as a source of coal for Atlantic and Pacific naval stations that supported the navy. Coaling facilities would become a critical element in worldwide naval operations.

In 1910, only seven years after the successful flights of Orville and Wilbur Wright at Kitty Hawk, North Carolina, pilot Eugene Ely flew a Curtiss-Hudson off a jury-rigged flight deck on the USS *Birmingham*. While little significance was attached to the experiment, the age of naval aviation was born (Blanton and Margolin 1994:51; Tazewell and Friddell 2000:110). In 1915, airplane manufacturer Glenn Curtiss moved his flight training operations from Buffalo, New York to Newport News. During the following year his chief test pilot broke all aviation speed records in one of his twin-engine land and sea "aeroplanes." The speed record helped bring in \$7 million dollars in orders from Great Britain and Russia. Many American and Canadian military aviators received their training at the Atlantic Coast Aeronautical Station at Newport News (Rouse 1990:96-97).

Although equally important in the future of the American navy, construction of a prototype-submarine by NNS&DDC received little enthusiasm. The innovative design was created by Simon Lake, a leader in undersea craft. Lake's genius was unappreciated by the American government, so he contracted with the Newport News shipyard to construct six submarines. Those were eventually sold to Czar Nicholas II of Russia. After that diplomatic imbroglio, the U. S. Navy purchased the two remaining submarines. Not surprisingly, one of those navy acquisitions, the *Seal*, "set speed and diving depth records" during sea trials conducted in 1911 (Blanton and Margolin 1994:51).

Prior to the American declaration of war against Germany, a German commerce raider sailed into Hampton Roads in March 1915. The *Prinz Eitel Friedrich* anchored off Newport News and proceeded to disembark 300 prisoners captured from Allied merchant vessels (Blanton and Margolin 1994:51). Rather than engage British warships "hovering" near the Virginia coast, the German commander shrewdly opted to seek political asylum in a neutral port. Military personnel and civilians were still in shock over the troubling incident, when yet another German vessel steamed into Hampton Roads. The cruiser *Kronprinz Wilhelm* also offloaded prisoners and, like its predecessor, was escorted to Portsmouth for the duration of World War I (Blanton and Margolin 1994:51). Less than a year after the *Prinz Eitel Friedrich* anchored off Newport News, the British ship *Appam* was brought into Hampton Roads by a German prize crew. In the summer of 1916, the German submarine *Deutschland* brought mail into Baltimore (Tazewell and Friddell 2000:116).

The impact of German and British naval activities was acutely felt in the United States. Exports to the Central Powers fell from \$170 million in 1914 to \$1 million two years later. Trade with the Allies increased from \$825 million to \$3 billion during the same period. Exports from Hampton Roads rose accordingly and coal topped the list of material and supplies shipped to European nations.

World War I Period

In April 1917, the United States declared war on Germany. One reason for the decision was the German declaration of unrestricted submarine warfare on 31 January 1917. German submarines sank a total of 900,000 tons of merchant shipping in April 1917 and antisubmarine warfare became one of the first priorities of the United States and Great Britain military. The adoption of convoy tactics, in May 1917, severely reduced the effectiveness of the German submarines. Within a year more than 400 ships of the Naval Overseas Transport Service were sailing out of Hampton Roads. The declaration of war also changed the nature of outbound cargos. While coal remained the top export, merchant steamers carried large quantities of supplies, war material and men (Engle and Lott 1975:219; Tazewell and Friddell 2000:116).

Hampton Roads also became the base of the Atlantic fleet during World War I. U. S. Navy vessels on convoy service and antisubmarine vessels patrolling the Atlantic seaboard operated out of the Norfolk Navy Yard. The demands of those duties required a rapid increase in naval vessels. The United States military buildup produced 396 new naval ships.

NNS&DDC received contracts for a total of 25 destroyers and increased their personnel from 7,600 in the summer of 1917 to 12,500 in late 1919. At the Navy Yard in Portsmouth, personnel increased to more than 11,000 workers. In 1917, the U. S. Navy established an operations and training base at Norfolk, and by that date army and coast guard facilities were established at Fort Monroe (Nesbitt 1993:87; Weinert and Arthur 1979:221). At Mulberry Island on the James River, the army established Fort Eustis as an artillery base in 1918. The region benefited considerably from the military establishments and their related industries, along with the large number of port facilities.

In 1917, Yorktown regained some of its earlier prominence when the U. S. Navy established a mine depot upriver from the town. Today this facility has evolved into the Naval Weapons Station Yorktown, that serves as an essential secure port for the Atlantic fleet. Yorktown also hosts a deep-water Amoco oil terminal, a coast guard training facility and Cheatham Annex, an auxiliary naval loading complex. All of these operations were placed in Yorktown due to the naturally deep channel and sheltered anchorages, which have attracted ships since colonial times.

Early Modern Period

In the wake of German surrender in November 1918, Hampton Roads facilities served American military personnel returning from Europe. However as their numbers steadily decreased, the boomtowns of Norfolk, Portsmouth, Hampton and Newport News began to return to civilian enterprises. With the exception of Fort Eustis, most of the temporary wartime camps were deactivated and closed. Many of the empty barracks buildings were torn down. Many of the civilian personnel that flooded the ranks of service industries returned to work as watermen, boat builders, farmers and lumbermen. The rapid growth of the area and the nature of the industries around Hampton Roads to a degree economically insulated the region during the Great Depression.

At NNS&DDC, warships under construction provided continued employment for many of the shipyard workers. Construction of military vessels included modification of the collier *Jupiter* to serve as the USS *Langley*, the first U. S. Navy aircraft carrier (Hanson 1969:226; Blanton and Margolin 1994:54). In 1921, the undeniable value of naval aviation was demonstrated by Brigadier General William Mitchell. General Mitchell first trained a bomber squadron using the hulks of the USS *Indiana* and USS *Texas* (ex-*San Marcos*) in the Chesapeake Bay (Burke 1967:80). Later, the general sank the German battleship *Ostfriesland* and several other captured vessels some 70 miles off Cape Henry (Figure 14). Mitchell's bombers operated out of the Army Air Corps training center at Langley Field (Burgess 1994:27; Rouse 1990:166-167).

During the 1920s, NNS&DDC also turned to repair and construction of commercial ships, passenger vessels and pleasure yachts to keep workers employed. In 1930, the company won a contract for the first purpose-built aircraft carrier, USS *Ranger*. In Hampton, the Newcomb Shipbuilding and Dry Dock Company received a contract to build 24 wooden cargo carriers (Blanton and Margolin 1994:53). Three years later NNS&DDC received authorization to

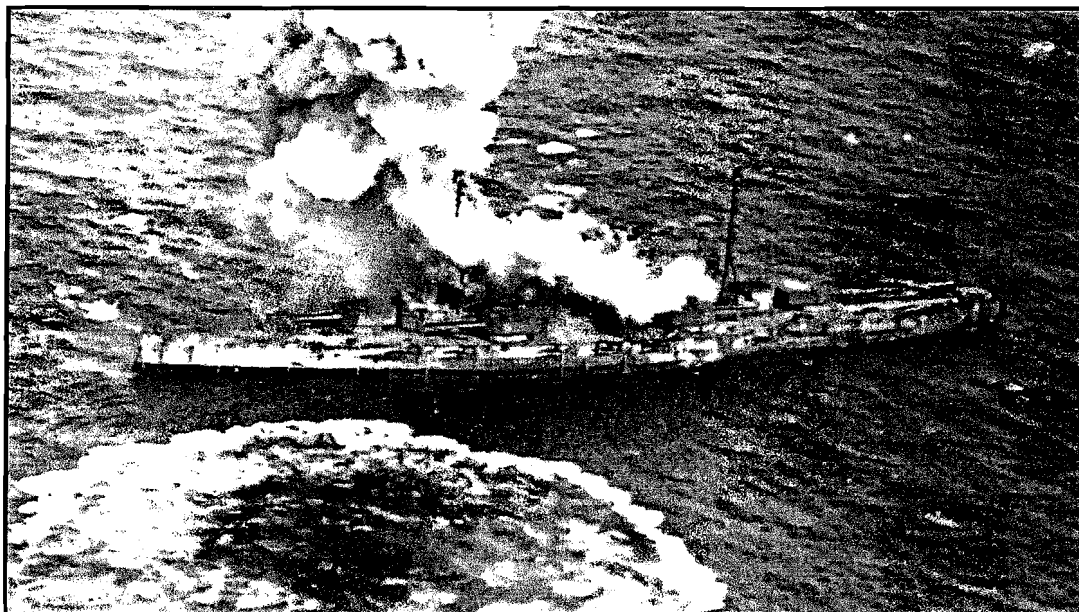


Figure 14. 27,000 ton-*Ostfriesland* after Mitchell airstrike (Davis 1967:n.p.).

build the carriers USS *Yorktown* and USS *Enterprise*. By the time the *Enterprise* was launched in 1938, it was apparent that the Japanese expansion in Asia and the Pacific and German military development in Europe would ultimately lead to global war.

In June 1940, world affairs stimulated congressional authorization of a naval construction bill to provide naval vessels for operations in both the Pacific and Atlantic (Foss 1984:85-86). Congressional support for naval preparations was expanded in September 1940 when the United States and Great Britain signed an agreement to exchange destroyers for military bases (Tazewell and Friddell 2000:123). Under President Roosevelt's administration, the Norfolk Navy Base was expanded and over 300 acres were purchased in 1940 to develop the Oceana Naval Air Station (Tazewell and Friddell 2000:123; Yarsinske 2002:145).

World War II Period

In December 1941, the Japanese attack on Pearl Harbor forced the United States government into World War II. The subsequent declaration of war stimulated a resurgence of military activity in Hampton Roads. NNS&DDC received contracts for 8 aircraft carriers, 8 cruisers, 29 landing ships and 1 battleship from the Navy department. As a consequence, personnel at the shipyard increased from 37,000 to 60,000 in just two years (Tazewell 1986:165-166).

In addition to new construction, Hampton Roads area shipyards were involved in converting merchant vessels for military operation. The NNS&DDC-built luxury steamers SS *United States* and SS *America* were refitted to transport troops (Rouse 1990:214). Even steamers built for the Chesapeake Bay operations of the Old Bay Line were pressed into service. One of the four Old Bay Line steamers, SS *Yorktown*, was torpedoed in route to Europe while

traveling in a convoy (Brown 1961:105-111). Two war-damaged British carriers, HMS *Illustrious* and HMS *Formidable* were also repaired in Norfolk. Five days after the Pearl Harbor attack, they departed for Great Britain with their hangar and flight decks crowded with American aircraft (Tazewell and Friddell 2000:123).

The dramatic influx of new personnel at NNS&DDC was not unique. Civilian and U. S. Navy personnel employed at the Norfolk Navy Yard was already on the rise before the air raid on Hawaii and thousands poured into the facility in the wake of the Japanese attack. Navy and army training facilities in the area were rapidly expanded to meet the demands of war. Although Fort Monroe no longer commanded the entrance to the Chesapeake Bay, its 16-inch guns remained as an integral part of the inner harbor defense system. It also became the site of the Coast Artillery School. Mine fields inside the Chesapeake Bay were also controlled out of facilities at Fort Monroe (Weinert and Arthur 1989:264-265).

Mine laying operations outside the Chesapeake Bay were managed from command centers across Hampton Roads at Little Creek (Weinert and Arthur 1989:264-265). Construction of U. S. Navy facilities on Little Creek began in earnest during the summer of 1942. In July, U. S. Navy staff began to construct four bases on the farmland and swamps around Little Creek. Camp Bradford, on the Bradford Farm property, was developed as a training facility for Navy Seabees. Camp Shelton, named for the Shelton farm property, was established as a training center for naval gun crews to serve on merchant vessels. Frontier Base was a forwarding area for amphibious force personnel and equipment destined for the European Theater (Foss 1984:91).

However, the principal function of facilities at Little Creek was to train navy personnel to operate amphibious landing vessels. Improvements at Little Creek were designed to support development of training facilities near the mouth of the creek that were built during the war. More than 200,000 Navy personnel and 160,000 Army and Marine personnel received training at the base before the war ended. Most of the personnel trained at the Little Creek facilities were taught to operate landing ships medium (LSM), landing craft vehicles, personnel (LCVP), landing craft mechanized (LCM) and a variety of small amphibious boats (Foss 1984:180; USACE, Norfolk 1945:549-551). The dramatic increase in base personnel and vessels to support training activities resulted in the necessity for significantly improving navigation in Little Creek. Extended channels, boat basins, dock structures and ramps were constructed (USACE, Norfolk 1945:549-551).

As was the case during World War I, Hampton Roads became a staging area for troops, equipment, war material and supplies bound for Europe. The Hampton Roads Port of Embarkation was created in June 1942 to manage staging and shipping of men, equipment and material to Europe (Tazewell and Friddell 2000:125). In October 1942, General George Patton, 34,000 men, and all their supplies and equipment departed Hampton Roads for North Africa. That convoy was comprised of 28 navy transport and supply vessels, the battleship USS *Massachusetts*, the cruisers USS *Wichita* and USS *Tuscaloosa* and a squadron of destroyers (Rouse 1994:200). Many of the men and much of the equipment and war material for the D-Day Invasion and subsequent liberation of Europe flowed through the Hampton

Roads Port of Embarkation. The artillery base established at Fort Eustis in 1918 became the home of the Army Transportation Corps during World War II and the "Third Port" was established on Skiffe's Creek as a facility for small vessels (Hagemann 1988:92).

Submarine warfare brought the European conflict to the Atlantic seaboard and Hampton Roads emerged as America's primary antisubmarine base (Rubin 1977:174). While most of the antisubmarine operations were offshore along the Atlantic shipping lanes, the German submarine U-574 shelled and sank a tug and three barges off Cape Charles on 31 March 1942. That same night a tanker was torpedoed off Cape Henry as the vessel slowed for a pilot. Only two months later, two outbound ships hit American mines laid for submarine defense and sank within sight of Virginia Beach (Tazewell and Friddell 2000:124-125). During the war antisubmarine vessels and aircraft sank a number of U-boats, including *U-85* and *U-701*, off the Atlantic coast (Blanton and Margolin 1994:55).

Germany's surrender in May 1945 curbed the stream of men and material to Europe. Within months of the fall of the Third Reich, American soldiers began to return to the United States. Camp Patrick Henry, located above Newport News, had been developed as a staging facility for troops bound for Europe (Weinert and Arthur 1989:273). At the end of the war, it was converted into a demobilization area for soldiers to return home. By the end of January 1946, over 1.4 million men and women had passed through Patrick Henry on their way home (Tazewell and Friddell 2000:126). Many of the vessels that carried returning soldiers, sailors and marines were decommissioned at Hampton Roads. While many ships were sold or scrapped, others were mothballed to prevent corrosion and anchored in the James River.

Modern Period

The end of World War II brought the Hampton Roads area quickly back to a peacetime environment. While many of the facilities that supported American participation in the war in Europe were closed, the tenuous order of post-bellum Europe and the dramatic changes in military weapon systems provided the incentive for modernization of the U. S. Navy. Russian development of nuclear weapons in 1949 marked the beginning of the "Cold War" that would benefit Tidewater Virginia.

In response to the requirements of new jet fighter aircraft, Congress funded the first new "supercarrier" in 1948. The keel of USS *United States* was laid the following year but the contract was cancelled almost immediately. When war broke out in Korea in June 1950, congressional funding for defense once again became a priority. That was reinforced by the position of President Dwight D. Eisenhower. One of the first indications of postwar rearmament was modernization of the U. S. Navy. In 1951, NNS&DDC was awarded another "supercarrier" contract for the USS *Forrestal*.

The Nuclear Age brought a systematic replacement of World War II technology. The expansion of nuclear-powered ship construction and the constant maintenance of the U. S. Navy's North Atlantic Fleet have supported the region's shipbuilding industry. In addition to the new class of nuclear aircraft carriers, NNS&DDC received contracts for the design and

construction of modern nuclear-powered submarines. The first of those was the USS *Robert E. Lee* that was launched in 1959 (Tazewell and Friddell 2000:139-140). The Norfolk Navy Yard and Norfolk Naval Shipyard facilities were also thoroughly renovated to adequately serve the modern nuclear North Atlantic Fleet. The Oceana Naval Air Station was also modified to serve carrier-based Navy aircraft.

Commercial development paralleled the military buildup at Hampton Roads. Area shipyards benefited from contracts for modern super tankers and extensive service and repair work on military vessels of both the U. S. Navy and the U. S. Army. Norshipco, founded in 1915, provided dry docking facilities for the largest merchant vessels and all but the largest nuclear warships. During the 1970s and 1980s, the exportation of coal, primarily from the C&O coal docks, increased to 50 million tons annually (Tazewell and Friddell 2000:140).

In 1988, the Hampton Roads Channel was deepened an additional five feet. The increased depth (50-foot) "tempted bulk shippers," who continue to dominate waterborne transport in the twenty-first century. Port facilities in Portsmouth were developed to accommodate the huge ships designed to carry containerized freight. By using port facilities at Hampton Roads instead of Baltimore, Taiwan's *Yang Ming Line* saved over one million dollars per year (Parramore et al. 1994:419).

By the end of the Gulf War [1991], Hampton Roads followed only Washington, D.C., in receiving federal defense monies. Expenditures to repair three carriers, the USS *Theodore Roosevelt* (40 million), the USS *America* (30 million) and the USS *John F. Kennedy* (25 million), were pumped into the local economy of Hampton Roads (Parramore et al. 1994:418). Those figures did not include the immense number of nuclear-powered vessels, amphibious craft, cruisers, frigates and oilers, that were also refueled, repaired, refitted or maintained in the area. Today, Hampton Roads serves as one of the largest naval facilities in the world, and is home to the North Atlantic Fleet.

In the early nineteenth century peacetime naval activities in the lower Chesapeake Bay and Hampton Roads resulted in the loss of a number of vessels. Warships of the U. S. Navy used derelicts sunk in the Chesapeake for target practice. During World War I, dramatically increased Naval activity contributed to the loss of several submarine chasers, motor patrol boats and a transport. In the Years following World War I a number of vessels were sunk off the Chesapeake Capes during target practice associated with weapons development. That activity continued after World War II when seven destroyers, several submarines and mine laying ships were sunk in testing new weapons systems.

Navigation Improvements in Virginia

Interest in improving navigation in Virginia waters has traditionally and extensively been focused on the James River, the Elizabeth River and Hampton Roads. Hampton Roads required little save navigation references until well after the Civil War when vessel size and draft began to increase significantly. Rivers like the York and Rappahannock are deep and

vessel traffic on those waterways remains light even today. Navigation on the Appomattox, Pamunkey and Mattaponi Rivers was also light and improvements consisted largely of efforts to remove snags, obstructions and shoals in the nineteenth and early twentieth centuries. Maritime travel on the James was a perpetual problem as colonists developed plantations and settlements along the river. That area of Virginia was the most extensively developed and vessel traffic on the James eclipsed all other Lower Bay estuaries.

Ironically, the James was perhaps the most ill suited to navigation. Its serpentine-like course, from Hampton Roads to the fall line at Richmond, was punctuated by obstructions, shoals and exposed rock. Improving the transportation routes to, and from Richmond became a necessity as the city developed after the Revolutionary War. Because waterways were the primary routes by which goods were transported during the late eighteenth and early nineteenth centuries, Virginia's growth as well as Richmond's economic development was tied to navigation on the James River. Following the Civil War, the James River became a major area of concern of the USACE.

While little was accomplished in the Elizabeth River before the Civil War, the development of naval and merchant marine facilities also focused a considerable amount of USACE attention on that area. Congress authorized surveys of Norfolk Harbor and the Elizabeth River in 1871 and the first funding for deepening a channel in the Southern Branch were appropriated two years later. Development of U. S. Navy facilities was a major element in nineteenth and twentieth century decisions to improve navigation on the Elizabeth River and both the Southern and Eastern Branch.

The first consideration for navigation improvements in Virginia was a lighthouse at Cape Henry. Construction of a lighthouse on Cape Henry was first proposed by the Virginia burgesses in 1727. Though an act supporting construction was passed by the General Assembly in 1752, no funds were appropriated. In 1773, the 1752 bill was amended and £6,000 was appropriated for building materials. Stone was obtained from quarries on the Rappahannock and equipment was ordered from London (Syer 1959:69; Squires 1937:6). Before a stone was laid, construction of the light was halted by the Revolutionary War. It was not until 1791 that Congress appropriated \$15,200 for construction and the State of Virginia ceded two acres to the United States Government that work was resumed. By October 1792, the first lighthouse in Virginia was lighted. That structure served until 1872 when a cast iron structure was built near by to replace it (Syer 1959:125; De Gast 1973:13).

Before the Civil War lighthouses were also built on Old Point Comfort, Back River Point and at Smiths Point on the south side of the Potomac to facilitate navigation in the Chesapeake Bay (Stephenson and McKee 2000:145). As United States Coast and Geodetic Survey (USCGS) vessels mapped the coastal waters of the Atlantic seaboard highly detailed navigation charts became available. In areas where traffic was high and shoals and obstructions were a hazard, lights and buoys were positioned to facilitate the safe passage of vessels. Navigation references were particularly important for steam vessels as they

frequently ran at night to maintain passenger service schedules. Floating lights and light vessels were also used in identifying safe channels of navigation. By 1847, a floating light was anchored off Willoughby Spit (Guthorn 1984:87).

In January 1785, the Virginia Assembly passed an act that instructed the James River Company to bring deep water to Richmond. The act provided for constructing canals and locks or any other means that were necessary to make the port accessible to ocean going vessels (Clary 1984, Chp. 1:23). By 1800, the James River Company had completed a canal that ran from the tidal portion of the James River to Westham, on the western side of the city.

The construction of the canal substantially increased shipping to and from the city, but the canal alone was not enough (Clary 1984, Chp. 1:23). Further improvements were legislated by the Virginia Assembly in 1804, and in 1816, the assembly supplemented the James River Company by chartering another company to improve navigation from Warwick Bar to Rocketts Landing. Little came of this legislation. The James River Company was in poor financial condition and went bankrupt in the 1820s, halting any further improvement of the river (Clary 1984, Chp. 1:23). Although these early improvements were minimal, they were enough to sustain the economic growth of Richmond.

In 1831, a public meeting was held in Richmond to consider internal improvements. The focus of the meeting was to provide for a survey of the James River to examine a trans-shipment connection up river at Lynchburg. The meeting appointed a committee to raise funds and arrange for the survey. The committee, however, accomplished little (Clary 1984, Chp. 3:23). As a result, the City of Richmond petitioned for help from the federal government. The U. S. Army Topographical Engineers (USATE) surveyed Richmond Harbor in 1836, promising to present a plan and estimates to Congress for its improvement. Because it would be pointless to improve Richmond Harbor without addressing additional problems downstream from Richmond, the engineers recommended an examination and survey of the entire James River (Clary 1984, Chp. 3:23).

The recommendation resulted in a survey of the James River in 1837 by United States Civil Engineer Howard Stansbury. Stansbury's survey determined that a 17-foot-deep channel existed from the mouth of the river to City Point, but above City Point the river declined in stages with only 10 feet of water present at Richmond Harbor. Although Stansbury believed that it was possible to open a 17-foot channel all the way to Richmond through a combination of blasting, dredging and constructing dikes, a federal navigation project to do so was not initiated (Clary 1984, Chp. 3:24). Richmond and the State of Virginia, however, continued their attempts to improve the river. The effort was aided in 1847 when the Virginia Assembly granted authority to the reorganized James River Company to charge tolls on large vessels between Richmond and Bermuda Hundred (Clary 1984, Chp. 3:24).

It was not long before Richmond and the State of Virginia again asked for help from the Federal government for improvements to the James River. A joint commission composed of Captain Joseph K. F. Mansfield of the USACE, Superintendent Alexander D. Bache of the United States Coast Survey (USCS), Isaac I. Stevens, a Lieutenant in the USACE and an

Assistant in the (USCS) and members of the Richmond City Council conducted a preliminary examination of the river and made their report in November 1852. The joint commission examined the river as far south as Harrison's Bar, interviewed pilots and other people familiar with the hydrography of the river and reviewed the previous surveys of the river (Clary 1984, Chp. 3:24).

The commission's examination located numerous bars that hindered navigation between the mouth of the James River and Richmond. These shoals included Goose Hill Flats, Harrison's Bar, Cox's Bar, Warwick Bar, Rocketts Reef and Richmond Bar. The joint commission's report presented a plan for cutting channels through these bars and reefs. They also recommended a more detailed survey of the James River, the construction of navigational aides and the elimination of two sharp bends in the river, one at Dutchman's Gap and the other at Jones Neck. The USCS agreed to survey the James River from Richmond to Harrison's Bar and at Goose Hill Flats and to prepare a feasibility study for excavating channels through the two bends (Clary 1984, Chp. 3:25).

Joseph G. Totten, Chief of the USACE accepted the joint commission's report and recommended that Captain K. F. Mansfield begin work on the James River. After the work was approved by the Secretary of War in December 1852, Mansfield commenced work (Clary 1984, Chp. 3:25). Early in 1853, Mansfield, with assistance from the USCS, examined the rocky foundations of the bars in the James River near Richmond. Jointly, they concluded that it would be possible to secure a 15-foot-deep channel at high water to the Richmond City docks. The City of Richmond contracted for the construction of a steam dredge, with work expected to begin once the machine was delivered (Clary 1984, Chp. 3:25).

The City of Richmond began dredging at Warwick Bar in March 1854 and completed excavation to the required depth by early 1855. Once the work at Warwick Bar was completed, the city began dredging at Richmond Bar. The work at Richmond Bar, however, quickly came to a stand still when the dredge encountered bedrock just below the bottom surface. The slow down quickly exhausted the appropriated money with little improvement to the river (Clary 1984, Chp. 3:25-26).

In November 1855, Brevet Colonel John L. Smith assumed charge of the James River project for the USACE. Unfortunately, no additional federal money was available. Some work was completed with money provided by the City of Richmond in 1856, but these funds were also quickly expended with few results. Owing to the extreme difficulty and the lack of funding for the project, no additional improvements were attempted prior to the Civil War (Clary 1984, Chp. 3:25-26).

Improvements During the Civil War

During the Civil War, the first great engineering feat to improve navigation on the James River was attempted. In 1852, the joint commission had identified Dutch Gap as an ideal location for a cut-off or canal to bypass Trent's Reach on the southern side of Farrar's Island.

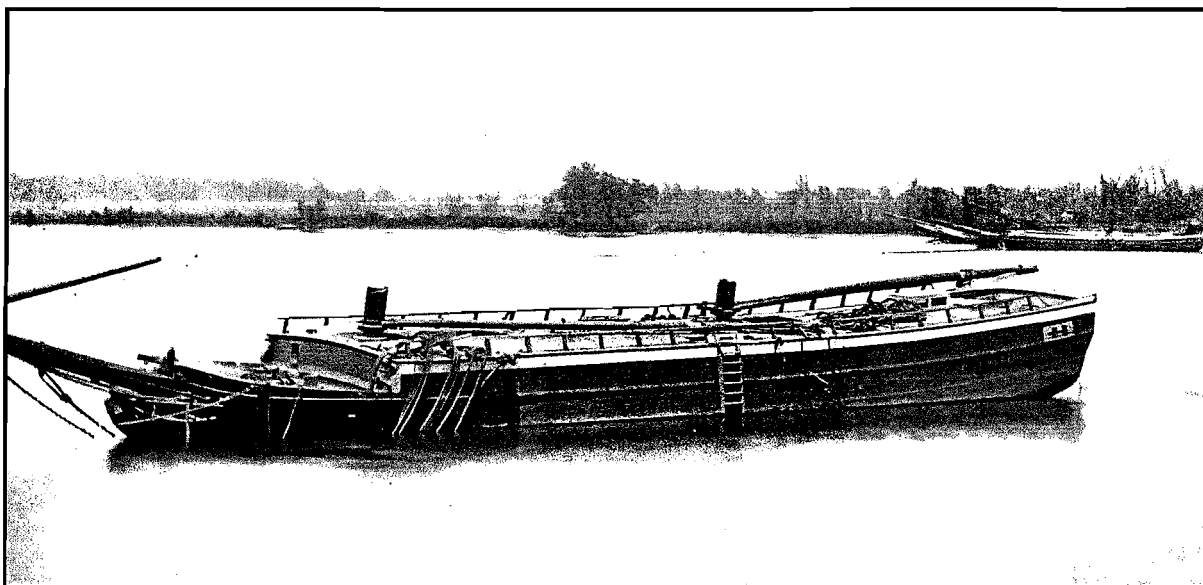


Figure 15. Sailing vessels sunk as obstructions at Drewrys Bluff (Library of Congress).

Union General Benjamin Butler and his engineers, after the Battle of Chaffin Bluff in September 1864, thought that they could excavate a canal across the neck of the sharp bend in the river at Dutch Gap, bypassing Confederate batteries at Howletts. Butler and his men began digging what became known as “Butler’s Ditch” or the Dutch Gap Canal (Clary 1984, Chp. 5:23).

The effort, however, created a controversy when General Butler put Confederate prisoners to work digging under heavy fire from the newly established Confederate positions along the river. Butler used these prisoners in retaliation for the South’s impressment of slaves and use of Union black prisoners to complete Confederate engineering works. This practice prompted a protest by the Confederates, and Butler was forced to finish the canal with regular Union Engineers. Butler’s Engineers and troops worked under shellfire for months, but a final explosion intended to open the canal misfired in January 1865 forcing Butler to abandon the project (Clary 1984, Chp. 5:23). Although Butler and his men were not able to finish the canal, they completed most of the work to make the idea a reality.

Removal of Wrecks and Obstructions

The James River below Richmond suffered much during the Civil War. In an attempt to defend Richmond, the Confederate Navy built numerous obstructions and military bridges and scuttled many vessels in the river (Figure 15). Those obstructions, when combined with the lack of channel maintenance, made the upper James River difficult to navigate during the years 1865-1870. Although some of the river obstructions were removed prior to 1870, limited local funding, coupled with a complete lack of federal funding, prevented any further improvements (Clary 1984, Chp. 6:5).

At the request of Congressman Philetus Sawyer, Major W. P. Craighill of the USACE examined the James River in August 1870. Craighill determined that it was necessary to begin work by removing the river's wrecks, obstructions and military bridges. At Craighill's recommendation, a request for proposals was sent out for the removal of the wrecks and obstructions (USACE 1870:68).

Work began in late 1870 when New York's B. Maillefert received the first contract to remove all wrecks and obstructions at Graveyard Reach, Warwick and Aiken's Landing, and to remove wrecks and obstructions at Drewrys Bluff to allow a channel 250 feet wide and 18 feet deep. In addition to salvage rights, Maillefert was compensated \$14,400 for the removal of the wreckage and obstructions. Maillefert completed this work in early 1871 with the removal of three schooners at Warwick, the wrecks of the *Gallego* and *Plume* at Graveyard Reach, 40 piles and the remains of an old bridge at Aiken's Landing and the opening of a channel 250 feet wide by 18 feet deep through the wrecks and obstructions at Drewrys Bluff (USACE 1871:597).

In March 1871, Maillefert approached the USACE and offered to remove the remains of the CSS *Richmond*, located off Chaffin Bluff, for the salvage rights to the vessel. The USACE, who were interested in the proposal because it did not require any funding from them, began to investigate the legality of the offer. During these investigations, the USACE discovered that the wreck was under the jurisdiction of the United States Treasury Department and that the salvage rights to the *Richmond* had been sold to the firm of Hebrew and Asserson of Norfolk, Virginia (NA, Philadelphia 1871). In their agreement with Hebrew and Asserson, the Treasury Department agreed to pay a fee in addition to the salvage rights.

On 10 June 1871, Maillefert was awarded a second contract to remove "the remainder of the steamer *Jamestown*, ironclads *Virginia* and *Fredericksburg*, the steamer *Beaufort*, the schooner *Wythe*, parts of the Brig *Marcus* and the remains of several stone "cribs" all located at Drewrys and Chaffin Bluffs." In addition, the contract called for the removal of "some forty or fifty pilings, remains of an old bridge and part of a steamer" at Wilton. Maillefert agreed to complete the project for the salvage rights to the vessels; no additional fee was built into the contract (USACE 1871:597-98). Maillefert completed the work 15 December 1871 (USACE 1871:603). Major Craighill was impressed with Maillefert's work. In his March 1872 report, Craighill stated, "Maillefert's operations have been very successful, and have resulted in restoring the fine channel existing by nature at Drury's Bluff" (USACE 1872:690).

By 1887, the channel at Kingsland Reach had filled in, requiring further improvements. The shoaling within the channel was attributed to wreckage still in the river from the Civil War and several floods that had occurred since the start of improvements. Work to remove the wreckage from the reach was completed in 1887 by the City of Richmond (USACE 1887, Pt. 2:870).

New improvements at Drewrys Bluff in 1894 prompted the removal of more wreckage and military obstructions. These obstructions were removed under a contract with Sanford Ross. Mr. Ross removed "the remainder of military obstructions at Drewrys Bluff," allowing for a channel 22 feet deep and 300 feet wide (USACE 1895, Pt. 2:155).

In 1896, further improvements at Warwick encountered a sunken vessel loaded with stone. Part of this vessel was removed under a contract with J. A. Curtis. The wreck was believed to be part of the obstructions placed there in 1861 (USACE 1896, Pt. 2:1014). At Richmond Harbor, a portion of the remains of the barge *John Hagan* was removed in 1899. This work was completed by the City of Richmond under the direction of Lieutenant Colonel Allen. The wreck was broken up and those portions obstructing navigation were removed (USACE 1900, Pt. 1:254).

Several wrecks were removed from the James River in 1907-1908. The dredge *The City of Richmond*, sunk in Richmond Harbor, was an obstruction to navigation. The wreck was broken up by dynamite and removed in October 1907 under a contract for \$2,700 (USACE 1908, Pt. 1:263). At Newport News two other wrecks were removed. These two wrecks, the schooner *Custus W. Wright* and another unidentified schooner, were removed by contract for \$4,215 (USACE 1908, Pt. 1:280). Two examinations were also conducted of an "old wreck at Bermuda Hundred." The examinations concluded that the wreck was not a hazard to navigation and did not warrant removal (USACE 1908, Pt. 2:1245-46).

In 1910, two more wrecks were removed from the James River. The first was the sloop *Haze*, sunk one mile north-northeast of the Nansemond River light. The *Haze* was removed by private sources at no expense to the USACE. At Hampton Roads, one mile from Pig Point lighthouse, the remains of the schooner *Bismark* were removed at a cost of \$250 (USACE 1910, Pt. 1:288). At Brandon Point, the wreck of the schooner *Wm. S. Rodgers*, sunk at Richtie's Wharf, was removed between 27 February and 1 March 1911 at a cost of \$516 (USACE 1911, Pt. 1:330).

Several more wrecks were removed from the James River in 1912. The wreck of the tugboat *Col. J. C. Hill* was removed on 10 and 11 November. The *Col. J. C. Hill* had sunk approximately one mile south of White Shoal Light House. At the mouth of Ward's Creek, a tributary of the James River, the wreck of a barge was removed between 6 and 8 November. In addition to the vessels removed from the James River in 1912, the remains of five schooners were removed from Hampton Creek in May of the same year (USACE 1912, Pt. 1:420).

Another obstruction was removed from the James River in 1914 and 1915. An old landing in the James River approximately two miles above Jamestown was removed because it posed a serious hazard to navigation. Completed in 1915, for \$598, the landing was broken up and removed (USACE 1915, Pt. 2:2314).

In 1969, the USACE, Norfolk District, advertised for proposals to remove the wreck of the steamship *Bangor*, which was sunk in the channel to Newport News. Since there were no bidders, the Navy agreed in 1970 to complete the wreck's removal as a training exercise. Since the Navy was unable to finish the project, the USACE had to re-advertise for the wreck's removal in 1973. The wreck was finally removed under contract in May 1975 (Clary 1984, Chp. 13:12).

James River

In 1869, members of the Richmond Common Council voted again to attempt improvements to the upper reaches of the tidewater portion of the James River. The council sought assistance from Congressman Philetus Sawyer of Wisconsin, Chairman of the House Subcommittee on Rivers and Harbors. Congressman Sawyer ordered a federal survey of the river and asked Congress to appropriate money for the removal of the wrecks and obstructions and to deepen the navigation channel. In 1870, Congress voted to appropriate \$50,000 for the improvement of the river and appropriated the same amount the following year. In addition to money appropriated by the federal government, the City of Richmond appropriated \$250,000 for the river's improvement (USACE 1870:68).

At the request of Congressman Sawyer, Major W. P. Craighill, of the USACE, completed an examination of the James River in August. This examination determined, by comparison with the survey conducted in 1852, that the bars and natural obstructions in the river had not changed since before the war. Craighill proposed changing the James River's navigation channel to 15 feet deep and 180 feet wide at high tide. The project was to be completed through a combination of dredging and removing rock by blasting, dragging and lifting. Craighill also wanted to finish the Dutch Gap canal and pursue the excavating of cut-offs at Jones Neck and Turkey Island. He proposed to start these additional improvements with any money that was left over after the obstructions and wrecks were removed (USACE 1870:68).

While Maillefert was busy removing the wrecks and obstructions in the James River, the USACE and the City of Richmond were busy making other improvements to the navigational channels of the river. In 1871, the USACE contracted with the American Dredging Company to improve Dutch Gap, which had opened naturally during a flood in 1870, to a depth of 18 feet with a minimum width of 100 feet. This work was completed in early January 1872 and the new cut off was officially opened for navigation. Unfortunately, in March, the new route encountered a minor setback when a landslide partially obstructed the gap. Although the landslide did not close the new channel, it did necessitate additional dredging (USACE 1872:69).

As the channel at Dutch Gap canal was being improved, other improvements were taking place closer to Richmond. The USACE contracted with Kalmbach & Barton to open a channel 18 feet deep and 125 feet wide through the bedrock at Rocketts (USACE 1871:598). The contract was annulled in February 1872, however, when Kalmbach & Barton was unable to make progress through the hard bottom. After the failure of Kalmbach & Barton, the improvement of the channel at Rocketts Reef was put under the supervision of W. G. Turpin,

the Engineer for the City of Richmond assigned to the James River improvements. Prior to taking on this most difficult portion of the improvement, Turpin was in charge of dredging the shoals that posed a threat to navigation (USACE 1871:73). By the end of 1873 Turpin's crews had excavated a channel 460 feet long, 75 feet wide and 18 feet deep, at high tide, through the reef at Rocketts (USACE 1873:75).

During these early stages of the improvements, the USACE began to construct wingdams and dikes along the river. The purpose of the wingdams was to constrict the flow of water, thus increasing the currents which naturally prevent the deposition of sediment in the channel. In addition, Craighill suggested the idea of creating dikes by connecting the ends of the wingdams. These dikes were then backfilled with stone and sediments removed during dredging (USACE 1871:603). Craighill's plan addressed the two fundamental problems encountered in previous attempts to improve the river. First, how to keep the channels open once they had been improved, and second, how to prevent the dredged material from being re-deposited within the river during the frequent spring floods.

In 1874, William Popp conducted a survey of the river between Richmond and Trent's Reach to evaluate the improvements made to the James River and to record the changes that had been completed since 1870. At the request of the council, composed of representatives from the City of Richmond and the USACE, Major Craighill used the information gathered during the survey to give estimates of what would be necessary to complete the project for depths of 15 and 18 feet at high tide, respectively. Craighill recommended that the present project be completed to the shallower depth of 15 feet, because the deeper depth was not economically justified (USACE 1874:39-40). The council, however, did not take Craighill's recommendation and choose to improve the channel to the 18-foot depth (USACE 1875:72).

Starting in 1875, the improvements on the James River began taking on a regular routine. The work completed in 1875 consisted of blasting and dredging channels through the various bars south of Richmond and maintaining the channels that deteriorated during the frequent spring floods. Improvements to widen and deepen the channel at Dutch Gap also continued. The construction of dikes and wingdams also continued along the reaches between the bars (USACE 1875:88-89). This routine continued through 1884, with the exception of a short period in 1876 when funds for the project were not available (USACE 1877:60).

In 1882, the U. S. Congress requested that the USACE prepare a survey and estimate of the practicality of improving the James River navigational channel to a depth of 25 feet from the sea to Richmond. As part of the report, the USACE detailed the progress of the project. Through 30 June 1881, the Federal Government had expended \$498,531 and the City of Richmond had expended \$383,011. At that date, the improvements to the James River consisted of a narrow channel 20 feet deep, at high tide, from the sea to City Point, from there to Warwick, a channel of 19 feet and from Warwick to the wharves at Rocketts 17 feet (USACE 1882:860).

Craighill's report on the practicality of improving the channel to a depth of 25 feet recommended that Congress consider other options. The report estimated that it would cost \$4,500,000 to complete the proposed improvements. Craighill and his engineer, Thomas Tuttle, suggested instead that Congress improve the channel to a shallower depth (USACE 1882:871).

On 5 July 1884, the U. S. Congress voted to improve the James River navigation channel to a depth of 22 feet, at mean low tide, from the sea to Richmond. The width of the new channel was to be 400 feet from the sea to City Point, from there to Drewrys Bluff 300 feet and from there to Richmond 200 feet (USACE 1885:142). Since the previous project had not yet been completed, the USACE suggested that Congress increase the yearly appropriations so that the modifications to the project could be completed within a reasonable period of time (USACE 1886:138).

Although Congress initiated the changes to the project's dimensions, work began slowly because Congress appropriated little money for it in 1885 (USACE 1886:888). By 1887, the project was fully underway. The first area to be improved was the 5 mile stretch of river between Warwick Bar and Richmond Harbor, which included Rocketts, Goode's Rock, Stearn's Dike, Richmond Bar, Randolph Flats and Warwick Bar.

During this period, further improvements were also made between Dutch Gap and Warwick Bar. In 1887, the channel at Kingsland Reach had filled in. This was attributed to some remaining Civil War wreckage and several recent floods in the river. Work was completed in 1887 to remove boulders, logs and wreckage from the reach in addition to returning the channel to its previously improved depth (USACE 1887:870). In 1889, another landslide at Dutch Gap re-deposited sediments into the channel. Work was completed in 1892 to correct the damage. In the 1892 report, the dimensions of the Dutch Gap cut-off were recorded as 515 feet wide on the northern end, 300 feet wide on the southern end, with a channel 18 feet deep and 100 feet wide throughout (USACE 1892:1015).

By the late 1880s, improvements were also taking place much farther downstream from Richmond. These improvements included dredging and the construction of wingdams and dikes. The new work areas included Swann Point Shoal, Dancing Point Shoal, Harrison's Bar, Goose Hill Flats, Varina and Curles Neck. All of the new dredging, however, was only completed to a depth of 18 feet at high water until the most difficult section of the river, below Richmond, was completed to the depths specified in the River and Harbor Act of 1884 (USACE 1905:1177).

Up to 1902, almost all of the new improvements concentrated in the area between Warwick Bar and Richmond. Occasionally, improvements were made at the few areas downstream which did not have a controlling depth of 18 feet at high water, but these were minimal. In 1902, work on the James River navigation channel had progressed to allow for a channel 18 feet deep from the sea to Warwick and from there to Richmond, a channel of 16.5 feet deep (USACE 1902, Pt. 2:1104).

The River and Harbor Act of 13 June 1902 modified the River and Harbor Act of 1884 by extending the project from the lower Richmond City Line to the head of navigation at the city docks. These changes increased the project budget from \$4,500,000 to \$5,224,943. Other modifications were included in the River and Harbor Act of 3 March 1905 which provided for the construction of a turning basin at Richmond Harbor 400 feet wide and 600 feet long. This additional modification increased the estimated budget for the project to \$5,374,943 (USACE 1907, Pt. 1:246).

By 1910, the channels in the upper reaches of the river had attained a minimum dimension of 18 feet deep, at low tide and 100 feet wide. Upon reaching this stage of the project, efforts shifted to improving the lower reaches of the river. In 1909, the first improvements were made that met the modifications to the project outlined in the River and Harbor Act of 1884. These improvements consisted of widening some of the reaches in the vicinity of Warwick to their specified width (USACE 1910, Pt. 2:1242). The work of increasing the width and depth of the channel in the lower reaches began in earnest in 1910-1911. During this period, the channel was widened and deepened at Varina, Deep Bottom Shoal, Swann Point Shoal, Dancing Point Shoal and Rocklanding Shoal. Most of these shoals were either widened and/or deepened, but none of them were completed to the dimensions specified in the River and Harbor Act of 1884 (USACE 1911, Pt. 2:1474).

In 1911, a reorganization of the USACE moved the controlling office of the James River Project. Previously, the project was under the jurisdiction of the Washington District, but with the reorganization, it was transferred to the Norfolk District. Until 1918, the project was managed out of the Richmond office, after which it was managed out of the District office in Norfolk (Clary 1984, Chp. 10:14).

The James River improvements had thus far consisted of dredging and blasting a channel through the upper reaches, dredging several bars in the lower reaches and constructing wingdams and dikes to constrict the natural channels and provide a disposal area for the material removed from the channels. In 1916, the USACE declared that the original 18-foot channel was virtually complete, and after conducting planning studies for the recommended 22-foot channel, the USACE recommended that the project be abandoned until such time as further improvements were necessary (USACE 1916, Pt. 1:510). Chief of Engineers Lansing M. Beach announced:

Owing to the fact that the navigation on the James River is decreasing and that there is no present need for improvement work, no work is proposed for the next fiscal year, it being proposed to hold all work in abeyance until the need for additional work is more apparent and more favorable terms can be secured for doing work. No estimate for additional funds is submitted, as the unexpended balance is sufficient for the immediate needs of commerce. The project is not being completed to the full dimensions, as the present needs of commerce are satisfied with the present dimensions (USACE 1920, Pt. 1:566-571).

The River and Harbor Act of 5 June 1920 demanded a re-study of the project, and on 10 December, the USACE reiterated its earlier position: "Improvement of this locality [is] not deemed advisable at present" (Clary 1984, Chp. 10:15). Although the USACE did not feel that any further improvement of the James River was necessary, Congress did not abandon the larger improvement.

A survey was conducted in 1925 to determine the condition of the project. That survey concluded that the channel had a minimum depth of 17.5 feet from the sea to Richmond. The depth of the channel was limited because of shoaling at Dancing Point (USACE 1925, Pt. 1:459). Maintenance dredging resumed in 1926 in order to re-open the overall channel to a depth of 18 feet (USACE 1926, Pt. 1:466).

After several years of debate between the USACE and Congress over whether or not the improvements were justified, new improvements resumed in 1928. The new improvements consisted of widening and deepening the channels on the lower portion of the James River to the 22-foot depth and 400-foot width stipulated in the 1884 River and Harbor Act. The areas improved in 1928 and 1929 were Rocklanding Shoal, Swann Point Shoal, Dancing Point Shoal, Harrison's Bar and City Point Shoal (USACE 1929, Pt. 1:515-16).

On 30 November 1929, the USACE presented a new plan for the improvement of the James River. The proposal called for deepening the channels in the lower reaches of the river even further. The proposed channel would be 25 feet deep and 300 feet wide from the mouth to Hopewell; from there to a point 3.8 miles below the lock gates at Richmond 25 feet deep and 200 feet wide. The channel from the point 3.8 miles downstream from the lock gates to Richmond, however, would remain 18 feet deep and 200 feet wide. The new plan also included excavating the cut-offs at Turkey Island, Jones Neck and Aiken Swamp, and improving the cut-off at Dutch Gap. The plan would satisfy those who wanted to see ocean-going traffic enter the interior of Virginia, and would permit the development of a deep water terminal not far from Richmond. This plan also took into account the USACE concern that any work beyond the 18-foot depth for the stretch in the vicinity of the city of Richmond would be unjustifiably expensive. Congress adopted the modifications to the project in the River and Harbor Act of 3 July 1930 (USACE 1930, Pt. 1:547).

Unlike previous legislated work, the improvements legislated by the River and Harbor Act of 1930 were quickly undertaken. The ability of the USACE to take on such an undertaking was aided by the Emergency Appropriation Act of 20 December 1930 which appropriated \$604,000 for the project (USACE 1931, Pt. 1:543). In 1931, all the channels in the lower portion of the James River were deepened to 25 feet and widened to 300 feet. These channels consisted of those at Rock Landing Shoal, Tribell Shoal, Goose Hill Flats, Swann Point Shoal, Dancing Point Shoal, Weyanoke Point, Windmill Point, Harrison's Bar, Jordan Point and City Point Shoal (USACE 1930, Pt. 1:540). All of these channels were completed in 1931 except for Rocklanding Shoal which was completed in 1932 (USACE 1932, Pt. 1:477).

In 1933, efforts shifted to excavating the cut-offs legislated by the 1930 River and Harbor Act. These improvements were aided by funds from the National Recovery Administration (NRA). The first cut-off to receive maintenance was the Aiken Swamp cut-off. Additional widening and deepening was also conducted at Dutch Gap. Work began on the cut-off in January 1933 and was completed in November 1933 at a cost of approximately \$391,000 (USACE 1933, Pt. 1:279; 1934, Pt. 1:323). After the Aiken Swamp cut-off was completed, efforts turned to the Turkey Island cut-off. Work began on the Turkey Island cut-off in December 1933 and was completed at the end of August 1934. The total cost for the excavation of the Turkey Island cut-off was approximately \$560,000 (USACE 1934, Pt. 1:323; 1935, Pt. 1:401).

In 1936, efforts focused on the maintenance of the existing channels and the removal of the cofferdam at the William Trigg Shipyard in Richmond Harbor. The Trigg cofferdam was removed by the USACE in 1936, though removal was not legislated by Congress until 1937 (USACE 1936, Pt. 1:397; 1937, Pt. 1:431). In November 1936, work began on excavating a cut-off at Jones Neck. The longest of the cut-offs contemplated in the improvement of the James River, the cut-off was completed in October 1937 at a cost of approximately \$564,000 (USACE 1937, Pt. 1:462).

Maintenance dredging of the original channel of the James River between Hopewell and Richmond Deepwater Terminal resumed in 1939. This work was completed in October 1939, leaving only the section of the river from Richmond Deepwater Terminal to Richmond Harbor to be improved to the specified width and depth (USACE 1940, Pt. 1:516-17). The USACE stated in the Annual Report for 1940 that the improvement of the James River was 95 percent complete (USACE 1940, Pt. 1:516-17).

The completion estimate was revised in 1942, however, when surveys discovered that part of the channel below Hopewell had deteriorated to 22.7 feet. In addition, the USACE recommended in 1942 that the project be modified to include the turning basin currently maintained by the City of Richmond at Richmond Harbor. The recommendation provided for an enlargement of the turning basin to 200 feet wide, 600 feet long and 18 feet deep (USACE 1942, Pt. 1:427). Small appropriations for the project during World War II also contributed to the revised completion estimate.

Although there was little money for the project during World War II, enough was appropriated in 1944 to allow maintenance dredging of the channels below Hopewell to return them to their 25-foot depth by 1945 (USACE 1944, Pt. 1:374). Legislation during the war provided for the enlargement of the turning basin at Richmond Harbor. The basin was added to the project in the River and Harbor Act of 2 March 1945. Once the war was over, operations resumed. In 1946, condition surveys and advanced planning were conducted in preparation for the completion of the project (USACE 1946, Pt. 1:596).

Work began in earnest on the channel between Richmond Deepwater Terminal and Richmond Harbor and on the turning basin in Richmond Harbor in April 1947. Even though the channel had to be widened to 200 feet through a rock bottom, the work was completed on 26 November 1947 (USACE 1948, Pt. 1:642). After nearly a century, all authorized work to improve the James River was complete (USACE 1948, Pt. 1:643).

The improvement of the James River took 76 years and cost the federal government \$6,796,240 in new work of which \$6,212,404 was from regular funds and \$583,837 was from Public Work Funds. In addition, \$2,759,327 was spent on maintaining the channels, bringing the project total to \$9,555,567. The City of Richmond had contributed greatly to the project, expending its own funds at various times during the project and providing spoil-disposal areas (USACE 1948, Pt. 1:642, 644).

It was not long, however, before an additional modification was made to the project. The USACE recommended in 1949 that the project be modified to include maintenance of the turning basin at Richmond Deepwater Terminal. Congress adopted this recommendation in the 17 May 1950 River and Harbor Act (USACE 1950, Pt. 1:558).

From 1950-1962 maintenance dredging was required almost yearly on the channels below Hopewell. The channels at Dancing Point, Swann Point, Harrison's Bar and Jordan Point were the most problematic. The almost yearly maintenance dredging required of these shoals dramatically increased the projected cost of maintaining the project. During the period 1950-1952, \$4,476,734 was spent to maintain the James River navigation channels (USACE 1955, Pt. 2:267; 1960, Pt. 2:316; 1962, Pt. 2:360).

By 1960, Congress was again debating with the USACE about further improvements to the James River navigational channel. The 23 October 1962 River and Harbor Act authorized the improvement of the channel to a depth of 35 feet and a width of 300 feet from the mouth to Richmond Deepwater Terminal. In addition to authorizing an increase in the channel depth and width, provisions were included for creating a mooring basin opposite Hopewell and for an enlargement of the turning basin at Richmond Deepwater Terminal (USACE 1963, Pt. 2:349-50). Although approved, these improvements were not initiated. An economic analysis of the James River completed in 1972, concluded that the changes authorized by the River and Harbor Act of 1962 were not economically justified. As a result, the project was classified as inactive (USACE 1991:32).

In March 1976, the USACE discontinued dredging in the James River as a scandal unfolded over the contamination of the river with the pesticide Kepone. The USACE, Norfolk District announced in 1980 that the channels at City Point Shoal had not been maintained since 1975 because of a large discharge of Kepone into the river at Hopewell. Maintenance dredging of the upper reaches of the river continued while a program of experimental dredging, to develop ways to minimize the effects of dredging in contaminated material, was initiated. The Kepone contamination affected more than the river bottom. New improvements to the channel were abandoned until a solution to the problem of toxic bottom sediments could be found (Clary 1984, Chp. 13:17; USACE 1991:32).

A second economic feasibility study of further improvements to the James River was completed in 1990. That report concluded that it was economically feasible to improve the river to a depth of 27 feet from the mouth to Richmond (USACE 1991:32). Whether or not these changes will be undertaken is still under study.

Jamestown Island

The River and Harbor Act of 17 August 1894 provided for improvements along the shoreline of Jamestown Island to curb erosion. Congress initially appropriated \$10,000 for these improvements, which consisted of a wall faced with granite in front of the threatened part of the island. However, observations of the destruction caused by ice in the winter of 1895-96 indicated that more improvements were necessary to protect the island from erosion. Congress appropriated an additional \$15,000 in 1896 for further improvements (USACE 1896:1016).

The improvements authorized in 1896 were not begun until 1900, however, because of a problem with gaining access to the land. Once started, the new improvements consisted of laying flagstones over a macadam backing along the shoreline. At the toe of these flagstones, a structure consisting of pilings and sheet piling fronted with riprap was constructed to further protect the island. These improvements were completed in November 1901 (USACE 1902:218).

The River and Harbor Act of 28 April 1904 appropriated an additional \$15,000 for shore protection along Jamestown Island. These additional funds were appropriated for removing the shoreline revetment that had been laid in 1895 and replacing it with the type that had been laid in 1900. At the completion of the 1904 project, the USACE felt that no further improvement would be necessary along the shore of Jamestown Island (USACE 1906:235-36).

In 1906, funds were appropriated for the construction of a permanent landing and pier at Jamestown Island. This project, however, was not completed because it was impossible to comply with the provisions of the law. The funds appropriated for this project were returned to the treasury in September 1907 (USACE 1908, Pt. 1:262).

In January 1982, staff from the USACE, Norfolk District, completed studies of the seawall at Jamestown Island, the foundation of which was buckling and undermined. With the state bearing half the cost, the seawall was rehabilitated by building an additional wooden bulkhead 1 foot offshore from the existing bulkhead. Once constructed, a concrete cap was placed over the new bulkhead and between the old and new bulkheads (USACE 1991:33).

Channel to Newport News

The 13 June 1902 River and Harbor Act provided for a channel 500 feet wide and 30 feet deep through the Middle Ground Bar in Hampton Roads. The project was completed but by 1907, the channel had deteriorated. In 1908, the L. M. Lewis Dredging Company was contracted to remove the shoals that had built up on the northern end of the channel (USACE 1910, Pt. 1:315).

The project was modified by the 25 June 1910 River and Harbor Act. This act authorized a channel 35 feet deep at low water and 400 feet wide for 3.5 miles through the Middle Ground Shoal. Work began in October 1910 under contract with Morris and Cumings Dredging Company, but funds ran out in March 1911. New money was available by June and the project was completed in August 1912 (USACE 1912, Pt. 2:1506).

Congress adopted further modifications to the channel from Norfolk Harbor Channel to Newport News in the 8 August 1917 River and Harbor Act. These modifications consisted of widening the channel to 600 feet for wartime shipping. Money, however, was not immediately available for the improvements. Congress granted the funding to complete the project on 8 July 1918 and work began with a USACE dredge. The dredge, however, was forced to leave with the project incomplete and the unfinished work was contracted to the Sanford and Brooks Company. Sanford and Brooks began work on the channel in June 1919 and finished the improvements the following year (USACE 1920, Pt. 1:460).

In December 1922, the Chief of Engineers recommended further improvement to the channel from Norfolk Harbor Channel to Newport News. These recommendations consisted of a channel 40 feet deep, 600 feet wide, with 1,000 foot flares at either end (USACE 1922, Pt. 1:368). The USACE believed that by flaring the ends of the channel, the tendency of the channel to shoal at the northern end would be reduced.

Congress, however, did not act on the recommendations until the River and Harbor Act of 21 January 1927 when they adopted the modifications to the project without appropriating money for it. An appropriation for the modifications was not granted until 23 March 1928. Work on the modifications finally began in March 1929 and was completed in June 1931. Despite the channel's early tendency to fill in at the northern end, surveys after the completion of the work indicated that the flares had corrected the problem (USACE 1932, Pt. 1:460).

By 1963, the USACE were again recommending modifications to the channel from Norfolk Harbor Channel to Newport News. These recommendations consisted of widening the channel from 600 to 800 feet and dredging two deep draft anchorages. These changes were soon modified to include deepening the channel and anchorages to 45 feet. Congress adopted the modifications in the River and Harbor Act of 27 October 1965 (USACE 1966, Pt. 1:306).

Work began under contract to deepen the channel in March 1967, but was slowed down when the wreck of the steamer *Bangor* was encountered. The wreck remained a menacing problem until it was finally removed in 1975 (USACE 1976:5-5). In 1971, the USACE awarded a contract for dredging the two anchorages. They were dredged to 40 feet in December 1971, but the legislated depth of 45 feet was deferred until it was needed (USACE 1972:5-6).

In 1986, the channel from Norfolk Harbor Channel to Newport News was further modified. The River and Harbor Act of 16 October 1986 authorized the channel to be improved to 55 feet deep (USACE 1986:5-11). The deepening of the channel to the intermediate depth of 50 feet was completed in December 1988. The 50-foot channel remains to be completed and no additional modifications to the project have been made (USACE 1993:5-3).

Norfolk Harbor Channel and the Elizabeth River

The Norfolk Harbor Channels extend from Hampton Roads up to the three branches of the Elizabeth River. Improvement of the Norfolk Harbor Channel began in the late nineteenth century to facilitate the ever-increasing naval and industrial demands for deeper wider channels to Norfolk and Portsmouth. That complex of channels begins in deep water at Hampton Roads and extends into each of the three branches of the Elizabeth River. One of the first navigation improvement priorities was removal of the remains of the CSS *Virginia* sunk on the west side of the channel southeast of Craney Island. The remains of the first Confederate ironclad were raised, towed into Drydock No.1 at the Gosport Navy Yard and broken up for salvage.

The first dredging activity for the Norfolk Harbor Channel occurred in 1878 to remove a shoal opposite the mouth of the Western Branch of the Elizabeth River. The goal of this project was to improve the approach to Norfolk Harbor and the U. S. Navy Yard at Gosport. This original work authorized a channel 500-700 feet wide and 25 feet deep from deep water in Hampton Roads to the Navy Yard (USACE 1907, Pt. 1:250). By 30 June 1910, the original 1878 project was nearly completed. The main entrance channel, however, was modified by the River and Harbor Act of 2 March 1907. This act authorized a channel 30 feet deep and 700 feet wide from deep water in Hampton Roads to Lambert's Point (USACE 1911, Pt. 1:332).

Three years later, in 1910, the channel from deep water in Hampton Roads to the Navy yard was still under improvement by contract. As of 30 June 1910, a channel 28 feet deep and 450 feet wide existed to the Navy Yard. The River and Harbor Act of 25 June 1910, however, further increased the authorized depth of the channel to 35 feet with a width of 400 feet (USACE 1911, Pt. 1:334). These improvements to the channel were completed in 1912.

The River and Harbor Act of 8 August 1917 again increased both the depth and width of the entrance channel to Norfolk Harbor. The new legislated depth was 40 feet with a width of 750 feet from deep water in Hampton Roads to the mouth of the Southern Branch of the Elizabeth River (USACE 1918, Pt. 1:539). The width of the Norfolk Harbor Channel from

Hampton Roads to the Norfolk International Terminal was again increased to 1,500 feet in 1954 (USACE 1993:5-12). The widening of the channel began in 1958 and was completed in 1960.

The River and Harbor Act of 27 October 1965 established an entrance channel through Hampton Roads from Fort Wool to Lambert point. This channel, although in natural deep water, was authorized to a depth of 45 feet and a width of 800 feet, but was modified to 55 feet in 1986 (USACE 1993:5-12). Both of the acts authorizing the establishment and changes to the Fort Wool to Lambert Point channel also authorized the deepening of the Norfolk Harbor Channel to the Norfolk International Terminal (USACE 1993:5-12). Since these improvements, the channel has been subject to periodic maintenance dredging, the most recent occurring in 1993.

In the Southern Branch of the Elizabeth River significant channel improvements began in 1910. The 22 to 25 foot channel authorized that year was deepened to 40 feet and widened to 450 feet during World War I. Those improvements extended from the confluence with the Western Branch south to the Belt Line Railroad Bridge. In 1925, the Southern Branch channel was deepened to 30 feet and widened to 375 feet to the Virginia Railroad Bridge and widened to 200 feet to the N&W Railroad Bridge. Following World War II, a turning basin 40 feet deep and 830 feet wide was dredged opposite the Norfolk Naval Shipyard. The channel south to the N&W Railroad Bridge was widened and deepened to 40 feet to a point within 1,900 feet of the N&W Railroad Bridge. There a second turning basin was dredged to a depth of 35 feet. In 1965, a 40-foot channel was authorized from the Belt Line Bridge to the Old Virginia Bridge and a 35-foot deep turning basin was dredged opposite Julians Creek. The 250-foot wide, 35-foot deep channel was extended to the Norfolk and Portsmouth Belt Line Railroad Bridge in 1976 and an 800-foot-square turning basin was excavated at the Mouth of Mains Creek (USACE 1979:5-22).

In the Eastern Branch, a 500-foot wide, 22 to 25-foot deep channel was begun in 1907. That same year shoals at the mouth of the Eastern Branch were also dredged. In 1925, a 200-foot wide, 25-foot deep channel was dredged between the N&W Railroad Bridge and Virginia Railroad Bridge. The channel was deepened to 30 feet to Berkeley following a 1930 congressional authorization. At the end of World War II, a 300-foot wide channel 25 feet deep was dredged from the N&W Railroad Bridge to the Campostella Bridge (USACE 1979:5-23).

Improvements to the Western Branch have been nominal by comparison with the Southern and Eastern Branch. A 300- to 400-foot-wide channel 24 feet deep was dredged to the West Norfolk Highway Bridge in 1913. In 1930, an 18-foot channel was dredged 3,000 feet upstream of the West Norfolk Highway Bridge (USACE 1979:5-23).

Cartographic Resources

Until the mid-nineteenth century, geographical accuracy was not particularly reliable in either maps or charts. However the development of survey instruments in the eighteenth and nineteenth centuries made mapping and charting a much more accurate enterprise. The need for accurate charts for navigation had always been a priority for mariners. However, it was not until 1807 that Congress authorized a "Survey of the Coast" (Guthorn 1984:17). Swiss mathematician and surveyor Rudolph Hassler was appointed first superintendent of the USCS but he was not able to begin work for 14 years because Congress abolished his position in favor of military personnel.

The first charts produced by the USCS were published in 1839. By 1844, survey work was being carried out in nine states and nine years later, the waters of every state in the Union were being systematically documented (Guthorn 1984:18-20). The actual conduct of USCS activity was carried out by naval personnel. In the 1830s the USACE began to map areas in conjunction with issues of national defense. In 1838, the USATE was organized and their cartography was included on USCS charts (Guthorn 1984:15). During the Civil War many of those officers served with Union and Confederate armies and made excellent maps to support and document military campaigns (McElfresh 1999:9).

Following the Civil War, USCS activity focused on both the remaining uncharted areas and updating the bathymetry of earlier charts. During the last quarter of the nineteenth century many of the charts published before the Civil War were revised to include navigation aids that identified channel alignments. For all practical purposes the methods of mapping and charting remained unchanged until well into the twentieth century. However, by the 1930s, aerial photography was used to enhance map and chart detail. While infrared and laser equipment significantly modernized surveying in the 1970s, it was the development of differential global positioning systems and satellite imagery that revolutionized cartography. Today detailed coastal bathymetric surveys are conducted with global positioning and either acoustic remote sensing or aerial lasers

Cartographic research identified a variety of maps and charts associated with over 400 years of navigation on Virginia waters. Many contain bathymetric data, soundings, channels, navigation aids, obstructions and occasionally shipwreck sites. Many maps and charts identify the location of landings, wharves, bridges, towns and other important features. The following maps and charts were identified and copied to provide data essential to constructing the Virginia GIS and HARP. Each map and chart was examined for geographical accuracy, shipwrecks and derelicts, geographical and place names and other clues that would help identify the locations of vessels in the NHC/VA GIS shipwreck database.

The following maps and charts provided information useful in constructing the NHC VA/GIS and HARP:

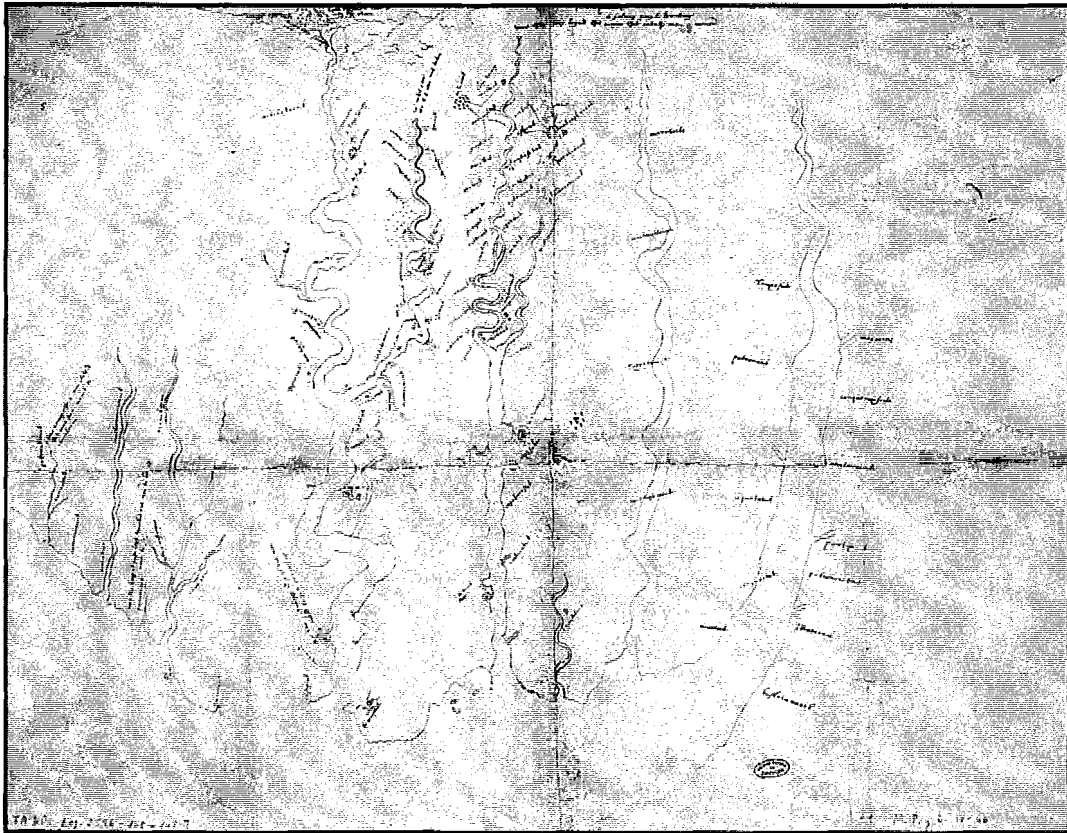


Figure 16. Zuniga Chart of Virginia, 1608 (Stephenson and Mckee 2000:33).

Zuniga Map of Virginia, 1608.

This is an early Spanish map of the lower Chesapeake Bay and river systems in northeastern North Carolina. Although crude in geographic accuracy, it provides an indication of the location of the Jamestown settlement and locations of the early homesteads and plantations along the James. The chart was sent from Zuniga, the Spanish Ambassador to England, to King Philip III with a letter dated 10 September 1608 (Figure 16).

Virginia Discovered and Discribed [sic], 1610.

The John Smith map is one of the earliest English maps of the Chesapeake Bay area. Although poor in geographic accuracy, it provides an indication of the location of contact period aboriginal villages, the Jamestown settlement and locations of the early homesteads and plantations. The map covers the area from the Chesapeake Capes to the Piedmont.

Nova Belgica et Anglia Nova, 1636.

Produced by the Amsterdam cartographer Jan Jansson, the *Nova Belgica et Anglia Nova* covers the area from North Carolina to Nova Scotia. Although Jamestown is identified, the scale precluded useful detail.

Virginia Vecchia e Nouva, 1647.

Virginia Vecchia e Nouva is based in part on the 1590 map of John White. It covers the area between Cape Lookout, North Carolina and Cape May, New Jersey. Although the scale precludes attention to detail, the document provides some insight into the early English settlements on the James River.

A mapp [sic] of Virginia discovered to the Falls, c. 1651.

A mid-seventeenth century map of the southeast coast of North America from Cape Lookout, North Carolina to Cape Cod. Although general, the document provides some insight into the early English settlements on the James River. The map was produced by John Farrer and was widely used in seventeenth century publications.

A New Description of Carolina, c. 1672.

Produced around 1672 by John Ogilby, this map includes the southeast coast of North America from the vicinity of Cape Canaveral to Cape Charles. It includes some details of the James River.

Virginia, Maryland, Pennsylvania, East and West New Jersey, 1706.

Produced by Thornton and Foster in 1706, the map illustrates a large area of the Chesapeake Bay. Because of the scale, little detail of the James River area is included. The Jamestown settlement is identified.

Chart of Hampton Roads, c. 1730.

This chart of Hampton Roads and the lower Chesapeake Bay was possibly produced during the second quarter of the eighteenth century. It includes some detail of the settlements at Jamestown on the James River and Yorktown on the York River.

A Map of the most Inhabited part of Virginia containing the whole province of Maryland with Part of Pennsylvania, New Jersey and North Carolina, 1751.

Map produced by Joshua Fry and Peter Jefferson. Although it does not include navigation information, the major geographical features in Tidewater Virginia are identified. Cities and plantations are also identified.

A New and Accurate Map of Virginia, 1770.

Map produced by John Henry. The map includes some navigation information. The major geographical features in Tidewater Virginia are identified as well as cities and plantations.

A New and Accurate Chart of the Bay of Chesapeake, 1776.

Produced by Anthony Smith in 1776, this navigation chart illustrates a large area of the Chesapeake Bay. In spite of the scale, the chart provides considerable detail of Hampton Roads and the James River. Eighteenth century towns, villages and plantations are also located and identified (Figure 17).

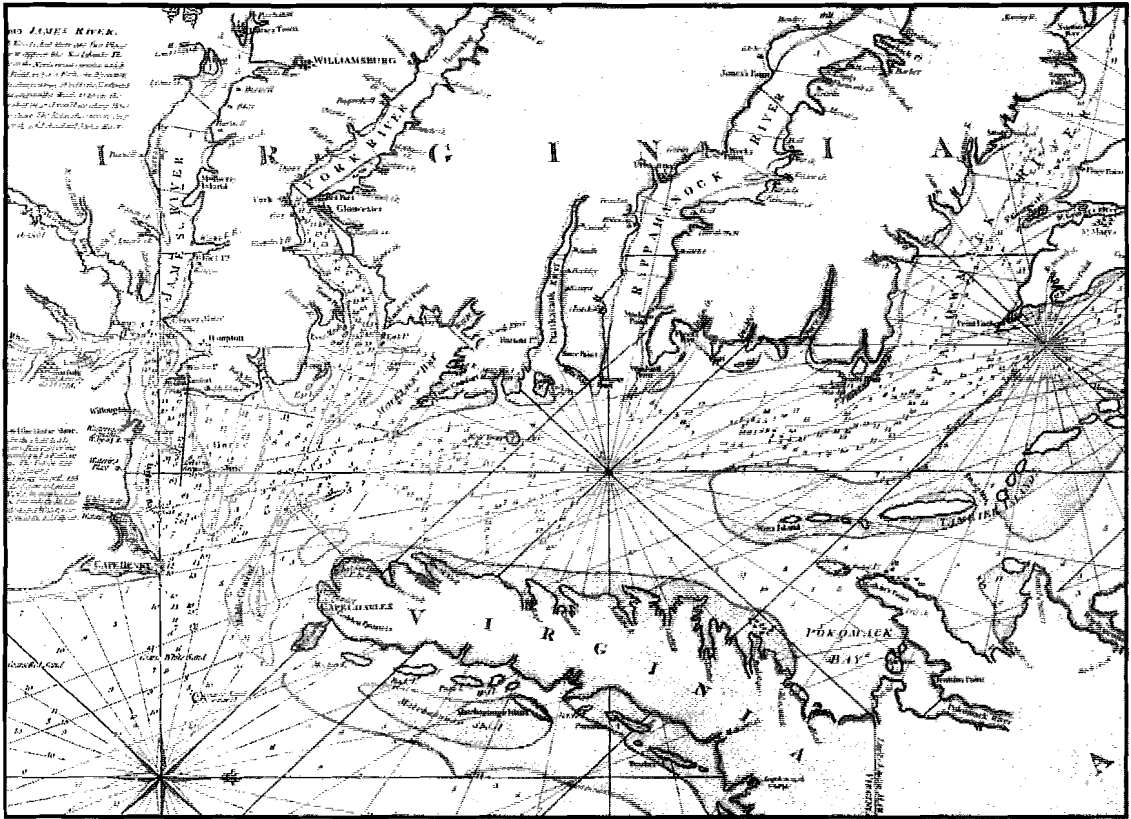


Figure 17. Anthony Smith New and Accurate Chart of the Chesapeake Bay, 1776 (Stephenson and Mckee 2000:105).

A Plan of the Entrance of Chesapeak Bay with James and York Rivers, 1781.

Indicates the positions of the British Army commanded by Lord Cornwallis at Gloucester and York in Virginia, the American and French forces under General Washington and the French Fleet under Count de Grasse. French frigates are depicted at Barwell's Ferry and off Point Comfort in the James River, at Gloucester at the mouth of the York River and off Cape Henry.

The Landing at Burrell's, James River, Virginia, 17 April 1781.

Locates the positions of the feint of the Queen's Rangers, the amphibious landing downstream from Burrell's Ferry, the Queen's Rangers in line, the Rebels and the Yagers. No soundings or subsurface features are indicated in the river.

Sketch of the Skirmish at Petersburg, 25 April 1781

Identifies the positions of the American and British forces involved in the skirmish at Petersburg, Virginia. While there are no bathymetric details associated with the Appomattox River the map shows the location of vessels sunk to avoid capture.

Sketch of the Action at Osburns 27 April 1781, and Action at Spencer's Ordinary 26 June 1781.

Osburns' sketch indicates the location of the first and second position of the Queen's Rangers, the 80th and 76th Regiments, Captain Fage with two six-pounders, Lieutenant Rogers with two three-pounders, the Yagers, the American Frigate *Tempest* and other vessels burnt and taken [at least two vessels sunk] and the American militia. Spencer's Ordinary sketch indicates the locations of the Rebel infantry and cavalry, the Queen's Rangers in halt and in line to attack, the Cavalry of the Queen's Rangers foraging and attacking the Rebel cavalry, the Vidette, Yagers, one three-pounder and Captain Althouse (Figure 8).

Plan of the Investment of York and Gloucester, 1782.

Plan of the American, French and British positions at Yorktown and Gloucester, Virginia in October 1781 drawn by Sebastian Bauman for General George Washington. Illustrates the location of French vessels in the York River during the siege.

Plan of the Siege of Yorktown in Virginia, 1787.

Indicates the positions of the British Army commanded by Lord Cornwallis at Gloucester and Yorktown and the American and French forces under General Washington. Map also shows the positions of Royal Navy vessels and ships scuttled in the York River offshore of Yorktown.

A Map of Virginia Formed from Actual Surveys, 1807.

Comprehensive and detailed map of the State of Virginia compiled by James Madison, William Prentis and William Davis. The Tidewater region of the map includes some navigation information such as lighthouses and shoals. The major geographical features in Tidewater Virginia are identified as well as cities and plantations.

Survey of a part of the Chesapeake Bay, 1810.

The USATE map covers the area from the Rappahannock to the Albemarle Sound in North Carolina. Actual soundings were taken by the USATE between Stingray Point and the Elizabeth River in 1810. While bathymetric data is limited to soundings and georeferencing is poor, the chart contains a wealth of information about creeks, rivers, early place names, structures, ferries, landings and bridges.

Plan of the Potomac River, 27 May 1813

William Tatham map illustrates the Potomac River from Ragged Point to Washington, DC. Some bathymetry is recorded in addition to shoals and islands. Creeks, rivers, topographic features, ferry landings and significant structures are identified. No wrecks or obstructions are noted.

Map of the Country contiguous to Norfolk, 1813.

The map was produced under the direction of Brigadier General Robert B. Taylor during the War of 1812. It covers the area from the Lynnhaven River to the Elizabeth River and identifies islands, rivers, creeks, roads, towns, bridges, ferries, houses and significant structures.

Reconnoitering of Chesapeake Bay, 1818.

Based on a survey carried out by USATE, this map shows the Lower Chesapeake, Hampton Roads, the Lower James and York rivers. Navigation data includes shoals, channels and navigation references. Topography and terrestrial detail is concentrated on the peninsula between the York and James rivers and along the shore of the Elizabeth, Nansemond and Pagan rivers.

Map of a Survey of the Mattaponi River, 1826.

Map of the Mattaponi River from Whitehouse to Milford Bridge based on a survey carried out by Claudius Crozet in 1826. The purpose of the survey was to support plans for improvements to navigation on the river. Good detail on water depths, shoals and obstructions.

Map of Virginia, Maryland and Delaware, 1839.

Comprehensive and detailed map of Map of Virginia, Maryland and Delaware compiled by David H. Burr. The Tidewater region of the map includes some navigation information such as lighthouses and shoals. The major geographical features in Tidewater Virginia are identified as well as cities and plantations, post offices, bridges, roads and canals.

Chesapeake Bay Entrance 1847

Blunt's The American Coast Pilot 15th Edition 1847. The Chart illustrates bathymetry, navigation references and geographical features in the Lower Chesapeake Bay from the entrance to the latitude of Mobjack Bay including the lower reaches of the James and York rivers. No wrecks or obstructions are identified.

Chesapeake bay entrance 1851

USCS chart illustrates the entrance channels to the Chesapeake Bay, bathymetry, navigation references and geographical features at Cape Henry and Cape Charles. Notes include sailing instructions. No wrecks or obstructions are identified.

Kingsland Creek to Falling Creek, James River, Virginia Topographic and Hydrographic Survey of 1853.

Though no plantations or wrecks are depicted this USCS chart it does show the presence of two possible piers. The first extends from a road just north of Kingsland's Creek on the west shore of the river. The second possible pier extends into the river just south of Falling Creek, also on the west bank of the James.

Ship and Sand Shoal Inlets, 1854

USCS chart illustrates the entrance channels at Ship Shoal Inlet and Sand Shoal Inlet. The highly detailed bathymetry contains soundings, shoals, islands, channels and channel navigation references. No wrecks or obstructions are identified on the chart.

Lynn-Haven Roads, 1854.

USCS chart to the entrance to Lynnhaven Inlet. Chart illustrated soundings, navigation channel and shoals through the inlet. No wreck specific information is illustrated on the chart.

Richmond to City Point including the Appomattox River from Petersburg to the Junction, James River, Virginia, 1855.

Survey of the Coast of the United States. Includes descriptions of the bars in the James River from Richmond to City Point, and the bars in the Appomattox River from Petersburg to City Point. Buoys are also marked, but the scale is too small to include wrecks, piers, etc (Figure 6).

Map and Profile of Experimental Survey, Virginia Section, New York and Norfolk Air Line Railway, 1855.

Map of the Eastern Shore of Virginia made to plan for construction of the New York and Norfolk Air Line Railway. Although it does not included navigation information, the major geographical features, landforms and creeks on the Eastern Shore are identified. City locations are also identified.

Rappahannock River Virginia, 1856.

USCS chart of the Rappahannock River from Moss Neck to Port Royal. The chart contains detailed bathymetry and associated topography. City of Port Royal, wharves, roads, bridges and ferry crossings are identified. Aids to navigation in the river were updated in 1884. No wrecks or obstructions are identified on the chart.

Rappahannock River Virginia, 1856.

USCS chart of the Rappahannock River from Near Port Royal to Saunders' Wharf. The chart contains detailed bathymetry and associated topography. Wharves, roads, bridges and ferry crossings are identified. Aids to navigation in the river were updated in 1884. No wrecks or obstructions are identified on the chart.

Preliminary Chart of York River, Virginia from Entrance to Kings Creek, 1857.

Produced by the USCS, the chart provides highly detailed bathymetry and identifies shoals, bottom sediments, navigation references, ranges and channels in the lower York River, Mobjack Bay and the adjacent Chesapeake. No wrecks or obstructions are identified on the chart.

Rappahannock River Virginia, 1857.

USCS chart of the Rappahannock River from Occupacia Creek to Deep Creek. The chart contains detailed bathymetry and associated topography. City of Port Royal, wharves, roads, bridges and ferry crossings are identified. Aids to navigation in the river were updated in 1884. No wrecks or obstructions are identified on the chart.

Rappahannock River Virginia, 1861.

USCS chart of the Rappahannock River from Entrance to Deep Creek. The chart contains detailed bathymetry and associated topography. Wharves, roads, bridges and ferry crossings are identified. Aids to navigation in the river were updated in 1884. No wrecks or obstructions are identified on the chart.

Potomac River, 1861

USCGS chart(s) of the Potomac River from Washington, D. C. to the Chesapeake Bay. The original survey was carried out in 1861 and the chart includes sailing instructions. Chart contains highly detailed bathymetry, soundings, shoals, islands, channels and navigation aids. No wrecks or obstructions are identified on the chart.

Plan of the Harbor of Norfolk and Portsmouth, 1861.

Map produced by Charles E. Cassell shows in detail the waterfront features of Norfolk and Portsmouth, Virginia. There is no hydrographic detail or navigation references but bridges, wharves, docks and slips are clearly labeled.

Military Reconnaissance of Hampton Roads, Virginia, n.d.

Includes portions of the York River, Mobjack Bay, the James River, Chesapeake Bay and Hampton Roads. The cartographer has included the engagements of the USS *Monitor* and CSS *Virginia*, as well as the blockade of the Warwick River, the blockade at the mouth of the York River and a "Schooner" laden with cotton bales and pitch turpentine off Yorktown.

Potomac River, 1862 (4 sheets)

USCGS chart(s) of the Potomac River from Washington, D. C. to the Chesapeake Bay. The original survey was carried out in 1862 and navigation aids were corrected in 1884. Chart contains highly detailed bathymetry, soundings, shoals, islands, channels and navigation aids. No wrecks or obstructions are identified in Virginia waters.

U. S. Navy Yard, Gosport, Virginia, June 1862

Survey map of the U. S. Navy Yard, Gosport, Virginia and the adjacent Elizabeth River. The map shows the location of the wrecks of a "Rebel Gunboat" and the Brig USS *Dolphin*, USS *Columbus* [sic], USS *Germantown* and USS *Delaware*. Those vessels were destroyed during the United States evacuation of the Gosport Navy Yard in April 1861. The "Rebel Gunboat" was destroyed when Confederates abandoned the facility in May 1862 (Figure 18).

Coast Chart No. 31, York River, Hampton Roads, Chesapeake Entrance, 1863.

USCGS Sheet No. 1 Chesapeake Bay and entrance to the James River. Aids to navigation corrected to 1885. Includes the wreck of the schooner *Anthea Godfrey* located northwest of Lynn Haven Inlet and the schooner *Tarry Not*, located on the Craney Flats, northwest of the mouth of the Elizabeth River.

Map of the Neighborhood of Richmond and Petersburg, Virginia, 1864.

Produced by the Topographical Depot, War Office, Great Britain. Illustrates the James River from below City Point to above Richmond. Identifies obstructions at Drewry's Bluff.

Sketches showing Lines Surveyed for the Proposed Canal thro' Bermuda Hundred Neck, 9 March 1869.

The proposed "short" canal transects the Bermuda Hundred Neck near the Presque Isle Mansion, and bisects the road from Bermuda Hundred. The proposed "long" canal runs from the depression near Watkin's to the village of Bermuda Hundred.

Norfolk Harbor, Virginia, 1871.

USACE chart of Norfolk Harbor from Craney Island south to the Gosport Navy Yard on the Southern Branch of the Elizabeth River. Chart contains detailed bathymetry, soundings and navigation aids. No wrecks are identified on the chart but the Merrimac Wreck Buoy is plotted southeast of Craney Island.

Cross Sections of Bermuda Hundred Canal, James River, Virginia, n.d.

Associated with the above map, this graphic includes 32 cross-sections for the proposed Bermuda Hundred Canal.

Richmond to Dutch Gap, James River, Virginia Survey of January-April, 1874.

Major W. P. Craighill, USACE. Prominent features include a Brick Yard, Brewery at Rocketts Reef, the Quarry Pier and the C&O Railroad Piers across from Drury Island near Powhattan's Grave. The proposed channel is also indicated.

Richmond to Dutch Gap, James River, Virginia Survey of January-April, 1874.

Major W. P. Craighill, USACE Sheets 1 and 5 of 6. Sheet 1 shows a possible beached vessel on the inner curve of a river bend near Grave Yard Reach. Sheet 5 indicates the location of Cox's Wharf.

Pamunky and Mattapony Rivers, Virginia, 1875.

USACE survey report illustration map. Map illustrates both rivers from below West Point to the Richmond and York River railroad bridge on the Pamunky and Mantapike on the Mattapony. No hydrographic details are shown but notes indicate water depths varying from 2.5 to 6 fathoms to the limits of the survey. Obstructions, shipyards, landings and structures are identified (Figure 19).

Map of Chickahominy, Mattapony and Pamunkey Rivers, 1875.

USACE survey report illustration map. Map compiled from USCGS maps and illustrates the Rappahannock, York, Mattapony, Pamunkey, James, Chickahominy and Appomattox rivers. Limited hydrographic details are shown but points, towns, landings and ferry crossings are identified.

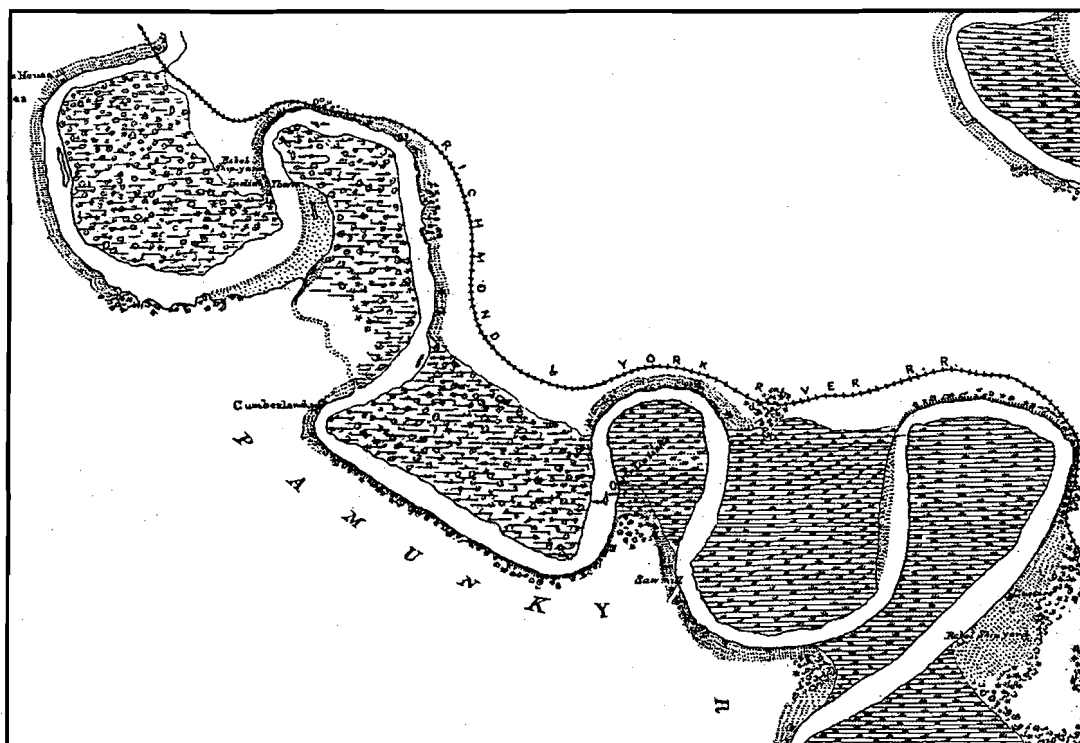


Figure 19. Section of map “Pamunkey and Mattaponi Rivers, Virginia, 1875” (Map G-255, NA 1875).

Coast Chart No. 30, From Hog Island to Cape Henry, 1875.

USCGS navigation chart of the entrance to Chesapeake Bay. Chart No. 30 contains detailed bathymetry, soundings and navigation aids. Several wrecks are plotted on the chart.

Coast Chart No. 404, Norfolk Harbor, Elizabeth River and Branches, 1875.

USCGS chart of Norfolk Harbor from Craney Island south to the limits of navigation on each branch of the Elizabeth River. Chart No. 404 contains detailed bathymetry, soundings and navigation aids. No wrecks are plotted on the chart but the Merrimac Wreck Buoy is plotted southeast of Craney Island.

Details of Dykes in Water from 2' to 6' and 6' to 20' Deep, for Improvements of the James River, Virginia, 1877?

USACE Office, Balto, Maryland. The specific location for the dykes is unspecified.

Kingsland Reach, James River, Virginia Survey of 1877.

Major William P. Craighill, USACE. Willis' Wharf is located on the west bank of the river and Bennets' Wharf is shown on the east bank. A cluster of six wrecks is indicated.

Plan of Wing Dams and Dykes, James River, Virginia, March, 1877.

Plans of the structures only. Does not include historic geographic information such as the location of the described dams and dykes.

Hampton Roads and Elizabeth River, Virginia, June, 1878.

USCS chart. A large Navy Yard appears south of Gosport on the west bank of the Elizabeth River. Fort Wool in Hampton Roads is also called Rip Raps at this time.

Coast Chart No. 137, From Cape Henry to Currituck Beach, 1878.

USCGS navigation chart of the entrance to Chesapeake Bay and Lynnhaven Bay and the Elizabeth River. The chart includes the Intracoastal Waterway from Norfolk to Coinchock, North Carolina. Chart No. 137 contains detailed bathymetry, soundings and navigation aids. Several wrecks are plotted on the chart.

Coast Chart No. 403, Hampton Roads and Elizabeth River, Virginia, 1878.

USCGS chart of Hampton Roads from east of Willoughby Point to Newport News Point and south into to Elizabeth River to Portsmouth and the Gosport Navy Yard. Chart No. 403 contains detailed bathymetry, soundings and navigation aids. No wrecks are plotted on the chart.

Lynn haven River, Broad and Linkhorn Bays, Virginia, 1879.

USACE survey map includes soundings, creeks, flats and shoals. Topographic features and structures are identified. No wreck specific data is included.

Mayo's Bridge to Falling Creek, James River, Virginia, 1879-1880.

Major William P. Craighill, USACE. Sheet 1 of 2. Indicates the James River & Kanawha Canal and Ship Lock, as well as several wharfs on both shores of the river.

Position of Wrecks, Drury's Bluff, James River, Virginia, 1881.

Indicates the location of the ironclads *CSS Virginia* and *CSS Fredericksburg*, the steamers *Beaufort*, *Jamestown*, *Northampton* and *Curtis Peck*, a pilot boat and the *Marcus*. Natural obstructions are also depicted, as is the present [1881] channel which appears to encounter the stern of the *Marcus*. A dock extends from the opposite shore of the river and two stone cribs are also identified (Figure 2).

Rappahannock River Virginia, 1882.

USCS chart of the Rappahannock River from Falmouth to Farleyvale. The chart contains detailed bathymetry and associated topography. Wharves, roads, bridges and ferry crossings are identified. Aids to navigation in the river were updated in 1884. No wrecks or obstructions are identified on the chart.

Kingsland Creek to Richmond, James River, Virginia Survey of January, 1882.

USCGS Sheet 5 of 5. Topographic details are defined to the west by the Richmond and Petersburg Turnpike and to the east by Osbornes or Old Petersburg Road. Soundings do not continue north of Richmond. Scale is too small to indicate wrecks, small piers, etc. Prominent features include Mayos' Bridge from Richmond to Manchester and the U. S. Granite Yards and Laboratory on the river east of Manchester.

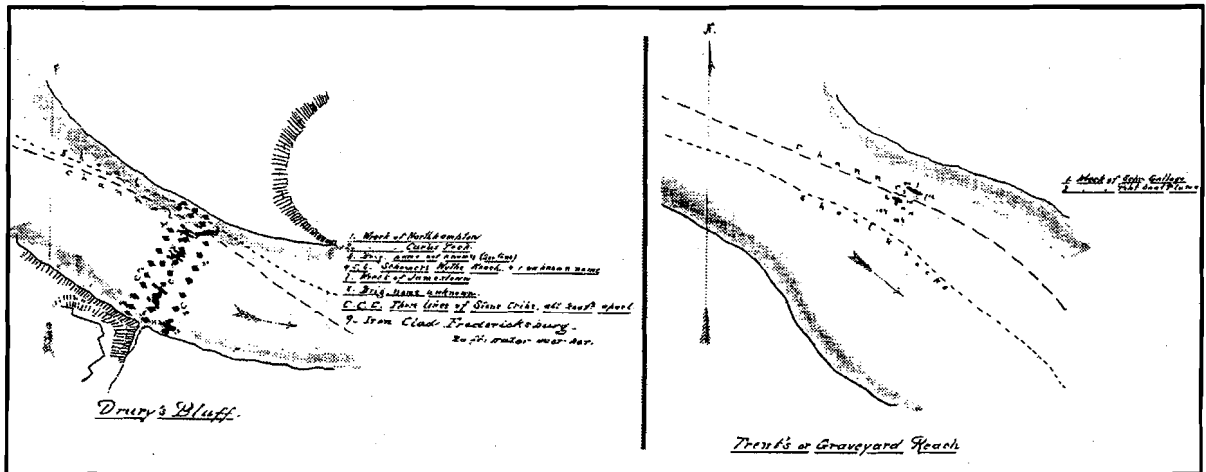


Figure 20. Close-up of wrecks and obstructions at Drury's Bluff and Trent's or Graveyard Reach from "Sketch to Show Location of Obstructions in James River, Virginia, 1884" (Map G-216, NA 1884).

City Point to Kingsland Creek, James River, Virginia, January, 1882.

USCGS Sheet 4 of 5. Indicates location of Dutch Gap Canal and confluence of Appomattox and James rivers. Scale is too small to show wrecks, piers, etc.

Sandy Point to City Point, James River, Virginia Survey of January, 1882.

USCGS James River Sheet 3 of 5. Harrison's Landing is located at Berkley and Swynard's and Wilcox' Wharfs are shown across from Windmill Point. A wharf is also located at Claremont. No wrecks are indicated.

Piankatank River, 1883

USACE survey from below Ferry Point to above Freeport. Shows detailed bathymetry associated with proposed dredging of a navigation channel. Chart identifies points, creeks and adjacent property owners. No wrecks or obstructions are identified.

Sketch to Show Location of Obstructions in James River, Virginia, 1884.

Indicates the presence of three small schooners on Warwick Bar and pile piers of a military bridge near Wilton and below Aiken's or Varina. The wreck of the schooner *Gallego* and the Pilot Boat *Plume* are located near Trent's or Graveyard Reach. Nine wrecks lie off Drury's Bluff including the steamers *Northampton*, *Curtis Peck* and *Jamestown*, two unnamed brigs, the schooners *Wythe* and *Reach*, an unnamed schooner and the ironclad *CSS Fredericksburg*. Three lines of stone cribs spaced about 200 feet apart are also located at Drury's Bluff (Figure 20).

James River from the Ship Locks to Drewry's Point, Surveyed May, 1884.

Sheet 1 features the area from Gillies Creek to Almond Creek, and features the C&O Wharfs, the Brickyard, the Brewery, the Laboratory across from Rocketts Reef, Davenport's Wharf and the Baltimore S. S. Company. Sheet 2 extends from Quarry Wharf to Turpins Dyke.

Coast Chart No. 30 from Hog Island to Cape Henry, 25 January 1886.

USCGS survey of the Atlantic coast and includes the locations of the wrecks of the coal barge *Albemarle* east of Hog Island and the schooner *Maria & Elizabeth* southeast of Cape Charles, located by Capt. H. T. Blake, U.S.R.M. Map does not include the James River.

Varina Beach, James River, Virginia, October, 1886.

Area west from Grue's Wharf, Chester. Another wharf is located between Slide and Caldwell on the north bank of the river.

Potomac River from Its Mouth to the City of Washington, 1891

USCGS chart of the Potomac River from Washington, D. C. to the Chesapeake Bay. Chart contains highly detailed bathymetry, soundings, shoals, islands, channels and navigation aids. No wrecks or obstructions are identified in Virginia waters.

Map of Lynn Haven Bay, Va., 1891.

USACE map of Lynnhaven Bay prepared to facilitate designing and locating a proposed breakwater. Detailed bathymetry but no wreck specific information.

Goode's Rock Section, south of South Richmond, James River, Virginia, 1891-1892.

Sheet 2 (two maps). This area of the James River features a series of long and narrow points and jetties extending from both shores of the river. No wrecks are indicated.

Notes, Goode's Rock Section, 1892.

Sheet 3 (two maps). Both shores of the river in this location feature a series of long and narrow points and jetties. The mooring locations of the USS *Manhattan*, USS *Mahopac*, USS *Lehigh*, USS *Canonicus*, USS *Catskill* and USS *Ajax* are clearly depicted.

Ship Lock to Drewry Bluff, James River, Virginia Survey of October, 1892.

Colonel William P. Craighill USACE (two maps). The most prominent features include a line of seven Monitors across from Randolph Flats, the C&O Railroad Wharf and the Quarry Wharf. No wrecks are indicated.

Turkey Island, James River, Virginia, 1893.

Concentrates on the Turkey Island Bayou south of Malvern Hill, north of the James River. Indicates a possible vessel on the inner bend of the river, northeast of Presquisle Swamp on Turkey Island. A small dock or pier extends into the river at Haxall or Hardings and another from a point north of the village.

Appomattox River from City Point to Petersburg, Virginia 1893.

USCGS chart of the Appomattox River with soundings, bars and shoals. Associated terrestrial features are identified along with some topography. No wrecks or derelicts are indicated.



Figure 21. Map of the U. S. Navy Yard, Gosport 1861 showing location of scuttled vessels (Map 738, Library of Congress 1902).

Point of Shoals to Sandy Point, James River, Virginia Survey of June, 1896.

USCGS James River Sheet 2 of 5. Dillard Wharf is located on the south bank of the James across from the mouth of the Chickahominy River. A pier also extends from Dollers Point and two from Hog Point. A pier is located at Jamestown between Church and Lower Points. Kings Mill Wharf is located across from Hog Point on the north shore of the James. No wrecks are indicated.

Map of the U. S. Navy Yard, Gosport, 1902

USCGS map of the U. S. Navy Yard, Gosport, Virginia and the adjacent Elizabeth River. The map shows the location of the wrecks of the USS *Pennsylvania*, USS *Columbia*, USS *Raritan* and USS *Delaware*. Those vessels were destroyed during the United States evacuation of the Gosport Navy Yard in April 1861 (Figure 21).

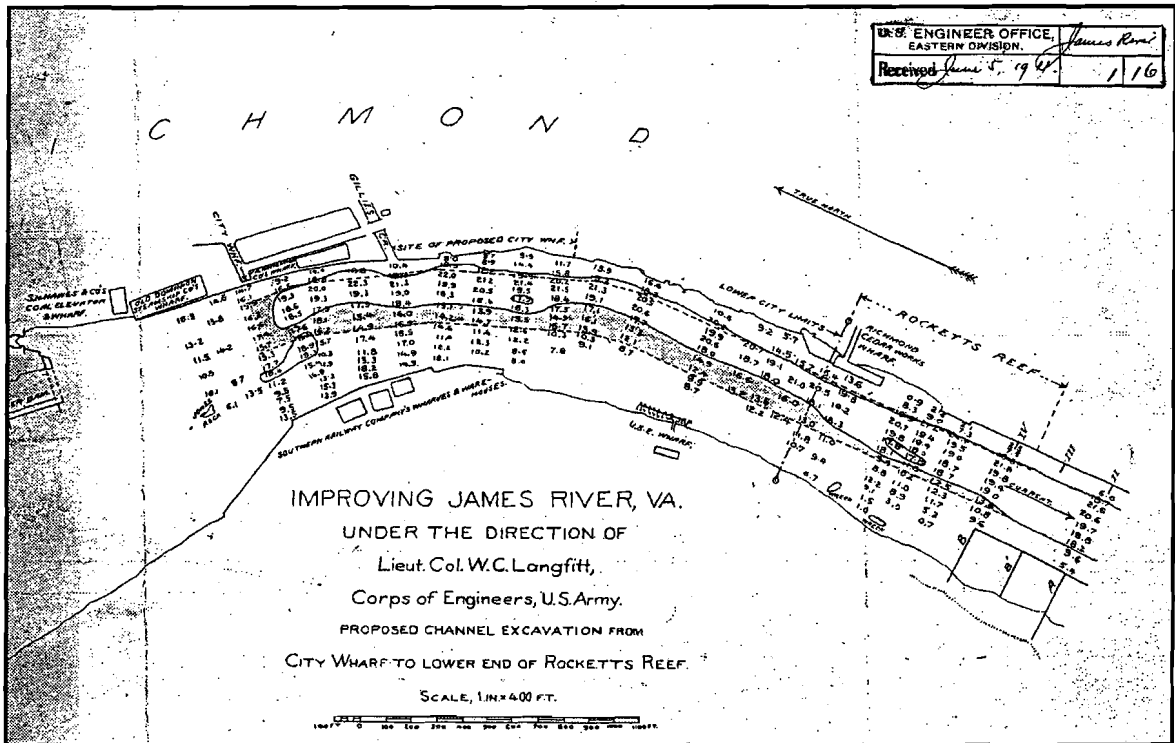


Figure 22. Map of “Proposed Channel Excavation from City Wharf to Lower End of Rocketts Reef, James River, Virginia, 5 June 1911” (Map 2642, NA 1911).

Hampton Roads to Point of Shoals, James River, Virginia Survey of May, 1908.

USCGS James River Sheet 1 of 5. Indicates the forbidden anchorage between Fort Wool and Fort Monroe, the dredged channel extending north from Seawall Point, and the dredged channel south of Newport News Middle Ground. A smaller dredged channel extends southeast from Craney Island and another east out of Agan Creek. No wrecks are indicated.

York River Entrance to Yorktown, 1908.

USCGS Chart 494. The chart illustrated the Chesapeake Bay area from Back River Light to White Creek and includes the York River to a point west of Yorktown. Also included are Mobjack Bay and the Severn, Ware and North rivers. Associated topography is detailed and cities, towns, wharves and landings are identified. Detailed bathymetry includes soundings and navigation aids. No wrecks are identified on the chart.

Proposed Channel Excavation from City Wharf to Lower End of Rocketts Reef, James River, Virginia, 5 June 1911.

Improving James River, under the direction of Lieutenant Colonel W. C. Langfitt, USACE. Indicates the locations of a Cofferd Dam near the lower end of the Richmond Docks and several wharves on both banks of the river extending south to Rocketts Reef. Two wrecks are indicated on the west shore across from Rocketts Reef (Figure 22).

Cape Henry Quadrangle, 1919.

USACE quadrangle sheet of Cape Henry from Sand Bridge to Little Creek. Very detailed topography, roads, railroads and structures but little navigation information.

Coast Chart No. 452, Norfolk Harbor and Elizabeth River, 1930.

USCGS chart of Norfolk Harbor from Craney Island south to the limits of navigation on each branch of the Elizabeth River. Chart No. 430 contains detailed bathymetry, channels, soundings and navigation aids. No wrecks are plotted on the chart.

Norfolk Harbor 40' Channel Condition after Dredging, 14 January 1941.

USACE, Norfolk Sheet 6 of 6. Adopted project includes a channel 40 feet deep and 450 feet wide from Sta. 0+00 to Sta. 107+24.7; thence 750 feet wide from Sta. 107+24.7 to the 40-foot contour in Hampton Roads. The controlling widths and depths as of January 1941 are 40 feet deep and 400 feet wide between stations 6+00 and 107+24.7, and 40 feet deep and 600 feet wide between stations 107+24.7 and 632+00.

Temporary Dumping Grounds used for Hampton Roads Area Survey of 12 July 1943.

USACE, Norfolk, Virginia. Soundings and bottom contours for the eastern portions of Anchorage "A" and "B" and Hampton Roads.

Norfolk Harbor Channel Dredge Disposal Area, Hampton Roads, Virginia, 1947.

Area between Seawall Point and Old Point Comfort, west of Fort Wool. Also shows the location of Willoughby Channel, Hampton Creek Channel and cable areas.

Hampton Roads, Virginia Survey after Removal of Shoal, August, 1949.

USACE, Norfolk. Two small areas north of Norfolk Naval Base, southwest of Fort Wool, southwest of Old Point Comfort and east of Newport News.

Norfolk Harbor 40' Channel Survey of October, 1949.

USACE, Norfolk Sheet 1 of 1. Project dimensions include a channel 40 feet deep and 750 feet wide southeast of Naval Anchorage "B," north of the Norfolk Naval Base.

Norfolk Harbor 40' Channel Survey of November, 1949.

USACE, Norfolk Sheet 1 of 1. Project dimensions include a channel 40 feet deep and 750 feet wide north of the Norfolk Naval Base, east of Anchorage "B."

Norfolk Harbor 40' Channel between the Belt Line Railroad Bridge and the 40' Contour in Hampton Roads, 15 May 1950.

USACE, Norfolk Sheet 10 of 10. Channel southeast of Naval Anchorage "B" showing its existing southeasterly limit, the limits of the existing channel and the limits of the proposed channel.

Norfolk Harbor 40' Channel Easement Survey of February, 1951.

USACE, Norfolk Sheet 1 of 1. Shows the location of Naval Anchorage "B" and its southeasterly limit, as well as the borders of the authorized channel and the limit of the channel provided by easement.

Coast Chart No. 452, Norfolk Harbor and Elizabeth River, 1952.

USCGS chart of Norfolk Harbor from Craney Island south to the limits of navigation on each branch of the Elizabeth River. Chart No. 452 contains detailed bathymetry, channels, soundings and navigation aids. No wrecks are plotted on the chart.

Norfolk Harbor 40' Channel Widening from STA 493+00 to the 40' Contour in Hampton Roads Survey of October, 1957.

USACE, Norfolk. Project dimensions include a channel 40 feet deep and 1,500 feet wide from that depth in Hampton Roads to a point approximately 1.1 miles north of Craney Island Light; thence 40 feet deep and 750 feet wide to the junction of the Southern Branch and Eastern Branch; thence 40 feet deep and 450 feet wide in the Southern Branch to the N.&P.B.L. Railroad Bridge; an approach and turning area 40 feet deep opposite the Norfolk Naval Shipyard.

Norfolk Harbor 40' Channel Junction of Southern and Eastern Branches to the 40' Contour in Hampton Roads Survey of February-June, 1964.

USACE, Norfolk Sheets 8 and 9 of 9. Project dimensions include a channel 40 feet deep and 1,500 feet wide from that depth in Hampton Roads to a point approximately 1.1 miles north of Craney Island Light; thence 40 feet deep and 750 feet wide to the junction of the Southern Branch and Eastern Branch; thence 40 feet deep and 450 feet wide in the Southern Branch to the N.&P.B.L. Railroad Bridge; an approach and turning area 40 feet deep opposite the Norfolk Naval Shipyard.

Norfolk Harbor 45' Channel Survey of September, 1973.

USACE, Norfolk Sheet 4 of 4. Project dimensions include a channel 45 feet deep and 1,500 feet wide from that depth in Hampton Roads to a point approximately 1.1 miles north of Craney Island Light; thence 45 feet deep and 800 feet wide to Lambert Bend.

Norfolk Harbor Channel Entrance Reach 50' Element, Plans for New Work Dredging Survey of March-April, 1987.

USACE, Norfolk 4 Sheets. Project Dimensions include a channel 55 feet deep and 1,000 feet wide from that depth in Hampton Roads to a point approximately 6.0 miles upstream from Lambert Point. Within the Norfolk Harbor Reach from Hampton Roads to a point approximately 6.0 miles upstream from the Bridge-Tunnel, portion of the 45 feet deep project channel will be maintained under the previous project. Construction of the 50 foot element will provide an intermediate depth through the Entrance Reach of 50 feet below Mean Low Water (National Ocean Service).

Norfolk Harbor Entrance Reach, Anchorage F, and Connecting Water to Thimble Shoal Channel (Seawells Point to Thimble Shoal Channel) Project Condition Survey of April, July, and August, 1990.

USACE, Norfolk 4 Sheets. Project dimensions include a channel 55 feet deep and 1,000 feet wide from the west end of Thimble Shoal Channel to the north end of Norfolk Harbor Channel at the Hampton Roads Bridge-Tunnel.

Hampton Roads, Virginia, United States East Coast Navigational Chart (12245), 1992.
National Oceanographic and Atmospheric Administration, Coast and Geodetic Survey chart.

Norfolk Harbor Entrance Reach and Connecting Water to Thimble Shoal Channel Survey of June, 1993.

USACE, Norfolk Sheets 1, 2 and 4 of 7. Project dimensions include a channel 55 feet deep and 1,000 feet wide from the west end of Thimble Shoals Channel to the north end of Norfolk Harbor Channel at the Hampton Roads Bridge-Tunnel. This project is maintained to a depth of 50 feet.

Norfolk Harbor 50' Anchorage Survey of October-November, 1993.

USACE, Norfolk Sheets 2, 3 and 4 of 4. Includes the locations of Area "A," Area "B-1," Area "C" and Fort Monroe.

Dancing Point to Swann Point Shoal Channel, James River, Virginia Survey of February-March, 1994.

USACE, Norfolk 4 sheets. Project dimensions include a channel 35 feet deep and 300 feet wide, maintained under previous projects to a depth of 25 feet.

Richmond Deep Water Terminal to Hopewell, James River, Virginia Project Condition Survey of February, 1996.

USACE, Norfolk. Two possible schemes for widening or channel realignment east of Bermuda Hundred have been drawn in to indicate the location of the archaeological survey. The U. S. Government's property easement on Turkey Island is also clearly marked, as is the approximate location of a submerged telephone cable at the ferry crossing.

James River NOAA Chart #12251, Jordan Point to Richmond.

Current National Oceanic and Atmospheric Administration Navigation Chart. Mercator Projection, scale 1:20,000 and based on North American Datum of 1983 (Figure 23).

James River NOAA 12251, Jamestown Island to Jordan Point.

Current National Oceanic and Atmospheric Administration Navigation Chart. Mercator Projection, scale 1:20,000 and based on North American Datum of 1983.

James River NOAA 12248, Newport News to Jamestown Island.

Current National Oceanic and Atmospheric Administration Navigation Chart. Mercator Projection, scale 1:20,000 and based on North American Datum of 1983.

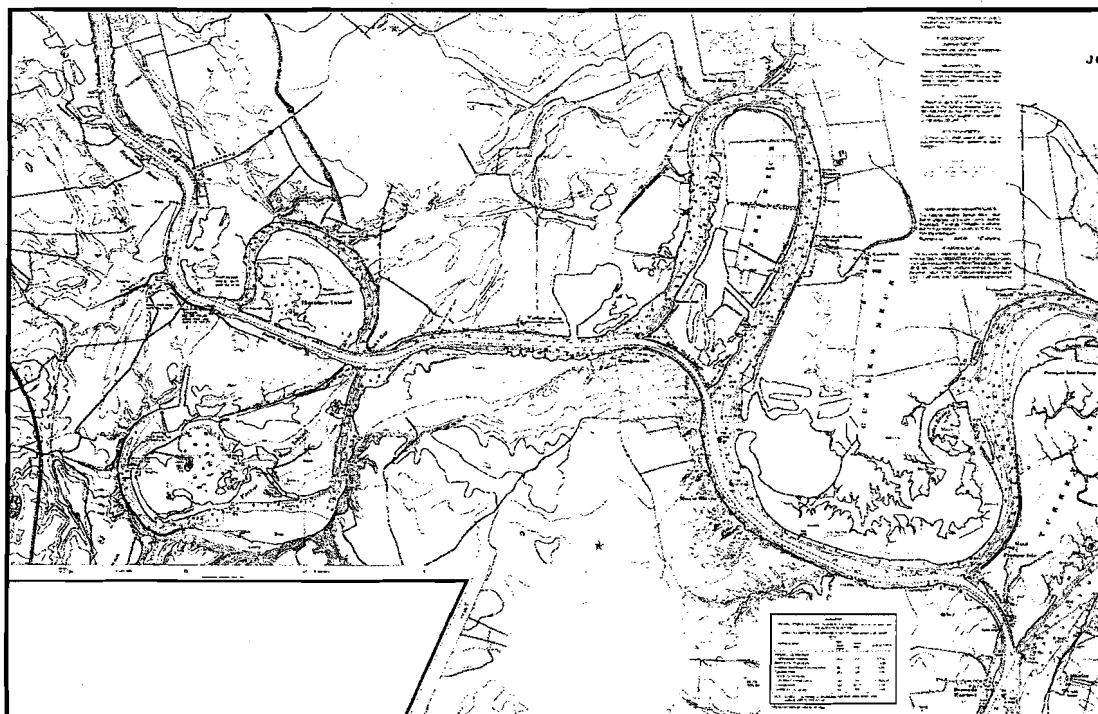


Figure 23. Section of “James River, Jordan Point to Richmond” (NOAA Chart #12251 1994).

Hampton Roads NOAA 12245.

Current National Oceanic and Atmospheric Administration Navigation Chart. Mercator Projection, scale 1:20,000 and based on North American Datum of 1983.

Nature and Scope of the Resource Base

Research has identified 212 shipwrecks and derelicts in Virginia waters that fall under the jurisdiction and management authority of the NHC (Figure 1). Those vessels have been categorized by the following historical periods:

Chronology	Period	Shipwrecks
1524 – 1606	Exploration	0
1607 – 1775	Colonial	3
1776 – 1781	Revolutionary War	12
1782 – 1811	Federal	2
1812 – 1814	War of 1812	0
1815 – 1859	Ante Bellum	0
1860 – 1865	Civil War	144

1866 – 1913	Late 19 th Early 20 th Century	5
1914 – 1918	World War I	7
1919 – 1940	Early Modern	16
1941 – 1945	World War II	5
1946 – 2002	Modern	18

Typologically, the 212 vessels represent an interesting spectrum of military and merchant vessels. American, British, French and Spanish warships are all present in the NHC VA/GIS database. The overwhelming majority of those are associated with naval activity during the Civil War. While many of the Civil War shipwrecks are U. S. Navy or Confederate State Navy ships, the majority are military transports, prize vessels and ships scuttled to block navigation. That category includes 144 vessels that range from ironclad warships to canal barges. Target ships used to test ordnance and for gunnery exercises make up the overwhelming majority of the 34 wrecks of the early Modern and Modern period.

A significant number of shipwrecks are associated with the Revolutionary War. Perhaps the most important engagement of the Revolution was fought at Yorktown on the York River. Vessels lost in association with those engagements include British warships and transports. During World War I and World War II, 12 U. S. Navy vessels were lost. Accidents were responsible for the loss of almost all of those vessels. Two British Navy vessels, the earliest in the database, were lost during the Colonial Period and a third was lost during the Federal Period. A French frigate was also lost during the Federal Period. During the period of exploration no naval shipwrecks have been documented and none have been identified in Virginia waters during either the War of 1812 or the Antebellum period.

Civil War Shipwrecks

A total of 144 shipwrecks in the NHC VA/GIS are associated with the Civil War (Figure 24). The largest concentration of U. S. Navy vessels sunk in Virginia waters was associated with destruction of the Gosport Navy Yard in April 1861. Ten warships including the ships of the line USS *Columbus*, USS *Delaware* and USS *Pennsylvania*; the frigates USS *Columbia*, USS *United States* and USS *Raritan*; the screw frigate USS *Merrimack*; the sloops of war USS *Germantown*, USS *Plymouth* and the Brig USS *Dolphin* were abandoned, burned and/or sunk at their moorings in the Elizabeth River (ND 1971, I:9-10). Although no remote sensing survey of the area has been carried out, historical research indicates that all of the vessels were subsequently raised and destroyed.

Of the U. S. Navy frigates USS *Congress* and USS *Cumberland*, sunk by CSS *Virginia* in March 1862, only *Cumberland* remains on the bottom of Hampton Roads. The remains of the *Congress* were raised and broken up. Although data from archaeological reconnaissance investigations indicates that the *Cumberland* is badly broken up, that wreck preserves an important record of the old sailing Navy and the battle with the *Virginia* that sealed the fate

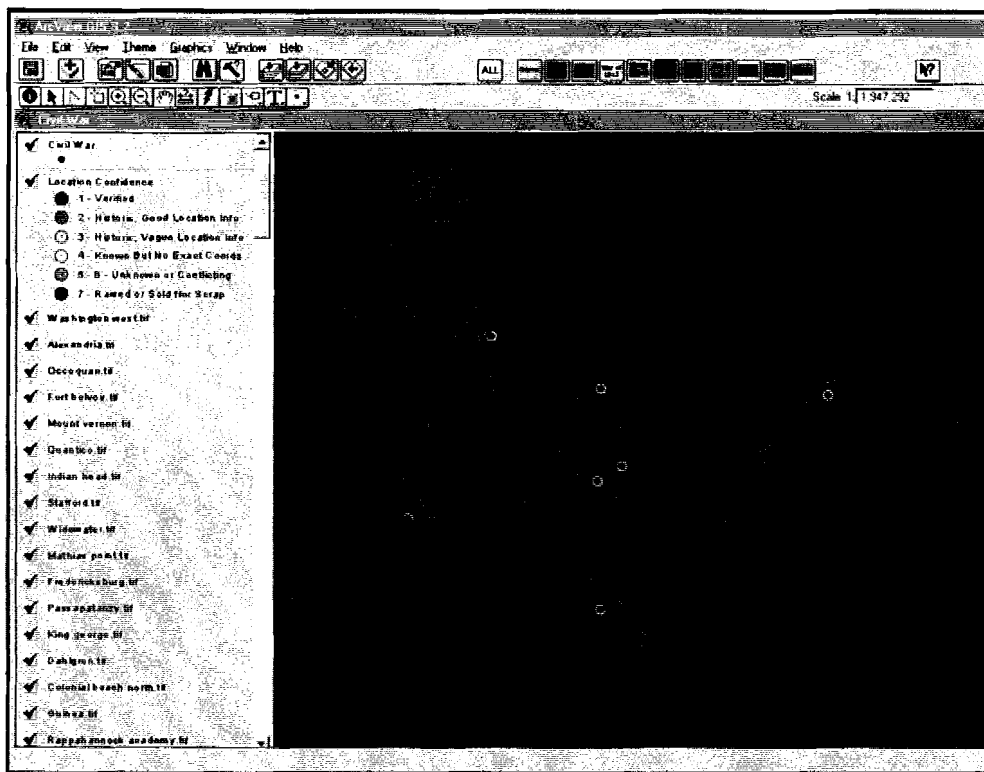


Figure 24. Location of Civil War shipwrecks.

of sail powered warships. The remains of sloop of war USS *Jamestown* may also survive as that vessel burned and sank at Norfolk in 1913 after a 50-year career in U. S. Navy service and 20 years with the Treasury Department (Silverstone 1989:132-133).

The remains of purpose-built Confederate Navy warships reflect early efforts to take advantage of the technology associated with both steam and armor. The dramatic success associated with Confederate conversion of the USS *Merrimack* provided the impetus for launching and commissioning 22 of ironclad steam warships (Still 1971:227). Although the wreck of the *Virginia* was raised and broken up in the dry dock in which the vessel was converted, the remains of several other Confederate ironclads lie in Virginia waters. The salvaged hulls of the CSS *Virginia* II and the CSS *Fredericksburg* lie beneath more than 15 feet of mud at Drewrys Bluff and the overturned casemate of the CSS *Richmond* lies embedded in a sandy bottom at Chaffins Bluff. The surviving structural remains of those vessels preserve an important record of Confederate ironclad design and construction.

The Confederate Government also built several screw propelled gunboats and torpedo boats. The Maury Class gunboats CSS *Hampton* and CSS *Nansemond* were both destroyed to prevent capture at the evacuation of Richmond. The gunboat CSS *Drewry* was damaged and run ashore near Trents Reach. The torpedo boats CSS *Scorpion* and CSS *Hornet* were also destroyed in action near Trents Reach while their tender, the screw steamer CSS *Torpedo*

was sunk near Richmond during the Confederate evacuation. Perhaps the most important Confederate screw gunboat in Virginia waters is the CSS *Florida*, the British built commerce raider, captured at Bahia, Brazil and sunk in Hampton Roads.

Both the U. S. Navy and the Confederate States Navy made considerable use of available merchant vessels. Many confiscated, purchased and captured steamers were converted for service as gunboats. Those vessels include tugs like the *Lizzie Freeman* destroyed by Confederates off the Pagan River and the *Titan* destroyed near Freeport and the *Beaufort* burned and scuttled near Richmond. Many sidewheel steamers were operated by both the navies and armies of United States and the Confederacy. All were in commercial service before southern states seceded from the Union. The *Patrick Henry* was operated as a gunboat and later as a training ship by the Confederate Navy. Others like the *Towns*, *General Scott*, *Northampton*, *Rappahannock*, *George Page*, *Curtis Peck*, *Jamestown*, *Jenny Lind* and *Raleigh* were operated as navy and army gunboats, transports and dispatch vessels. All were sunk either to prevent capture or as obstructions.

Several U. S. Navy sidewheel steamers were captured and/or destroyed while in service. The USS *Island Belle* grounded in the Appomattox River and was burned to prevent capture. The ferry boats USS *Whitehall* and USS *Commodore Jones* were both sunk. The *Whitehall* sank off Fort Monroe after being accidentally set on fire, and the USS *Commodore Jones* was destroyed by a torpedo in the James River. The transport *A. H. Schultz* was also blown up by a torpedo in the James River and the sidewheel tug *Shawsheen* was destroyed after being damaged by artillery fire near Turkey Bend. Several screw steamers are also among the U. S. Navy shipwrecks in Virginia waters. The army chartered screw steamer *Greyhound* was sunk by a torpedo and the screw steamer USS *Sumpter* (also spelled Sumter) was sunk in a collision with the *General Meigs*.

During the Civil War dozens of sloops and schooners were sunk as obstructions, lost due to weather or navigation or were captured and destroyed. Thirteen were associated with first United States Government plans to obstruct southern inlets with stone laden vessels during the summer of 1861. By far the largest number of scuttled sloops and schooners, many loaded with Confederate Army supplies, were burned and/or scuttled in the Pamunkey River in May 1862. At least 51 have been identified and included in the NHC VA/GIS. Those vessels provide an unparalleled representative sample of the most common vessel types in southern waters prior to the Civil war. A number of other sloops and schooners, such as *Coquett*, *Golden Rod* and *Two Brothers* in the Rappahannock, were lost as a result of being scuttled or captured and destroyed. In addition to ageing sloops and schooners, the United States Government purchased 12 canal boats for use as obstructions in the James River.

Modern Shipwrecks

Modern shipwrecks make up the second largest category of vessels in the NHC VA/GIS (Figure 25). A total of 18 were sunk between the end of World War II and 1980. With the exception of the historic USS *Hartford*, which sank at its mooring and was raised and broken up in 1956, modern losses all represent naval vessels used for target practice and weapons

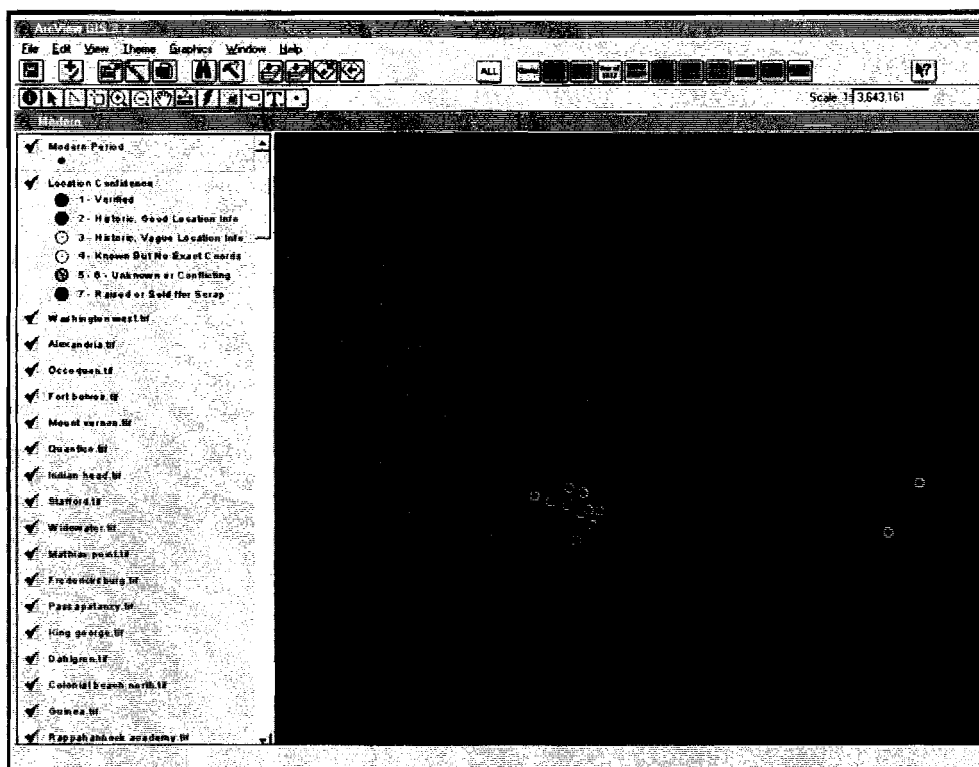


Figure 25. Location of Modern shipwrecks.

experiments. Those include nine destroyers, one submarine chaser, three submarines, three escort vessels and a minesweeper. All were sunk well offshore of the Virginia Capes in deep water.

Early Modern Shipwrecks

During the period between World War I and World War II, only two vessels were lost in service and 15 were sunk for target practice and weapons experiments (Figure 26). One vessel was the YPD-11, a floating pile driver struck from the records in 1920 and the tug *Wicomico* sunk after a collision in 1940. The remaining 15 vessels were sunk as targets. Most of the naval gunfire experiments were carried out in 1920 and 1921. With the exception of the torpedo boat *McKee* which was sunk off Craney Island, all of the vessels were towed well out to sea for destruction. The target vessels included five submarines (four of which were German and one American), three battleships (including the *Ostfriesland* sunk by General William Mitchell), one German light cruiser, a torpedo boat and three torpedo boat destroyers.

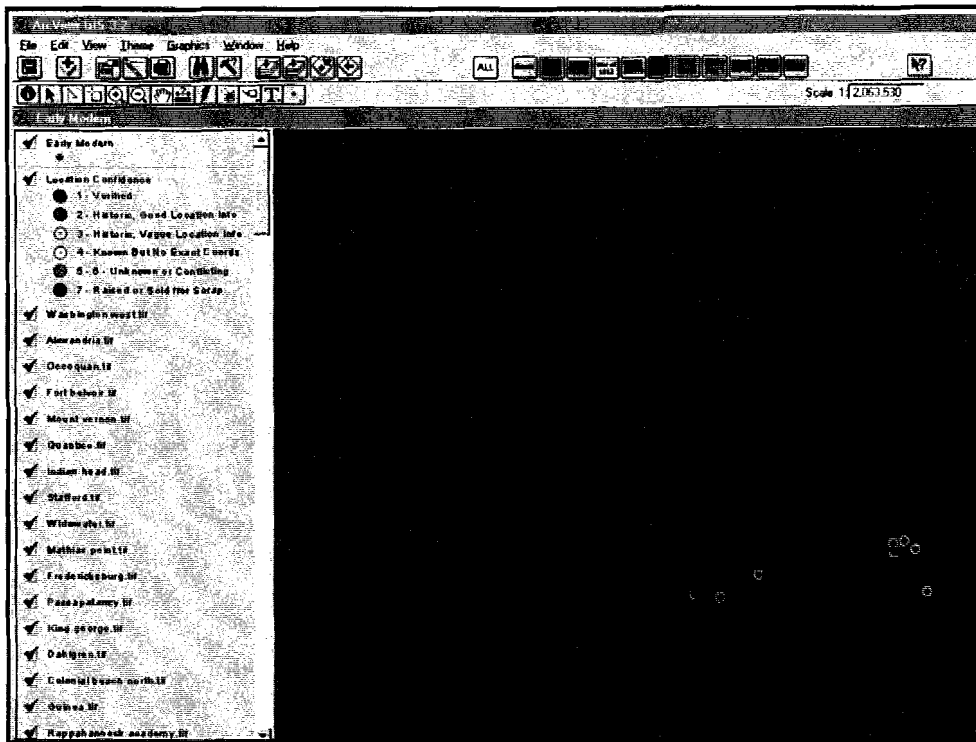


Figure 26. Location of Early Modern shipwrecks.

Revolutionary War Shipwrecks

While no American Navy vessels were lost in Virginia waters during the Revolutionary War a number of Royal Navy ships and transports were sunk (Figure 27). British warships include the 44-gun frigate HMS *Charon*, the 28-gun ship HMS *Guadeloupe*, the 24-gun ship HMS *Fowey* and the 16-gun sloop HMS *Hunter*. HMS *Fowey* was built in 1749, HMS *Charon* was built at Harwich in 1778 and HMS *Hunter* was built in Bermuda in 1796 (Colledge 2003:74, 97, 112, 131, 162, 349). In addition to Royal Navy ships, at least six British transports lie at Yorktown. The brig *Betsy* has been excavated and documented and the remains of five additional vessels have yet to be unidentified. The remains of those English warships and transports provide a valuable record of seventeenth and eighteenth century Royal Navy vessels on duty in Virginia waters.

World War I Shipwrecks

A total of seven U. S. Navy vessels, or vessels chartered by the U. S. Navy were sunk in Virginia waters during World War I (Figure 28). None of those were lost as a consequence of combat operations. Six of the seven losses were a result of accidents. Two submarine chasers were lost as a consequence of fire and collision. Similar accidents claimed two motor patrol boats and a third was ordered destroyed. Fire and explosion destroyed a transport and a schooner.

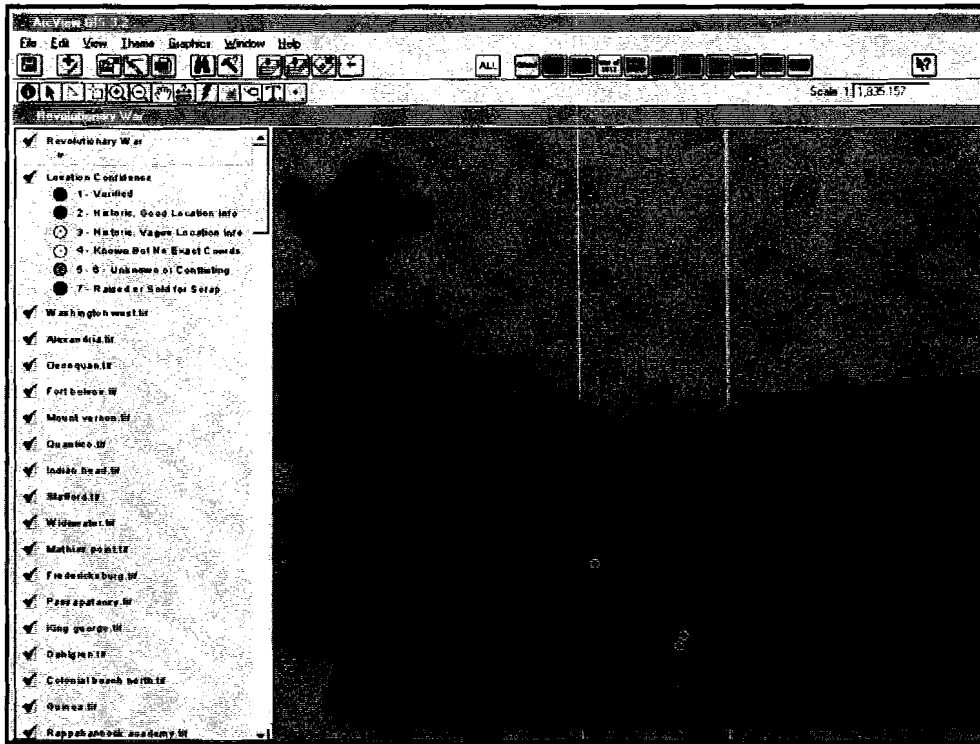


Figure 27. Location of Revolutionary War shipwrecks.

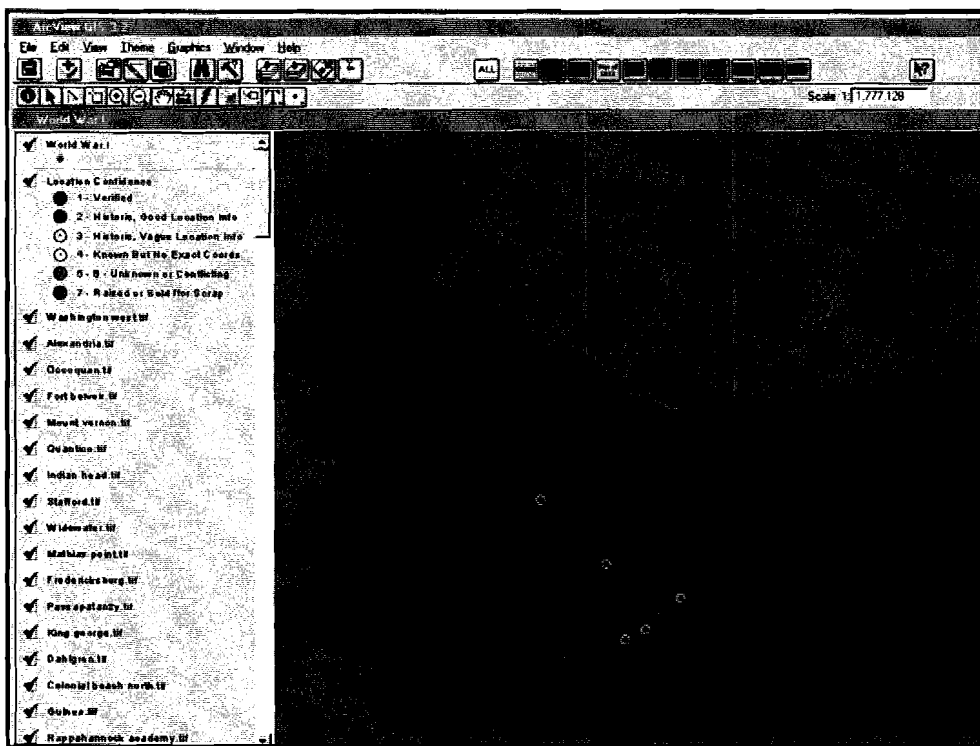


Figure 28. Location of World War I shipwrecks.

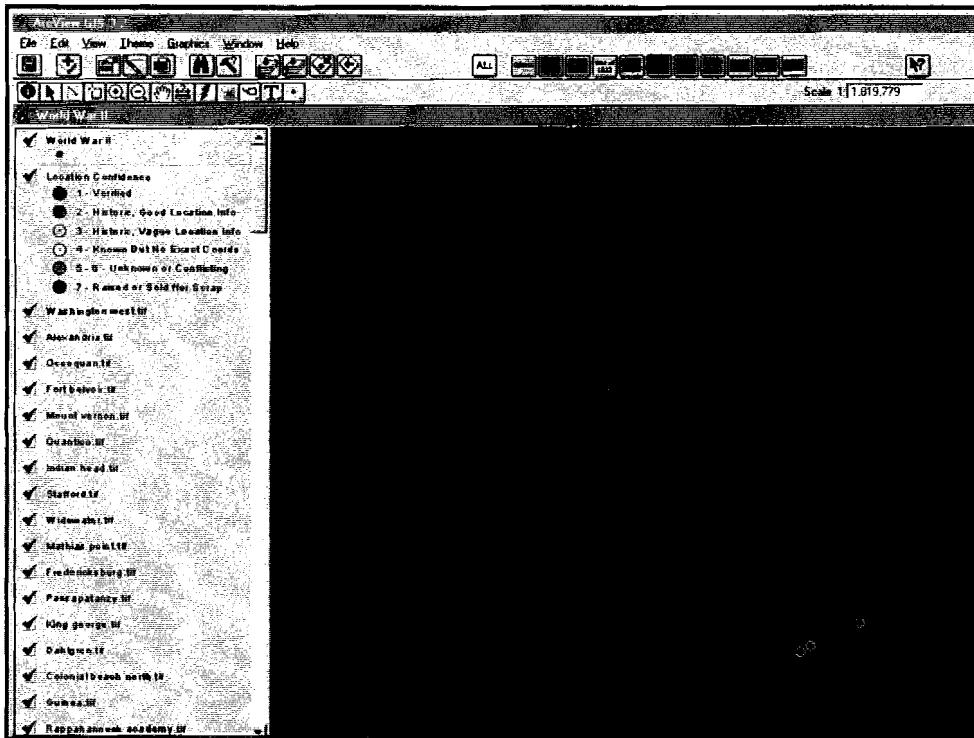


Figure 29. Location of World War II shipwrecks.

World War II Shipwrecks

During World War II, the Liberty ship *John Morgan* exploded and sank after a collision near the entrance to the Chesapeake Bay and the YAG-17 was destroyed after grounding. Two decommissioned auxiliary ships were sunk as targets offshore of Cape Henry in 1944 and 1945 (Figure 29).

Colonial Shipwrecks

Only three shipwrecks during the Colonial Period are included in the NHC VA/GIS (Figure 30). Two of those are English. The 32-gun ship HMS *Elizabeth* is the earliest Royal Navy vessel lost in North America. HMS *Elizabeth* built in 1647 at Deptford and was destroyed by the Dutch during a raid on the James River tobacco fleet in 1667. The other was HMS *Deptford*, a 10-gun ketch built at the Deptford Navy Yard in 1665. The ketch wrecked on the Virginia coast in 1689. The remaining wreck is the Spanish 50-gun frigate *La Galga* sunk off the Eastern Shore in a storm in 1750.

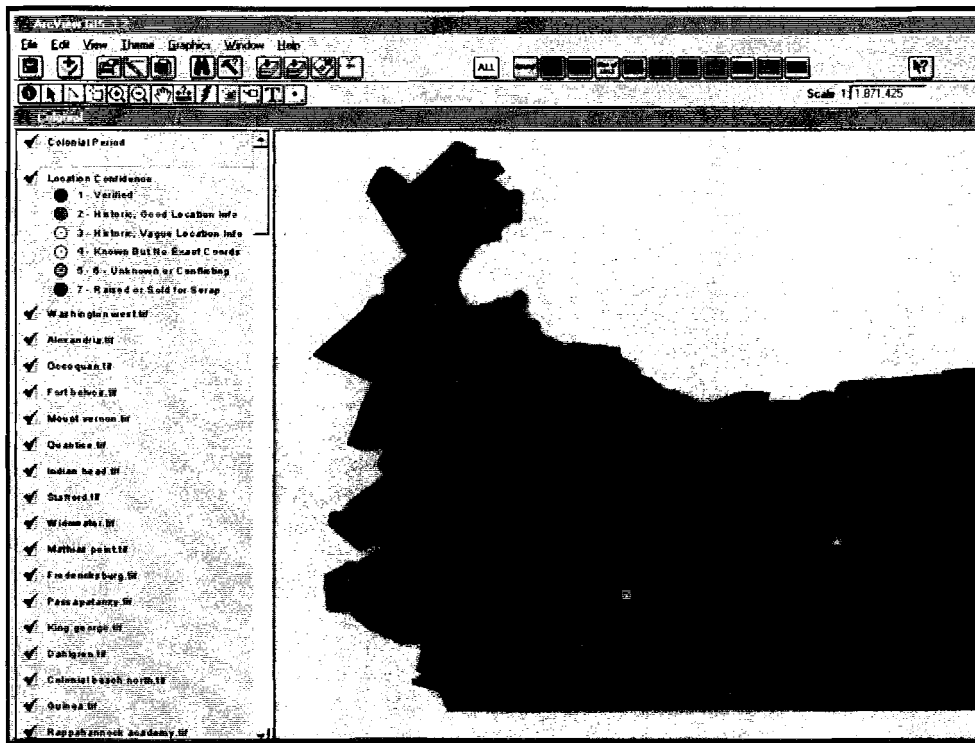


Figure 30. Location of Colonial shipwrecks.

Federal Period Shipwrecks

Two naval vessels were lost during the Federal Period (Figure 31). One was the British Royal Navy 18-gun Bermuda-built sloop HMS *Hunter*. The *Hunter* was run aground off the Eastern Shore in 1797. The other was the French Navy 74-gun frigate *Impetueux*. The frigate was chased ashore south of Cape Henry and destroyed by a British squadron in 1806.

National Register Significance of NHC VA/GIS Shipwrecks

The historical and archaeological significance of the 212 shipwrecks included in the NHC VA/GIS must be assessed on a ship specific basis. Significance must be a factor of eligibility criteria established for nomination to the National Register of Historic Places. To qualify for the National Register of Historic Places, a shipwreck “must be significant in American history, architecture, archaeology, engineering or culture, and possess integrity of location, design, setting, materials, workmanship, feeling and association.” To be considered significant the vessel or shipwreck must meet one or more of four National Register criteria. These criteria include:

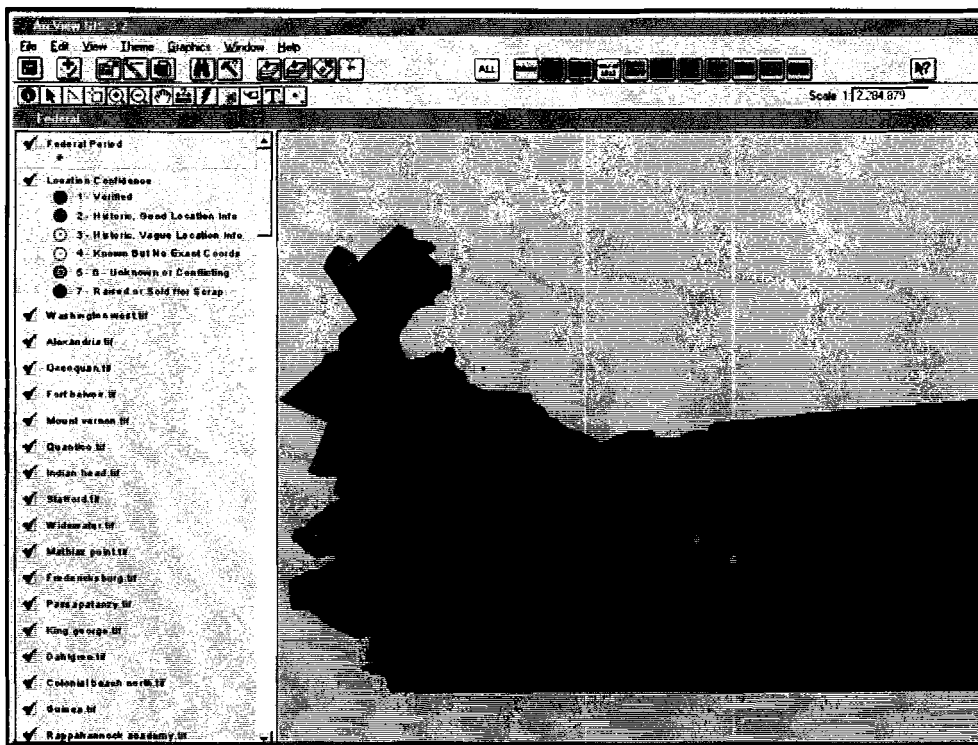


Figure 31. Location of Federal shipwrecks.

- A. Association with events that have made a significant contribution to the broad patterns of our history; or
- B. Be associated with the lives of persons significant in our past; or
- C. Embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. Have yielded, or may be likely to yield, information important in prehistory or history.

It is apparent that even without positive identification, a wreck under investigation can meet the qualifications listed above and therefore should be considered potentially eligible for nomination to the National Register of Historic Places (U. S. Department of the Interior 1987).

While each of the 212 wrecks must be considered to be potentially eligible for nomination, only a few of the wrecks are currently on the National Register of Historic Places. Those wrecks are all associated with the British fleet at Yorktown. The remains of six vessels are currently included on the National Register as part of the Yorktown Shipwrecks National Historic District. That 1973 nomination placed the first submerged cultural resources on the National Register. Curiously HMS *Charon*, HMS *Fowey* and a yet to be identified wreck are not included in the district. While the USS *Cumberland* has been listed on the state register it has not been placed on the National Register. The remains of schooner sunk in the Pamunkey River are apparently on the National Register as a consequence of being located within the Pamunkey Indian Reservation Archaeological District (Blanton and Margolin 1994:85).

While vessel specific significance must be determined on an individual basis in accordance with criteria established by the National Register of Historic Places, concentrations of Civil War shipwrecks such as those at Drewrys and Chaffins Bluff, City Point, Hampton Roads and the Pamunkey River could be nominated as elements in a district. That approach has been employed successfully in North Carolina with a number of Civil War shipwreck district nominations. The most complex is associated with Fort Fisher and the entrances to the Cape Fear River. Sufficient historical and archaeological information is available to develop nominations for districts at Drewrys and Chaffins Bluff, City Point, Hampton Roads and the Pamunkey River.

In addition, sufficient information exists to expand the Yorktown Shipwrecks National Historic District. At present only six vessels are included in the nomination. All of those appear to be the scuttled merchant vessels in the shallow waters along the Yorktown waterfront. None of the Royal Navy vessels or other British transports are registered. As Yorktown is one of the most important concentrations of shipwreck remains in Virginia waters, the district nomination should be expanded to be comprehensive.

Archaeologically Investigated NHC VA/GIS Shipwrecks

One reason that the Yorktown shipwrecks are on the National Register is they have been the focus of most of the underwater archaeological research carried out in Virginia waters. Archaeological investigation of the Yorktown shipwrecks began in 1975 when John Broadwater, John Sands, Dave Hazzard and Gordon Watts carried out a reconnaissance survey of the Yorktown waterfront and an examination of the exposed remains of one of the scuttled vessels identified as the Cornwallis Cave Wreck (44YO12). That reconnaissance produced a plan of the exposed hull and confirmed the extent of archaeological record associated with the wreck (Broadwater et al., 1975).

The following year a magnetic remote sensing survey was carried out by personnel from the Magnetics Branch of the David W. Taylor Ship Research and Development Center. Using vessels provided by the Virginia Institute of Marine Science and with assistance from Hazzard and Broadwater, a total of 189 magnetic anomalies were identified between 30 April

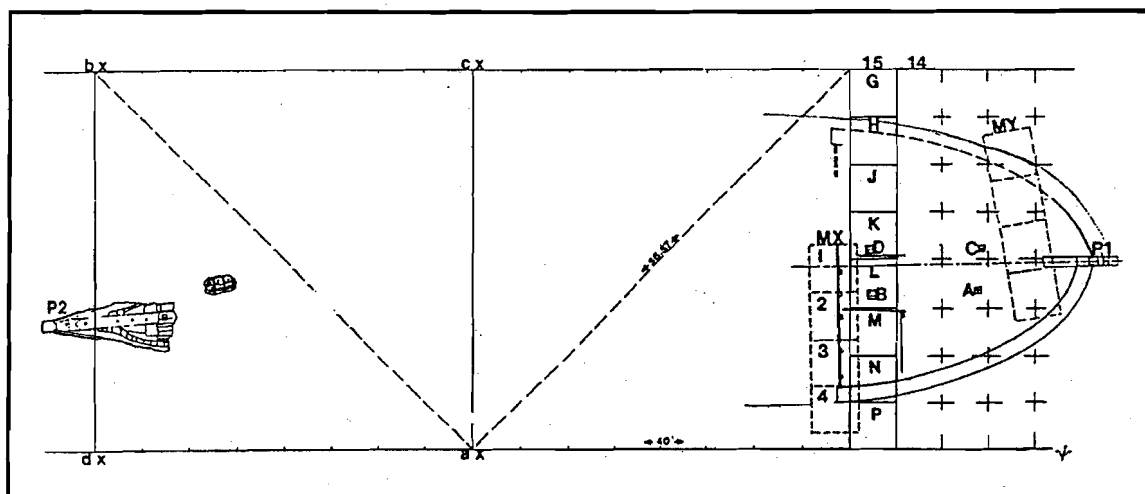


Figure 32. Plan of the Cornwallis Cave Site (Bass et al. 1976:32).

and 2 May 1976. The initial survey focused on the shallow water areas off Yorktown and Gloucester. A second survey in October 1977 focused on deepwater in the channel between Yorktown and Gloucester. In 1978 additional survey work was conducted using a side scan sonar and sub-bottom profiler provided by Klein Associates of Salem, New Hampshire. That work identified the locations of a number of additional shipwrecks (Sands 1983:152-156).

During the summer of 1976, a second investigation of the Cornwallis Cave Shipwreck was carried out by the staff and students of the American Institute for Nautical Archaeology (AINA) at Texas A&M University (Figure 32). Under the direction of Dr. George F. Bass, the AINA investigation focused on documentation of the exposed bow of the vessel and excavation of several test trenches within the surviving hull structure to ascertain its dimensions (Bass et al., 1976). That investigation identified the Cornwallis Cave Shipwreck as one of the large merchant vessels used by the British as a transport. The overall length of surviving hull structure was 112 feet measured from the sternpost to the base of the stem. No structure above the turn of the bilge survived at the site (Broadwater 1996, I:44-45; Sands 1983:146-151).

AINA's excavation of the Cornwallis Cave Shipwreck and the results of the remote sensing surveys stimulated considerable interest in the Yorktown shipwrecks. In 1979 and 1980, additional survey work was carried out and a total of nine Revolutionary war shipwreck sites were identified. During the summer of 1980, AINA returned to Virginia to conduct a field school investigation on the remains of HMS *Charon* (44GL136). Under the direction of Professor Richard Steffy, students carried out a series of excavations in the bow, midships and in the stern. The excavations exposed structural evidence and produced artifacts that confirmed identification of the wreck as the *Charon* (Steffy 1981:114-143).

With funding from the National Endowment for the Humanities and the State of Virginia, the best preserved example of the Yorktown shipwrecks was identified and excavated (Figure 33). That wreck, designated 44YO88, was intact from the level main deck to the keel and the

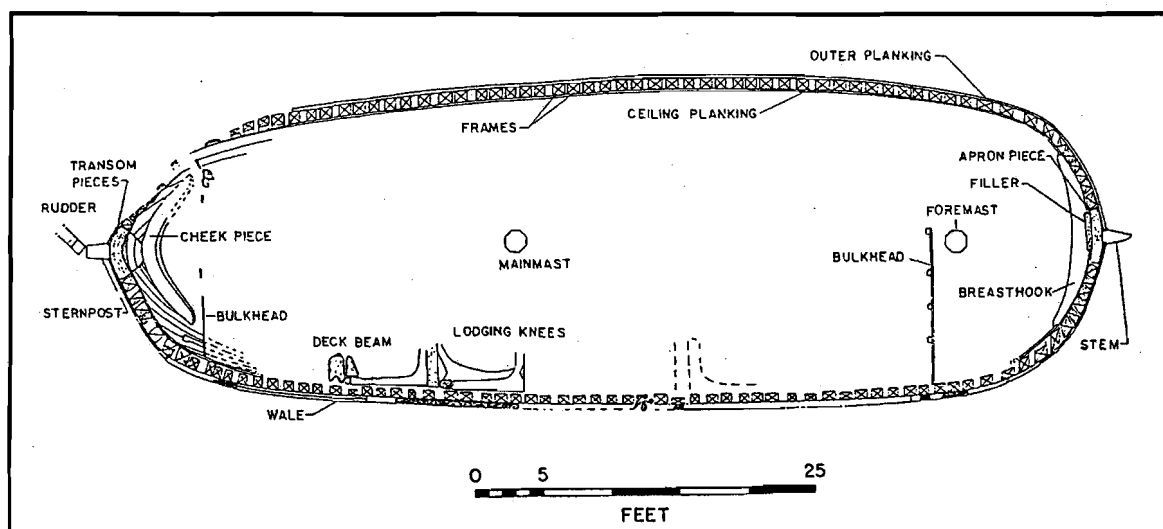


Figure 33. Site plan of collier brig *Betsy*, 44YO88 (Broadwater 1996, I:89).

remains of both masts were still stepped. Under the direction of Dr. John Broadwater the wreck was isolated from the York River environment by a sheet pile cofferdam in 1982. A pier with surface facilities and a filtration system for the cofferdam water were subsequently constructed to support investigation of the wreck. Between 1982 and 1988, the wreck was systematically excavated and meticulously documented.

Archaeological and historical research ultimately identified Yorktown shipwreck 44YO88 as the collier brig *Betsy*. *Betsy* was built in Whitehaven in 1772 for the Dublin coal trade and measured 176 32/94 tons burthen. In 1780, the brig was leased to the Royal Navy for use as a victualler and dispatched to America to support the British Army's efforts to suppress the rebellion. At Yorktown, *Betsy* was scuttled to protect the Yorktown waterfront from French or American amphibious assault (Broadwater 1996, I:159-161).

Once excavation of the *Betsy* was complete, the hull remains were recovered. The cofferdam that protected excavation from the York River environment was cut down to the bottom surface and sections of the sheet pile were laid over the wreck site. Although vessels currently use the cofferdam pier for docking, the wreck is protected from scouring and propeller wash by the cofferdam sections.

The earliest attempt to locate the USS *Cumberland* and CSS *Florida* was conducted in 1980 by the NUMA and the Virginia Research Center for Archaeology (VRCA) (Warner 1980). This joint project consisted of a magnetometer and fathometer survey of the James River off lower Newport News. Nineteen anomalies were located by the magnetometer, two of which were also identified by the fathometer. These two targets were investigated by divers. One was determined to be a 30-x-90-foot iron coal barge. The other target consisted of loose planking with no observable intact structure. Construction features determined that the site dated to the nineteenth century. The survey did not conclusively identify any targets as the two wrecks.

In 1981, NUMA joined with UAJV to conduct further investigations to locate the remains of the *Cumberland* and *Florida*. On the basis of information obtained from local watermen, UAJV conducted a remote sensing survey off lower Newport News (Figure 34). This survey located two potential sites: one off the Virginia Port Authority's Pier C, and another off the Horne Brother's Shipyard Pier (NUMA and UAJV 1982b). Diver investigation produced evidence supporting identification of the sites as two Civil War vessels. The site located off the Horne Brother's Shipyard contained over 135 feet of scattered hull debris, with one 121-foot section of intact hull. Hull features and dimensions, as well as the artifact assemblage, suggested that the Horne Brother's site was the CSS *Florida* (Figure 35). The vessel located off of the Virginia Port Authority's Pier C was in an advanced state of decay. Significant features noted on this wreck included a large anchor, intact decking and a long section of bilge pump pipe. A large variety of artifacts were recovered from the site, all dating to the mid-nineteenth century. The structural and cultural evidence suggested the remains were associated with the USS *Cumberland*. NUMA and UAJV recommended the vessels be nominated to the National Register of Historic Places and that more extensive investigations be conducted to positively identify the two wrecks.

Between 1983-1985, three diving investigations were conducted by the Navy Mobile Diving and Salvage Unit Two on the USS *Cumberland* site. Those dives were carried out in conjunction with the Hampton Roads Navy Museum at Norfolk. While Navy divers recovered a number of artifacts associated with the wreck, the work generated little insight into the nature and scope of hull remains at the site.

In 1986, Tidewater Atlantic Research, Inc. (TAR) was contracted by the Hampton Roads Naval Museum to conduct additional remote sensing of the remains of the two vessels. TAR conducted a detailed acoustic and magnetic remote sensing investigation of the two vessels. Analysis of the data confirmed that the *Florida* contained a high degree of structural integrity. The *Cumberland*, on the other hand, was found to be disarticulated (Watts 1987). On the basis of TAR's report, a SHARPS map was produced of the *Cumberland* site by the Hampton Roads Naval Museum and the Navy Mobile Diving and Salvage Unit Two. This effort produced a preliminary plan of the site which included the disarticulated segments of the wreck and some of the larger artifacts associated with the vessel.

A final study on the two vessels was conducted by Panamerican Consultants, Inc. (PCI) of Tuscaloosa, Alabama. PCI was contracted by Law Environmental, Inc., for the USACE, Mobile District on behalf of the U. S. Navy Atlantic Division, Naval Facilities Engineering Command. Money for the project was funded under the auspices of the Department of Defense Legacy Resources Management Program. The object of this study was to assess the current condition and integrity of the vessels and document evidence of looting and vandalism (James et al. 1994). The project also provided for the creation of a management plan for both wrecks to guide potential future investigations.

The study confirmed the nature of the integrity of the *Cumberland's* hull as observed in previous investigations. Because of the nature of the surviving remains and the wealth of historical documents recording the vessels construction, it was determined that

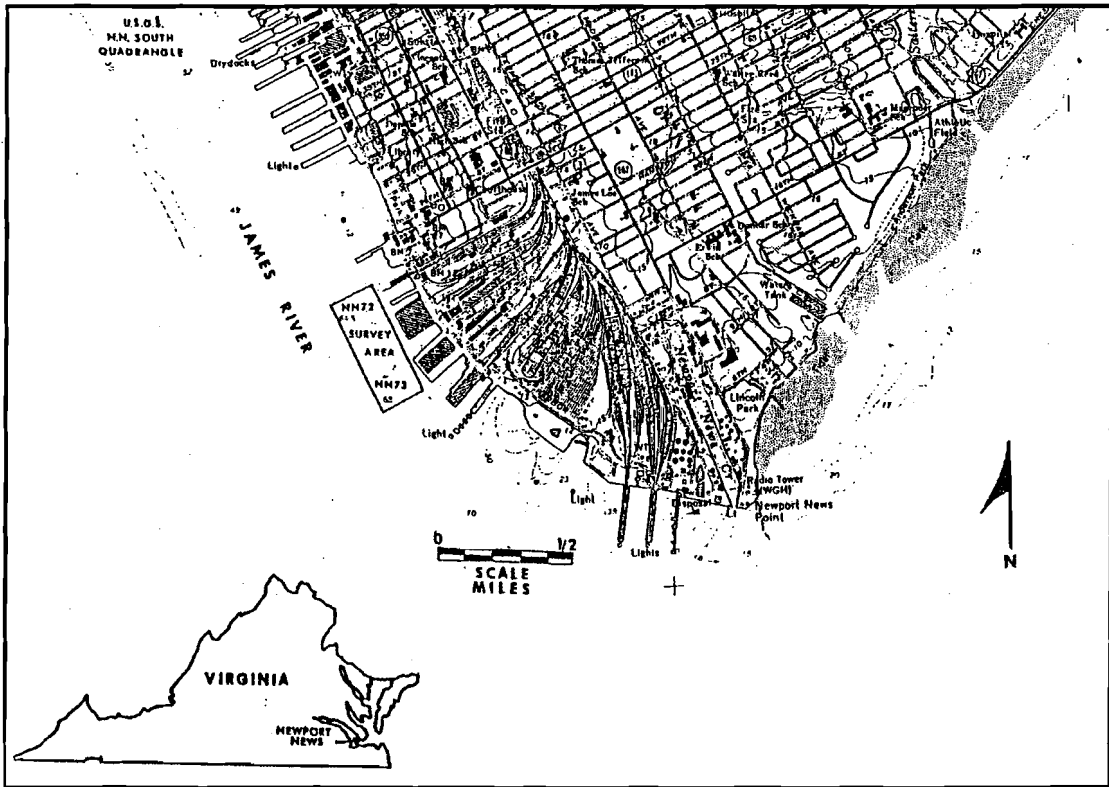


Figure 34. Location of NUMA & UAJV Hampton Roads Survey (NUMA and UAJV 1982b:n.p.).

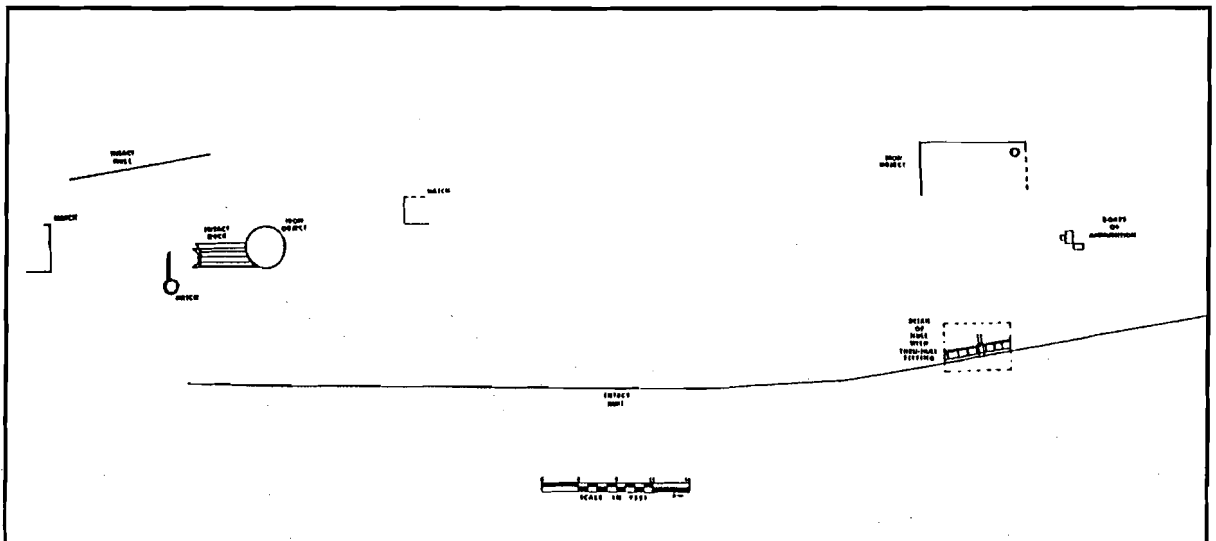


Figure 35. Site Plan of CSS Florida, N.N 72 (NUMA and UAJV 1982b:n.p.).

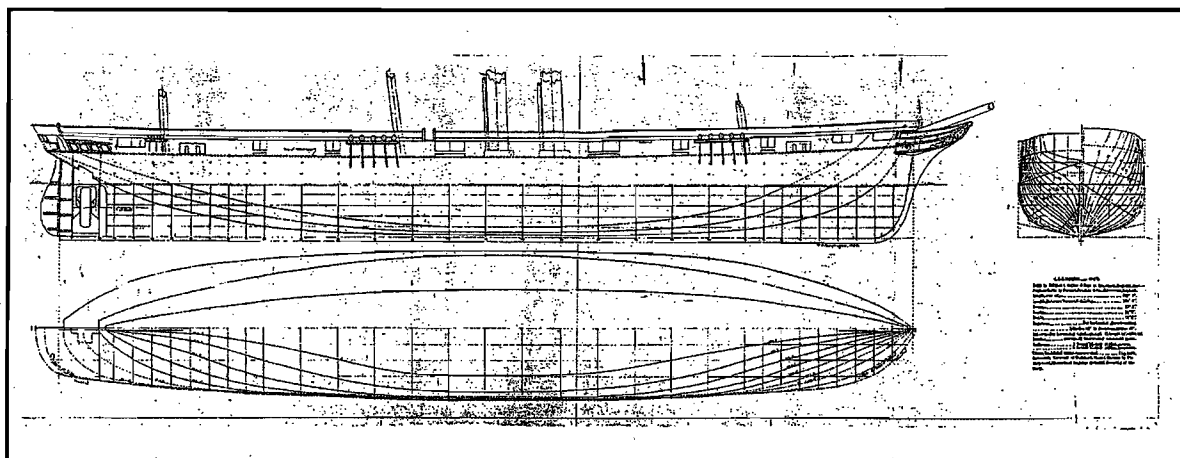


Figure 36. CSS *Florida* body, sheer and half-breadth plans produced from builders model (James 1994 et al.:47).

further archaeological investigation of the site would be cost prohibited (James et al. 1994). It was noted that while the site did not warrant further investigation, its remains were still historically significant and it was also the resting place of over 100 seamen of the U. S. Navy. As a result, a preservation plan was recommended.

Unlike the *Cumberland*, the *Florida* was recommended not only for protection, but for data recovery as well (James et al. 1994). The site was in good condition and little documentary data survives concerning the vessel's constructional history (Figure 36). Management procedures suggested for the wreck also included regulations for restricting clamming in the site area and site monitoring to assess the degradation due to environmental and man-made impacts. Since much information can be collected to enhance the scant historical record, any data recovery on the wreck should be conducted according to a detailed plan addressing a number of archaeological research questions. Finally, it was recommended that the data recovery consist of two phases; mapping to document the site and on-site excavation to collect as much material as possible.

Three underwater archaeological surveys have been conducted in the Drewrys/Chaffin Bluffs vicinity. The first was conducted by NUMA and UAJV in 1982. Portions of the James River lying directly off Drewrys and Chaffin Bluffs were surveyed using both remote sensing and diver investigation. The purpose of the survey was to locate submerged cultural resources associated with the Civil War.

The survey located three significant magnetic anomalies off Drewrys Bluff and one significant anomaly off Chaffin Bluff (NUMA and UAJV 1982a). The investigators compared target locations with a plan of the sunken ships at Drewrys Bluff drawn by submarine engineer James Maillefert in 1881. From the data collected by the historic research, remote sensing survey, diver investigation and cartographic information contained

in the 1881 Maillefert map, NUMA reported the location of what was believed to be the remains of the Confederate ironclads CSS *Fredericksburg*, CSS *Virginia II* and CSS *Richmond* and the steamer *Northampton*.

In 1986, Bruce Terrell, of the Hampton Roads Naval Museum, conducted historical research on Civil War vessels lost in Richmond (Terrell 1986). Due to flooding in the fall of 1985, the USACE proposed the construction of a floodwall along the south bank of the James River in downtown Richmond. If the proposed construction was initiated, Bruce Terrell recommended that a submerged cultural resource survey be conducted of the area. Terrell conducted background research on the James River Squadron and noted that several vessels were destroyed in the areas of the proposed floodwall. The vessels reportedly sunk in this area were of a unique design and could provide additional information on Virginia's maritime history as well as valuable data on ship construction techniques.

In 1988, MAAR Associates, Inc., under contract with Harland Bartholomew and Associates, conducted Phase I and Phase II cultural resource surveys of the Route 288 corridors across the James River for the Virginia Department of Highways and Transportation. The purpose of the study was to locate and identify resources in the flood plain and underwater portions of the proposed building area. Seventy-five cultural resources were identified during the original Phase I terrestrial survey, including 42 archaeological sites and 33 standing structures (Traver et al. 1988). An additional six sites were located during deep testing of the flood plain. Thirty-eight of the archaeological sites and seven of the architectural resources were subjected to evaluations. Of these resources, 22 of the archaeological and four of the architectural were determined to be significant and eligible for nomination to the National Register of Historic Places.

The submerged part of the field investigation consisted of a visual examination of the river bottom at the two proposed river crossings. The two survey areas were 300 feet wide and 550 and 600 feet long respectively (Traver et al. 1988). If any cultural resources were located during the inspection, a more intensive investigation was to be conducted, including limited subbottom testing to locate additional material. No resources were identified in the submerged portions of the proposed crossings.

In March 1993, the USACE, Norfolk District, conducted a remote sensing survey of proposed maintenance dredging sites between Hopewell and the Richmond Deepwater Terminal. That survey employed a Klein 500 kHz side scan sonar. The investigation identified a number of potentially significant side scan sonar targets (USACE 1993). The Norfolk District contracted with Bay Contracting, Inc. to identify the material generating these side scan sonar signatures. While most of the signatures proved to be associated with bottom surface debris, one target at Chaffin Bluff appeared to be associated with the remains of the Confederate ironclad CSS *Richmond*. Dottie Gibbens, District Archaeologist with the USAC-Mobile District, reviewed the side scan sonar records to determine if additional potentially significant targets were present. Her recommendations included diver examination of the ironclad and a second target at Chaffin Bluff (Gibbens 1993).

In 1993, a third project at Chaffin Bluff was conducted by TAR for the USACE, Norfolk District. This project involved a remote sensing and diver investigation of the two previously identified acoustic targets at Chaffin Bluff. One target proved to be a current scoured shelf in the bottom sediment. The other target contained structural material consistent with the remains of a casemate and/or upper hull of a Confederate ironclad (Watts 1993). Preliminary historic and cartographic research identified the wreckage as the remains of the CSS *Richmond* (Figure 37). Because of the likely historical significance of the remains, the site was recommended for further testing to assess the structural integrity of the vessel and determine its eligibility for nomination to the National Register of Historic Places.

Shipwreck Survey and Assessment

Shipwreck survey and assessment should be one of the highest management priorities for NHC. Wreck specific data must be generated to support management decision-making. Because the resources of NHC are not sufficient to support an extensive ongoing international program of systematic site survey and assessment, priorities for available funding must be identified both on an international, national and state specific basis.

In Virginia, there is no active state underwater archaeology program such as those that exist in states like North Carolina, South Carolina, Georgia and Florida. However, the VDHR does provide limited support for the investigation of threatened submerged cultural resources. One means of accomplishing the survey and assessment requirements of NHC would be to partner with VDHR in conducting or sponsoring annual or bi-annual investigations. With marginal funds, specific survey and assessment objectives could be accomplished by the two agencies. Where personnel and equipment represent an obstacle, agreements could be developed with university programs or Not-for-Profit organizations such as the Maritime Archaeological Historical Society (MAHS). Developing those partnerships could provide NHC with an expanded capability to respond to critical situations where resources are threatened.

Research Priorities for Survey and Assessment

The shipwrecks that fall under the management responsibility of the Naval Historical Center represent an invaluable collection of historic vessels. Through scientific investigation they can contribute significantly to a more comprehensive understanding of our maritime and naval history. While each of the database vessels preserves relevant information, some represent sources of data unavailable elsewhere. Those shipwrecks should be high priorities for protection and research. In Virginia waters priorities should include a combination of individual vessels and wreck concentrations.

The remains of naval vessels and merchant ships pressed into naval support services can provide specific insight into design and construction. Because naval ships and merchant vessels were not always built to plans or models until well into the nineteenth century,

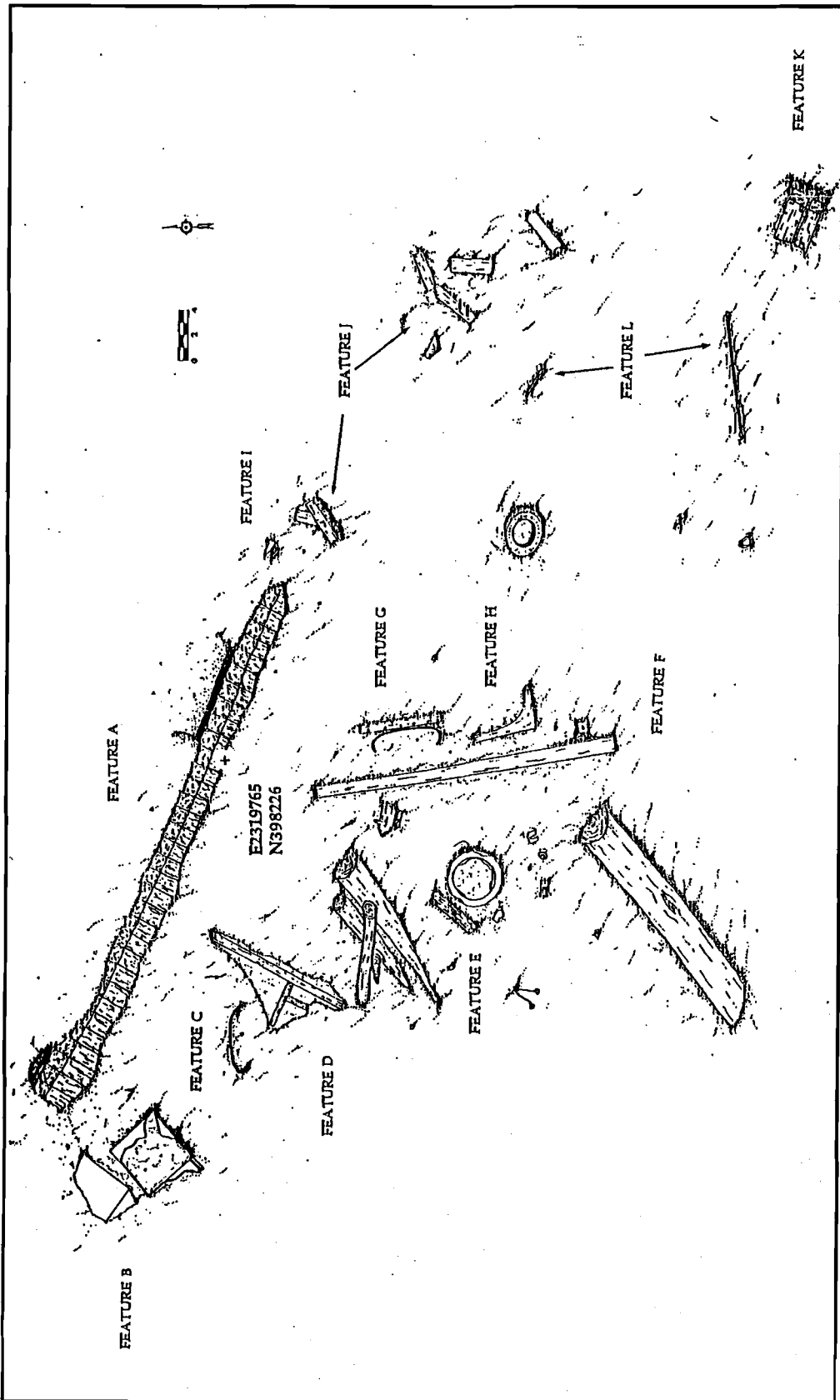


Figure 37. Site Plan of the CSS Richmond site (Watts 1993:17).

shipwrecks frequently represent our only source of technical data. In addition, vessel design and construction contracts were not always strictly followed by builders. Once afloat or during refitting, specific details of design and construction were subject to alteration to improve fighting and handling qualities and/or habitability. Analysis of surviving structural remains can provide insight into the technologies associated with construction, materials availability and preferences and shipwrights skill and attention to detail. Each shipwreck represents a highly specific source of information reflecting the complex evolution in ship architecture and construction. In Virginia, investigation of the remains of HMS *Charon* and the brig *Betsy* serve as excellent cases in point.

Naval shipwrecks are also important sources of information related to life aboard the vessel and the social, political and technological climate in which the vessel operated. Cultural material associated with the officers, crew and other personnel aboard a vessel can be found in the archaeological record associated with shipwrecks. Those data can be as generalized as the victuals and cooking hardware or as specific as the personal effects belonging to a specific officer or crew member. Military arms, ordnance and material reflect not only the technology that produced it, but the political climate in which its use was anticipated. In Virginia waters the remains of Confederate ironclads in the James River reflect the technological limitations encountered by the Confederate States Navy. The artifact assemblages associated with the CSS *Florida* and USS *Cumberland* provide insight into life aboard two distinct types of warships. USS *Cumberland* was an old sailing ship of the line and CSS *Florida* was one of the Confederate commerce raiders built in Great Britain. Ordnance associated with the remains of the USS *Cumberland* reflect the "smooth bore" technology that was being superseded by the "rifled" guns that could be preserved inside the casemate of the CSS *Richmond* at Chaffins Bluff.

In a more general sense, the location of sunken military vessels and transports often reflect the general objectives of war or the specific strategies of campaigns. Concentrations of vessels in the James River, Hampton Roads, the York River and the Pamunkey River are all factors of wartime strategy. The Chesapeake Bay and off shore location of vessels like the USS *Texas* and *Ostfriesland*, sunk as target ships, reflect peacetime evaluation of weapons system technology. The wreck locations of warships can also be as inadvertent as accidents and weather. Location of HMS *Hunter* and the French Navy frigate *Impetueux* reflect both the generality of their mission and the impact of weather.

In consideration of these and other research priorities the following wreck sites have been identified as potential priorities for survey and assessment. Where resources and interest are available, these sites should be identified and their condition assessed. All should be high priorities for protection and research.

During the Colonial Period two important vessels were sunk in Virginia waters. HMS *Elizabeth*, sunk in the James River in 1667 is clearly the earliest and one of the highest priority vessels. That English warship is the earliest Royal Navy vessel dispatched to protect the American colonies. The other seventeenth century warship is HMS *Deptford*, a 10-gun ketch wrecked on the Virginia coast in 1689. The location and condition of those wrecks

remain unknown and thus they are virtually impossible to effectively manage and protect. Location and assessment of the condition of HMS *Elizabeth* and HMS *Deptford* should be a high priority for management related research activities.

During the Quasi-War with France, the 18-gun HMS *Hunter* was lost off Cape Henry. HMS *Hunter* was one of a number of Royal Navy vessels built in Bermuda. As such it preserves an important architectural record of Bermuda-built warships. Bermuda-built vessels had a significant impact on vessel architecture in America and the HMS *Hunter* should be a priority for survey and assessment. In 1806, the French frigate *Impetueux* was driven ashore south of Cape Henry by British warships. Like vessels built in Bermuda, French frigates influenced warship construction in Britain and in America. *Impetueux* would be a valuable source of design and construction data. Both HMS *Hunter* and *Impetueux* would be readily detectable because of their ordnance.

Shipwrecks at Yorktown, Virginia represent an unparalleled collection of vessels associated with the Revolutionary War. While several have been investigated, including the brig *Betsey*, HMS *Charon* and the Cornwallis Cave vessel, not all of the area has been systematically surveyed and only six wrecks are currently on the National Register of Historic Places. Due to their association with the birth of our nation, those wrecks should be a high priority for survey, assessment and protection.

Civil War vessels represent the largest category of shipwrecks in the Virginia GIS. While each one should be considered potentially eligible for nomination to the National Register of Historic Places, some are clearly more significant than others. The largest single category is the vessels scuttled as obstructions. While they played a less dramatic role in the naval activities of the Civil War, they preserve important data concerning pre-war trade and shipbuilding. Many of the scuttled vessels represent the schooners and steamers that were the backbone of American coastal trade and passenger service prior to the secession. Because of that association each one is a valuable source of information.

Remains of the vessels of the James River Squadron should also be high priorities for research. They played a critical role in the Confederate defense of Richmond. The hull remains of the CSS *Virginia* II and CSS *Fredericksburg* have been located at Drewrys Bluff and the casemate of the CSS *Richmond* has been identified at Chaffins Bluff. However, no comprehensive investigation of those important ironclad warships has been carried out to date. That should represent a priority for research as their remains preserve an important record of Confederate ironclad design and construction. Remains of the *Richmond* may well be the most comprehensive casemate available for investigation.

The James River was equally important in association with Union efforts to capture Richmond. The area around City Point, Virginia was one of the busiest Union terminals in Virginia. Several transport vessels were lost there due to explosions caused by Confederate saboteurs. Many of the barges and canal boats that were employed to transport war materials were abandoned. Not far downstream from City Point, the U. S. Army steamer *Greyhound* was destroyed. At the time of her loss the vessel was serving as headquarters for General

Benjamin Butler. Confederate saboteurs were suspected to have been responsible for the explosion that destroyed the ship. Investigation of the Civil War vessels lost near City Point could answer many historical questions about clandestine Confederate activities.

Singularly, the remains of the USS *Cumberland* represent one of the most significant shipwrecks in Virginia waters. The *Cumberland* was one of the old navy vessels destroyed by the ironclad CSS *Virginia* on 8 March 1862. In addition to the remains of the USS *Cumberland* and the ram of the CSS *Virginia*, the site contains the remains of numerous Union sailors that were killed during that historic engagement. As a war grave, it is the most important U. S. Navy shipwreck in Virginia waters. Remote sensing surveys and preliminary reconnaissance investigation of the site suggests that much of the hull of the vessel survives below the bottom surface.

Near by the *Cumberland* lie the remains of the CSS *Florida*. CSS *Florida* was the first purpose built commerce raider launched by the Confederate States Navy. After being captured in Bahia, the *Florida* was rammed and sank at Hampton Roads before it could be returned to Brazil. Remote sensing and preliminary surveys of the site suggest that much of the hull and machinery of the vessel survives at the site. Artifacts from the wreck suggest that much of the cultural material aboard the ship at the time it was captured remains aboard. The remains of the *Florida* appear to represent the most intact example of a Confederate commerce raider. As such the site preserves an invaluable record of design and construction in addition to insight into life aboard that class of warships.

Virtually nothing has been done to locate, identify and assess the condition of dozens of wrecks in the Pamunkey River. Those vessels are associated with Confederate supply and Union efforts to attack Richmond in 1862. Unlike warships, those wrecks represent commercial vessels pressed into service as transports and supply ships. They represent the antebellum commercial marine that maintained American commerce. If relatively well preserved, they could reveal very important design and construction data associated with antebellum schooners. Schooners represent perhaps the most common and most important elements of our merchant marine. In terms of survey and testing, those vessels should be one of the highest priorities.

At Trents Reach on the James River a flotilla of canal boats were scuttled as obstructions. Like the schooners scuttled in the Pamunkey River, those wrecks could provide insight into the design and construction of a unique class of vessel. Canal boats were specifically designed and built to operate on the complex of canals that were one of the highest American navigation priorities of the first quarter of the nineteenth century. Canals became one of the most popular and economical means of moving freight prior to the development of railroads.

Although less important as sources of information, shipwrecks of the modern period can also contain interesting design and construction information. The remains of several torpedo boats could provide insight into the evolution of small offensive craft. Submarines, submarine chasers and other warships from the twentieth century are well documented but

could serve as important outlets for divers interested in avocational archaeological research. An inventory of those wrecks that are suitable for public access and agreements with organizations such as the MAHS could encourage education and conservation.

Threats to Navy-managed Shipwrecks in Virginia Waters

There are a variety of potential threats to Navy-managed shipwreck sites Virginia waters. Those threats vary in intensity and can be attributed to a variety of different sources. All need to be considered prior to identifying impacts to any individual site. While environmental conditions can represent a dynamic and continuous source of change on shipwreck sites, the most adverse impacts are manmade.

Nature is the most constant and unpredictable threat to submerged cultural resources. Virginia's rivers and coastal areas are high-energy environments that have tidal variation of approximately 3 to 5 feet. Rivers are subjected to significant flooding at various times. Hurricanes can disturb the sea bottom to a significant depth in both the Chesapeake Bay and offshore Atlantic Ocean.

The forces of nature can change the path of a river, causing the build up of sediment over submerged cultural resources, which in turn protects them. In deep water, currents associated with tidal forces can cause scouring around submerged cultural resource sites, eventually destroying them. Sites located along the shorelines are also extremely vulnerable to erosion, whether natural or man-made. Consequently, once exposed, many shoreline sites have been lost to erosion. Erosion can represent a significant threat to vessel remains either on shore or in shallow coastal waters along the Atlantic and inside the Chesapeake Bay. However, without specific environmental information, the site specific impacts of erosion are virtually impossible to quantify.

Hurricane and winter storms can have very little or dramatic impacts on submerged cultural resources. The nature and scope of that impact may be related to the intensity and speed of the storm, the depth of water at a site and the unobstructed fetch. Hurricanes in Bermuda in 1988 and 1998 interrupted shipwreck excavations undertaken by the Program in Maritime History and Underwater Archaeology for the Bermuda Maritime Museum. When the storms had passed virtually no impact was observable on sites within the reefs that ranged in depth from 18 to 22 feet. However, hurricane Hugo moved the remains of a 450-foot ship sunk as an artificial reef in water 90 feet deep more than a quarter of a mile (Wilbanks 1990, pers. comm.).

Storm related changes in current patterns and surface dynamics have exposed and moved historic shipwreck remains in shallow coastal waters off the North Carolina Outer Banks. In 1977, the forward section of the hull of a large vessel was uncovered off shore of Nags Head, North Carolina. That section of wreck structure was washed ashore by one storm and subsequently refloated by another four months later. After migrating more than 26 miles south along the Outer banks the wreck was redeposited at Oregon Inlet (Bright 1993:92-93).

The impact of hurricanes and nor'easters on the coastal environment has been well established. Unfortunately there is little, if anything, that can be done to mitigate those impacts. Only the comprehensive scientific investigation and/or recovery of highly significant shipwreck sites in exposed areas represent an effective means of protecting resources from environmental dynamics.

While little scientific information exists, the adverse impact of riverine channel migration has been observed on several of the Revolutionary War shipwrecks at Yorktown (Broadwater 1996, I:41). While channel migration generally represents a slow but constant change, upland storm related flooding represents a more dramatic impact. At flood stages the volume and speed of water in river channels increases significantly. Historic vessel remains can be exposed and moved. The wreck of the CSS *Chattahoochee* was found to have moved from a documented location near the mouth of Broken Arrow Creek in 1871 to a different location more 400 feet downstream by 1985 due to environmental conditions in the river (Watts et al. 1990:6). Like weather threatened sites offshore or in the bay, the only effective way to protect shipwreck sites in riverine environments is by comprehensive scientific investigation and/or recovery.

Although environmental threats are beyond our ability to control, human activities represent a more potent threat to shipwreck resources. One of the most significant impacts is associated with safe navigation. Since the Colonial Period, efforts have been made to improve navigation associated with port facilities. By the first quarter of the nineteenth century that became a priority for the United States Government as well as the individual states. The size and draft of vessels increased dramatically as the nineteenth century progressed and efficient steam powered mechanical dredges were developed to clear, deepen and realign channels to accommodate that increased capacity. In the twentieth century, expanding navigation channel requirements were accomplished by rapidly expanding dredging technology. As the distribution of historic shipwrecks generally reflected the origin of modern patterns of navigation, the shipwreck related impact of improvements was frequently highly destructive. The remains of the CSS *Georgia* provide an excellent documented case in point. Salvage and improvements to the Savannah River navigation channel have virtually destroyed the remains of that Confederate ironclad (James and Watts 2004).

Clearing, deepening and widening navigation channels can also accelerate scouring in and around submerged cultural resource sites. In Virginia, the best example of the impact of these activities can be found on the James River. Aside from the Chesapeake Bay and Elizabeth River, that waterway represents the most important ship channel in Virginia. It is also possibly the most important in terms of shipwrecks under Navy jurisdiction.

Ship traffic can also have an adverse affect on submerged cultural resources along narrow channels. Propeller wash from large commercial vessels can rapidly scour and degrade a fragile submerged cultural resource. The remains of a small nineteenth century schooner known as the Hilton Wreck were significantly degraded by vessel traffic in the Northeast Cape Fear River at Wilmington, North Carolina (Watts 1994:7). However, other evidence

indicates that this is not always the case. The proximity of the casemate of the CSS *Richmond* to the navigation channel provides a case in point. During an investigation in 1993, propeller wash associated with the passage of large vessels was observed to have only nominal impact on sediment covering the wreck site (Watts 1993:34). On-site observations during investigation of the remains of the CSS *Georgia* also indicate that the passage of large vessels does not pose a threat to vessel remains in the vicinity of navigation channels (James and Watts 2004).

Improvement of the navigational channels can also have a positive effect. For example, excavating the Dutch Gap cut-off has probably had a positive affect on the important Revolutionary War wrecks at Trent's Reach on the James River. Since excavation of the cut-off, the old navigational channel has been abandoned. Sediment that has filled that area in the absence of maintenance dredging activity has most likely sealed those wrecks within layers of mud that assure indefinite preservation.

Today, navigation improvements and potentially destructive construction projects must be reviewed to assess their impacts on submerged cultural resources. That provides agencies responsible for the management and protection of submerged cultural resources with an opportunity to require surveys to identify resources in the project area. The 106 Review Process affords a high degree of protection for potentially significant shipwreck sites. Any project for such activities as channel maintenance and improvement; bridge, tunnel or port construction; pipeline and cable laying; marina and bulkhead construction and outfall construction required a Section 106 Review.

The principal agency in conducting and/or permitting bottom disturbing activities is the USACE. In Virginia, the Norfolk District has taken a proactive role in submerged cultural resource management. In addition to contracting for and requiring surveys to identify and assess potential construction project impacts of submerged cultural resources, the Norfolk District has developed a GIS and HARP for Hampton Roads and the James River. Those two areas and the Elizabeth River are the focus of the majority of USACE developmental activity in Virginia.

Vandalism constitutes another threat to Virginia's submerged cultural resources. Many of the most important wrecks lie in shallow waters within easy reach of the diving public. Since the lure of souvenirs is a strong attraction, many wreck sites are damaged or destroyed. Relic hunters often use highly destructive techniques. There have been numerous unconfirmed reports that relic hunters have pillaged Civil War and other shipwrecks along the James River. In 1994, relic hunters who recovered artifacts from the USS *Cumberland* and the CSS *Florida* both sunk in Hampton Roads were prosecuted. Unfortunately, the resources and personnel available to provide surveillance are limited. Unless vandalism is brought to the attention of state and federal agencies with management authority, those activities are rarely detected.

Archaeological investigation can also contribute to the destruction of submerged sites. Even when an archaeological investigation has been designed to minimize impact on a submerged cultural resource, excavation can expedite deterioration. When a vessel has been buried beneath the bottom surface, the deterioration rate slows due to the lack of oxygen and the stability of the environment. The anaerobic environment hinders the growth of microorganisms that destroy underwater materials. When the wreckage becomes exposed, the deterioration rate begins to accelerate and water column dynamics increase pressure of exposed structure. Therefore, it is the responsibility of the researcher to incur as little damage to the site as possible.

Salvage operations are one of the most destructive actions imposed upon historic shipwrecks. Parties interested in salvaging a vessel or its cargo are often unconcerned with the vessel's historic value. The use of cutting tools and explosives can completely destroy a vessel and eliminate any possibility of recording the archaeological record preserved in the vessel's remains. Salvage activity on those remains identified as the Spanish frigate *La Galga* completely exposed the site before the MAHS forced the issue of ownership into court and the vessel was declared the property of the Spanish Government (221 F.3d 634 [4th Cir. 2000]).

Submerged Cultural Resource Legislation and Regulations

Federal legislation pertaining directly or indirectly to archaeological and historic resources spans a period of more than 80 years. Taken as a whole, this legislation shows a steady trend toward placing responsibility for preserving and conserving the nation's archaeological and historical heritage under the umbrella of Federal control.

The Antiquities Act of 1906 (16 U.S.C. 433)

The 1906 Antiquities Act establishes the Federal Government as the protector of archaeological and historical sites and objects. It also mandates the government to work actively for the preservation of cultural resources and for the public's access to them. This legislation has served as the basic guideline for most state regulatory legislation. The act also provides for a system of permits, obtained from the chief archaeologist of the National Parks Service, which allow for scientific investigation of specific sites, provided artifacts from the investigation are preserved in a public museum. It also provides for a system of fines (and imprisonment) for unauthorized excavation, removal of objects and/or vandalism of an archaeological or historical site situated on government lands.

Historic Site Act of 1935

The 1935 Historic Site Act declares as national policy the government's interest in the preservation of historic sites, buildings and objects that are of national significance. The act directs the National Park Service to investigate and assess historical and archaeological sites,

and provides the basis for the National Parks Service's archaeology program. This act extends the Antiquities Act of 1906 by charging the National Parks Service with a nationwide responsibility, which is in no way restricted to areas owned by the federal government or impacted by federal government activities.

Submerged Lands Act of 1953

The Submerged Lands Act of 1953 affirms state ownership of all constantly submerged land within the individual states' navigable bodies of water. The term "submerged archaeological historic property" under Section 54-7-620 of the act means "any site, vessel, structure, object or remains which: yields or is likely to yield information of significance to scientific study of human prehistory, history or culture and is embedded in or on submerged lands and has remained unclaimed for fifty years or longer." This term includes, but is not limited to, abandoned shipwrecks and their contents, as well as individual assemblages of historic or prehistoric artifacts.

Reservoir Salvage Act of 1960

The 1960 Reservoir Salvage Act extended the Historic Sites Act of 1935. It directs that attempts will be made to recover historical and/or archaeological information that will be affected by the construction of any dam by a federal agency.

Historic Preservation Act of 1966 (16 U.S.C. 470)

The 1966 Historic Preservation Act provides for an expanded National Register of Historic Places and encompasses local, state and regional sites of significance. This act provides matching funds to state and local governments to conduct surveys and develop preservation plans for specific projects that are designed to protect or preserve sites of significance in American history. The legislation requires states to survey culturally significant sites, designate a liaison officer for the state's archaeological program and establish a state review committee to recommend sites to the National Register. In addition, the act provides grants to the National Trust for Historic Preservation and establishes matching grants to encourage states to obtain and preserve sites on the National Register. Contained within the act is a specific statement prohibiting the use of Federal authority to adversely affect sites listed on the National Register if alternatives are feasible.

National Environmental Policy Act of 1969

This act states, as a matter of federal policy, the responsibility of the Federal Government to preserve important historical, cultural and natural aspects of our national heritage. One of its most significant aspects is the requirement that all government programs and projects must formulate an environmental impact analysis that encompasses an examination of the historic, archaeological and cultural data affected.

Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469)

This act was passed to further the policy set forth in the 1935 Historic Site Act. It specifically addresses the impact of dam construction projects on historic American sites, buildings, objects and antiquities of national significance. When notified of the potential destruction of cultural resources by construction related activities, the Secretary of the Interior is authorized to initiate survey activities designed to identify those resources and recover data critical to preserving architectural, historical and architectural heritage.

Archaeological Resource Protection Act of 1979 (16 U.S.C. 470aa)

This act establishes regulations concerning the necessity of resource preservation. It requires surveys to determine the potential archaeological value of a site considered for development. This survey and ancillary work must meet specific federal guidelines. The act also identifies certain portions of every agency budget that can be allocated for archaeological research.

Theft of Government Property (18 U.S.C. 641)

This act covers the theft of money, property or records from the United States Government. It identifies classifications of property and the fines and/or sentences to be imposed for violation of the law.

Documents, Historical Artifacts and Condemned or Obsolete Combat Material: Loan, Gift or Exchange (10 U.S.C. 2572)

This act provides an outlet for lending and/or gifting condemned or obsolete military related items to appropriate institutions or organizations. It defines the nature and scope of the loan or gift and the types of groups that may participate in the program.

Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101)

This act asserts the Federal Government's title to any abandoned shipwreck that meets criteria for inclusion in the National Register. It stipulates that title to these shipwrecks will be transferred to the states in whose waters they lie, thus removing them from the jurisdiction of the Federal Admiralty courts. Incumbent on the states is the responsibility to formulate a plan to manage the wrecks that follow the guidelines established by the Advisory Council on Historic Preservation. These guidelines address the need to allow access to the sites by the general public while preserving the historical and environmental integrity of the site for scientific investigation. The act specifically calls for the establishment and management of underwater parks for the purpose of providing such protection.

Archaeological Resources Protection Act Final Uniform Regulations (32 CFR 229)

This regulation defines the process and requirements for issuing permits for investigation of archaeological resources on Federal land. It defines the nature and scope of permits and the information required to obtain permission for archaeological investigations.

Protection of Historic Properties (36 CFR 800)

This section of the National Historic Preservation Act requires Federal agencies to be accountable for the impacts of their activities on historic properties. It identifies the 106 process requirements, participants, standards and alternatives. The 106 process is possibly the most important regulation in cultural resource identification, protection and management.

Secretary of the Interior's Standards for Historic Preservation Projects (36 CFR 68)

This regulation identifies the Secretary of the Interior's Standards for Historic Preservation Projects. While it is focused on historic structures, appropriate standards have been applied to historic vessels.

Abandoned Shipwreck Act Guidelines (55 FR 50116)

The Abandoned Shipwreck Act Guidelines were prepared by the National Park Service to provide advice to state and Federal agencies on issues related to the management of shipwrecks under their ownership or control. The guidelines cover ten subjects that define areas of responsibility associated with shipwreck identification, protection, management and public involvement. Those areas are: State Programs, Federal Programs, Funding, Surveying, Documenting, Recovery, Public Access, Interpretation, Volunteers and Underwater Parks.

National Register of Historic Places (36 CFR 60)

Part 60 of Title 36, Code of Federal Register addresses the authorization and expansion of the National Register. The National Register was established to identify and provide protection for elements of the Nation's cultural resources that merit preservation and protection.

Determinations of Eligibility for Inclusion in the National Register of historic Places (36 CFR 63)

Part 63 regulations were developed to assist Federal agencies in identifying and evaluating properties for inclusion on the National Register. It provides guidelines for obtaining determinations of eligibility under Executive Order 11593 and defines regulations of the advisory Council on Historic Preservation.

Recovery of Scientific, Prehistoric, Historic and Archaeological Data (36 CFR 66) - Draft

Part 66 of Title 36 is a draft document setting guidelines for locating and identifying historic properties containing scientific, prehistoric, historical or archaeological data. This document contains identical information as those required for identifying properties eligible for the National Register of Historic Places pursuant to section 106 and was prepared separately only for the convenience of Federal agencies and other users.

Curation of Federally-Owned and Administered Archaeological Collections (36 CFR 79)

These regulations establish definitions, standards, procedures and guidelines to be followed by Federal agencies to preserve collections of prehistoric and historic material remains, and associated records, recovered under authority of the Antiquities Act (16 U.S.C. 431-433), the Reservoir Salvage Act (16 U.S.C. 469-469c), Section 110 of the national Historic Preservation Act (16 U.S.C. 470h-2) or the Archaeological Resources Protection Act (16 U.S.C. 470aa-mm).

Protection and Enforcement

The State Historic Preservation Officer, the Virginia Institute of Marine Science and the Virginia Marine Resources Commission protect the Commonwealth's submerged historical and archaeological resources as mandated by Virginia Code §10.1-2214(B). Underwater historic property is defined as "...any submerged shipwreck, vessel, cargo, tackle or underwater archaeological specimen, including any object found at underwater refuse sites or submerged sites of former habitation, that has remained unclaimed on the state-owned subaqueous bottom and has historic value as determined by the Department" §10.1-2214(A).

In addition,

"It shall be unlawful for any person, firm or corporation to conduct any type of recovery operations involving the removal, destruction or disturbance of any underwater historic property without first applying for and receiving a permit from the Virginia Marine Resources Commission to conduct operations pursuant to §62.1-3. If the Virginia Marine Resources Commission, with the concurrence of the Department and in consultation with the Virginia Institute of Marine Science and other concerned state agencies, finds that granting the permit is in the best interest of the Commonwealth, it shall grant the applicant a permit. The permit shall provide that all objects recovered shall be the exclusive property of the Commonwealth.

Permits shall provide the applicant with a fair share of the objects recovered, or at the discretion of the Department, a reasonable percentage of the cash value of the objects recovered to be paid by the Department. Title to all objects recovered under contract are retained by the Commonwealth, unless or until, they are released to the permit

applicant by the DHR. All recovery operations undertaken pursuant to a permit issued under this section shall be carried out under the general supervision of the Department and in accordance with §62.1-3 and in such a manner that the maximum amount of historical, scientific, archeological and educational information may be recovered and preserved in addition to the physical recovery of items. The Virginia Marine Resources Commission shall not grant a permit to conduct operations at substantially the same location described and covered by a permit previously granted if recovery operations are being actively pursued, unless the holder of the previously granted permit concurs in the grant of another permit" §10.1-2214(C).

In Virginia, the navigation channels that are maintained by the USACE fall under the jurisdiction of the Norfolk District. That agency is responsible for insuring that its activities do not adversely impact submerged cultural resources without proper mitigation. It is also responsible for insuring the protection of submerged cultural resources that might be impacted by and development and maintenance activities that fall under their permit jurisdiction. In order to maintain compliance with Federal legislation and regulations concerning the identification and protection of submerged cultural resources, the Norfolk District has an agreement with the USACE, Wilmington District for archaeological expertise.

The State Preservation Officer does not physically enforce laws; he or she works in conjunction with federal and state law enforcement agencies. Under Federal law the U. S. Navy, USCG, USACE and NPS are mandated with responsibility to enforce Federal laws. The Attorney General and state law enforcement agencies such as the State Highway Patrol, County Sheriffs Department, Department of Natural Resources, local police and the Ports Authorities, are also empowered to enforce laws concerning submerged cultural resources. The Department of Natural Resources, which controls submerged bottom lands, works in conjunction with Virginia's Attorney General to enforce the Commonwealth's laws, as well as answer legal questions pertaining to current legislation and regulations set forth by both Federal and state agencies.

The remains of U. S. Navy vessels and other shipwrecks in Virginia waters that are the management responsibility of the U. S. Navy are Federal property. As such, those wrecks do not fall under the permit system established by the State of Virginia. Permits for research on U. S. Navy vessels and other shipwrecks that are the management responsibility of the U. S. Navy are issued by the Naval Historical Center. Personnel from the Naval Historical Center are also charged with the responsibility for supervising permitted research projects.

Section 106 Survey and Assessment Requirements

It is important that a set of procedures be developed to guide submerged cultural resource investigations in order to ensure that those resources are identified and properly documented prior to the initiation of any activities, which may disturb the bottomlands of Virginia. These procedures should be designed to meet the minimum requirements necessary to satisfy Federal and state legislation protecting submerged cultural resources. Given the nearly 400 years of documented activity on the waterways of Virginia, the potential for intact

shipwrecks or water related structures in any unsurveyed or undisturbed areas of the river should be considered very high. As a consequence, a set of guidelines should be developed which encompass historical research, remote survey (Phase I), assessment (Phase II) and data recovery (Phase III). Sufficient data should be collected to identify resources, which may be eligible for inclusion in the National Register of Historic Places.

Historical Research

Documentary research is an important element for assessing the probability of encountering submerged cultural resources at specific sites. Historical records have recorded the location of many shipwrecks, wharves, landings and plantations along the waterways of Virginia. The level of submerged cultural resource investigation should govern the intensity of research to be undertaken.

Phase I documentary research should involve developing the historical context of the project area from prehistoric times to the twenty-first century. This research should be broad in scope and incorporate discussions of social, economic, architectural, technological, ethnic and other historical and cultural trends that would have been contributing factors in the loss of vessels or presence of other submerged cultural material in the vicinity of the project area. That research should also consider the effects of earlier construction related activities nearby submerged cultural resource sites.

Historical research for Phase I archaeological investigations should include an examination of general and/or specific secondary histories of the region, reports of previous historical and archaeological investigations in the area and historic maps, atlases, photographs and navigation charts. The SHPO should be contacted to determine if any previously identified sites are located in the project area and if so inquire whether any have been listed on the National Register of Historic Places. Finally, interviews with local watermen, the family members or descendants of watermen and the local diving community should be conducted to solicit their assistance in generating project specific cultural resource data.

The purpose of Phase II documentary research is to identify potentially significant submerged cultural resources that have been located during Phase I investigations and determine their potential National Register of Historic Places eligibility. This research should provide an in-depth study of the historic use of the cultural resource, information concerning constructional and technological developments and if possible, social, economic and ethnic affiliations of the resource. Data collected should be used to develop the cultural resource's importance according to the criteria established for determining National Register of Historic Places eligibility.

Historical research for Phase II archaeological investigations should include documents not previously reviewed during Phase I investigations. Primary documents such as naval records, admiralty records, ship manifests, city directories, insurance claims or other public and/or private records should be consulted. Historic maps, atlases, photographs and navigation charts should also be consulted. Secondary literature research should concentrate

on gathering pertinent data concerning the historical and cultural contexts of the identified site in order to address its significance and National Register of Historic Places eligibility in detail.

Documentary research for Phase III activities should be concerned with developing criteria for formulating hypotheses to guide the investigation and help define suitable excavation strategies. Primary and secondary literature research should focus on material not collected during previous phases of investigation and concentrate on resource specific information that may aid in answering the questions proposed in the research design. A summary of all previous research conducted to date should also be included.

Phase I - Remote Sensing

The purpose of the Phase I survey is to determine whether or not submerged cultural resources exist in the project location, to document their location and to provide information on the testing strategies required for a Phase II survey. The methodologies used should be rigorous enough to make it highly probable that all sites within the survey area will be detected. For locating submerged cultural resources in harsh underwater environments, remote sensing should be conducted in a systematic fashion with the latest remote sensing technology. These surveys should include magnetic, acoustic and subbottom instruments, interfaced through a navigation program with a highly accurate positioning system. Conducted in this fashion remote sensing data can identify specific targets that possess the characteristics indicative of submerged cultural resources. While remote sensing surveys usually cannot positively identify submerged cultural resources, when used in conjunction with historic research and target assessment activities, remote sensing can identify exact locations for further investigation.

Magnetometers determine the presence of ferrous materials on and beneath the river bottom's surface. Towed from a small boat, a magnetometer capable of sampling once a second with a one-gamma resolution can locate small ferrous objects such as iron fasteners and hardware. Since most historic vessels were constructed of wood with iron used only for fasteners and hardware, a properly conducted magnetic survey with a high quality magnetometer is essential for locating the remains of wooden shipwrecks. Once collected, magnetic data can be contour plotted to facilitate target analysis and locate targets between remote sensing survey lanes.

The use of high quality side scan sonar can locate small objects exposed on the river bottom. Researchers can then analyze that data for characteristics indicative of submerged cultural resources. The data recorded by a side scan sonar can be accurate enough to determine the nature of a submerged cultural resource, but in most circumstances, the data only determines the presence of a foreign object on the river bottom.

Subbottom profilers use acoustics to profile the sediment layers underneath the river's bottom surface. Used in a systematic fashion, a subbottom profiler can locate stratigraphic features indicative of significant submerged cultural resources. Analysis of the data collected by a subbottom profiler can identify targets with the characteristics found in association with inundated terrestrial archaeological sites and with shipwrecks.

Navigation and data collection should be controlled by a sophisticated hydrographic software program and a highly accurate positioning system. The positioning system should have an accuracy of ± 3 feet and be used to generate coordinates for the computer navigation system. All magnetic and acoustic records should be tied to positioning events generated by software programs. Positioning data generated by the navigation system should be tied to magnetometer records by regular annotations to facilitate target location and anomaly analysis. Annotations should include lane number, date, time of start and end of each lane and target identification.

The remote sensing data should then be analyzed to detect target signatures suggestive of significant submerged cultural material. That analysis should include, but not be limited to, anomaly intensity, duration, areal extent, contrast with background, target elevation and possible relationships between targets. Analysis of each target signature should include consideration of magnetic and acoustic signature characteristics previously demonstrated to be reliable indicators of historically significant submerged cultural resources. Assessment of each target should incorporate recommendations for additional investigation to determine the exact nature of cultural material generating the signature and potential National Register of Historic Places significance. A magnetic contour map of the study area should be produced to aid in the analysis of each target. All targets should be listed and described and a map produced showing their location, in UTM and State Plane coordinates, within the project area.

Phase II - Target Assessment

Since remote sensing surveys cannot usually determine the age or significance of a target generating a particular signature, target identification and assessment is essential. This activity includes analyzing remote sensing data for targets suggestive of submerged cultural resources and physically examining the object lying on or below the river bottom. Evaluation of anomalies located during remote sensing should include a precise and thorough description of the anomaly as it exists on the bottom including a record of its dimensions, structural components, artifacts and other materials observed in it and nearby. In locations where the resource has been determined to lie below the bottom surface a grid should be deployed and the area systematically examined with probes. Where probing identifies near surface subbottom material, hand fanning and limited excavation should be employed to remove overburden and expose diagnostic material. Deeper subbottom material should be exposed using an induction dredge. Structural material and associated artifacts should be mapped using triangulation or other mapping techniques and recorded using three dimensional mechanical drawings and photographs where visibility permits.

Assessment of the target should be designed to identify the type of cultural material present and provide a reliable dating context. In addition to identification and dating, efforts should be made to establish and assess the nature and significance of the associated archaeological record. Attention should focus on on-site preservation, disturbance of the site, environmental conditions and research potential. On-site research should be designed to collect sufficient data to support a preliminary assessment of National Register of Historic Places eligibility.

Phase III - Data Recovery

Once a submerged cultural resource site is eligible for inclusion on the National Register of Historic Places, the best course of action is to avoid the site so that it is not impacted. A program of avoidance needs to include a complete assessment of all threats and potential impacts to a site. Avoidance plans should include a program of site monitoring to ensure that other disturbance activities do not impact the site.

Submerged cultural resources are finite and extremely valuable. While avoidance is the best way to prevent submerged cultural resources from being disturbed, avoidance plans should include a program of site documentation to ensure the survival of a particular site's critical information. If avoidance is not possible, documentation should be undertaken. While site documentation does not need to recover all the data at the site, as much information as possible should be gathered from the site without extensive disturbance. Site documentation should include a detailed plan of a particular site, a determination of National Register of Historic Places eligibility and a thorough evaluation of the sites integrity and the amount of effort that it would require to recover all data from the site.

When avoidance of an archaeological resource on or eligible for inclusion in the National Register of Historic Places is not possible and project related activities will adversely impact that resource, mitigation through data recovery may be deemed necessary. Data recovery from a site includes developing a research design which will recover all the data which makes the site significant and eligible to the National Register. Previous investigations, funding and time constraints usually play a significant role in determining the level of mitigation to be taken on an archaeological resource. Therefore, that level of research should be predetermined by the development of a research design that satisfies federal and state legislation concerning archaeological resources.

The research design will determine the excavation methodology: total excavation of the resource, excavation of half of the resource or block excavation of significant features and stations to record the profiles of the wreck. Once this methodology has been determined, a baseline should be established to guide excavations. Overburden should be systematically removed from the wreck by hydraulic dredges. Each dredge should be equipped with discharge strainers to collect small artifacts. Artifacts should be mapped *in situ* and loose structural material may be recovered for documentation on the surface. All exposed interior structures should be recorded using measured drawings. Particular attention should be directed toward key structural components of the wreck, such as bilge ceiling, frames, floors, the keelson, stringers, mast steps, sternpost, stempost, rudder and machinery. Profiles of the

hull should be recorded at measured intervals using a leveled measuring bar with a series of adjustable rods tied into the baseline. All data should be entered into a computer for the development of a three-dimensional site plan of the wreck and associated artifacts.

In addition to documentation of all structural remains, on-site investigation should be designed to record all loose wreck structure as well as artifacts. Disarticulated pieces of the wreck structure that might be associated with the vessel may be recovered for documentation and returned to the wreck for reburial. Significant artifacts may be recovered and documented on board the surface support platform. Those artifacts that merit conservation should be stored wet for transportation to conservation facilities immediately after they have been processed and recorded. All material not selected for conservation should be returned to the site for reburial following documentation. After conservation, all materials should be turned over to the proper agency or institution for permanent curation.

If data recovery is the course of action, resource recovery needs to be completed in conjunction with data recovery operations prior to site disturbing activities. Resource recovery can range from recovery of artifacts associated with a particular site to recovery of an entire vessel structure. The level of recovery efforts must be determined on an individual basis. In determining the level of artifact and/or feature recovery, criteria such as the significance of an item and the number of existing examples needs to be considered as well as the state of preservation of the object or objects.

Preserving artifacts and/or structural material from an underwater archaeological site entails an expensive and time-consuming undertaking. Cultural resources deposited in a marine environment begin to deteriorate rapidly. Burial in sediments, however, tends to stabilize the deterioration process, but when disturbed, the process begins again at an accelerated rate. Therefore, creating a recovery and conservation plan should be part of all data recovery and resource recovery operations. As conservation is extremely expensive, the recovery plan should include very specific plans for artifact conservation and should also consider all possible preservation options.

The Geographic Information System

A GIS is a system of hardware and software used for storage, retrieval, mapping and analysis of geographically referenced data. Practitioners also regard the total GIS as including the operating personnel and the data that go into the system. Spatial features are stored in a coordinate system (latitude/longitude, state plane, UTM, etc.), which references a particular place on the earth. Descriptive attributes in tabular form as well as other sources of information are associated with spatial features. Spatial data and associated attributes in the same coordinate system can then be layered together for mapping and analysis. GIS can be used for scientific investigations, resource management and planning development.

GIS differs from CAD and other graphical computer applications in that all spatial data is geographically referenced to a map projection in an earth coordinate system. For the most part, spatial data can be “re-projected” from one coordinate system into another, thus data from various sources can be brought together into a common database and integrated using GIS software. Another property of a GIS database is that it has “topology,” which defines the spatial relationships between features. The fundamental components of spatial data in a GIS are vector data (including points, lines [arcs] and polygons) and raster data (including scanned maps, charts and other images).

Cartography

The first objective was to create the geo-referenced base map that would be the foundation of the NHC/VA GIS. As the state of Virginia is split into two different UTM zones and two different state plane coordinate system areas, it was decided to use geographic coordinates (latitude and longitude) for the base map projection and subsequent wreck site location identification. For other agencies that wish to project the data into other GIS projects with different coordinate systems, the geographic coordinates were converted to both state plane feet (NAD83) and UTM meters (NAD83) using Corpscon for all the vessels in the database.

Vector base map data depicting political borders (state, county, parks, forests, reserves and city limits), roads, bridges, openwater, swamp and streams was obtained from the Virginia Department of Transportation (VADOT) in their September 1999 Virginia County Map Series and September 2001 Network Level Basemap coverages. The data provided by the VADOT was organized by county. This individual county data was synthesized into several thematic coverages for the project area. The NHC/VA GIS displays this vector base map data until a zoom scale of 1:90,000 is reached.

DeLorme Xmap 3.5 was used to display 3-dimensionally shaded relief geo-referenced USGS 1:24000 quad sheets. Each individual quad sheet was exported from Xmap 3.5 as a geotiff under its original name. The quads were exported with a resolution of 2.39 meters per pixel. This gave good image quality with reasonable file size. These geotiffs were then imported into the NHC/VA GIS as separate themes. These raster images are used at higher zoom levels, greater than 1:90,000, for enhanced detail in the base map and to allow the user to print the map or easily plot the wreck location on a paper map that can be transported into the field. These quad sheets are arranged in the GIS from West to East and North to south (Figure 38).

Database Development

Concurrently with base map generation, researchers and historians began construction of a wreck inventory and information cataloging system. Preliminary data was supplied by the NHC from their database of known U. S. Navy shipwrecks. The subset of shipwrecks in the

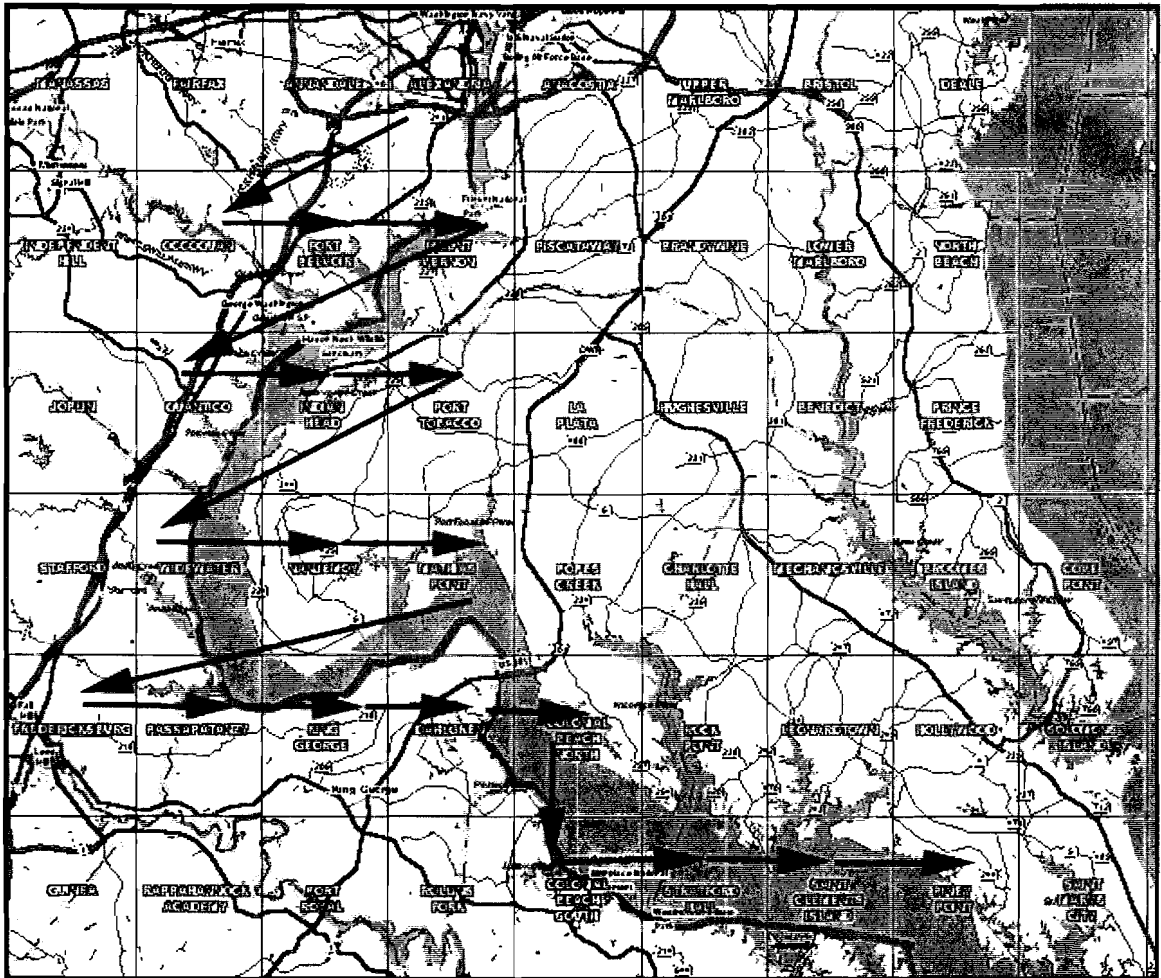


Figure 38. Quad sheet order in the table of contents of the GIS.

State of Virginia waters was extracted. To make the database more functional, fields were reorganized, added or revised. Further research was conducted to refine and expand the information from the NHC database (Figure 39).

Wreck locations were determined through various sources including interviews, archival research, cartographic research and remote sensing surveys. The location of each wreck was entered into the GIS and is represented by a symbol. Historic charts that indicate the locations of wrecks were scanned, rubber sheeted and geo-referenced to increase the accuracy of the vessels location. By selecting a wreck symbol, the user can access database information including vessel characteristics, history, disposition and other relevant information.

POPULAR_NM	LOC	LOC_CITY	COUNTY	LOCATION	LOC_SOURCE	INFO_SOURCE	NUMBER
CSS A H Schultz	VA	CHAFFIN'S BLUFF	HENRICO	JAMES RIVER	NAVYDB	NAVYDB DANFS SHON	
CSS Ada	VA	NO CITY CLOSE BY	LANCASTER	CORROTOMAN CREEK	NAVYDB	NAVYDB SHOMETTE	
USS Alabama	VA	TANGIER SOUND	NORTHAMPTON	CHESAPEAKE BAY	NAVYDB	NAVYDB DANFS BAUE	
USS Albert T Harris	VA	VIRGINIA CAPES	OUTSIDE 3MI LIM	ATLANTIC OCEAN	DANFS	SILVERSTONE DANFS	
USS Alvarado	VA	MOORINGS	HAMPTON	HAMPTON ROADS	NAVYDB	NAVYDB CIVLREC DA	
USS Andalusia	VA	CAPE CHARLES 200E	OUTSIDE 3MI LIM	ATLANTIC OCEAN	DANFS	DANFS	
CSS Ann Bell	VA	BASSETT'S LANDING	HANOVER	PAMUNKEY RIVER	NAVYDB	NAVYDB SHOMETTE D	
USS Augustus Holly	VA	MOORINGS	HAMPTON	HAMPTON ROADS	NAVYDB	NAVYDB SHOMETTE D	
USS Baltimore	VA	CAPE HENRY	VIRGINIA BEACH	ATLANTIC OCEAN	DANFS	DANFS	
USS Barton	VA	NO CITY CLOSE BY	OUTSIDE 3MI LIM	ATLANTIC OCEAN	BAUER2	BAUER2	
USS Bausell	VA	NO CITY CLOSE BY	OUTSIDE 3MI LIM	ATLANTIC OCEAN	BAUER2 WE	SILVERSTONE DANFS	
CSS Beaufort	VA	RICHMOND - BELOW	RICHMOND	JAMES RIVER	SHOMETTE	NAVYDB SHOMETTE	
CSS Besaregard	VA	HAMPTON ROADS	ISLE OF WIGHT	JAMES RIVER	NAVYDB	NAVYDB DANFS PHSC	
CSS Ben Bolt	VA	BACK CREEK	YORK	YORK RIVER	NAVYDB	NAVYDB DANFS	
CSS Betsy Richards	VA	BASSETT'S LANDING	HANOVER	PAMUNKEY RIVER	NAVYDB	NAVYDB SHOMETTE D	
USS Brandywine	VA	NORFOLK NAVY YARD	PORTSMOUTH	HAMPTON ROADS	NAVYDB	NAVYDB DANFS PHSC	
USS Buena Vista	VA	TRENT'S REACH	CHESTERFIELD	JAMES RIVER - MAIN CHA	NAVYDB	NAVYDB SHOMETTE D	
CSS California	VA	CUMBERLAND	NEW KENT	PAMUNKEY RIVER	NAVYDB	NAVYDB SHOMETTE D	
CSS Carolina Baker	VA	CUMBERLAND	NEW KENT	PAMUNKEY RIVER	NAVYDB	NAVYDB SHOMETTE D	
USS Charles F. Hughes	VA	NO CITY CLOSE BY	OUTSIDE 3MI LIM	ATLANTIC OCEAN	BAUER2	BAUER2	
HMS Charon	VA	YORKTOWN	YORK	YORK RIVER	ARCHAEOLC	NMI ARCHAEOLOGICA	
CSS Claudio	VA	WHITE HOUSE	NEW KENT	PAMUNKEY RIVER	NAVYDB	NAVYDB SHOMETTE D	
USS Columbia	VA	NORFOLK NAVY YARD	NORFOLK	HAMPTON ROADS	NAVYLIST	NAVYLIST PHSCVIL SI	
USS Columbus	VA	NORFOLK NAVY YARD	PORTSMOUTH	HAMPTON ROADS	NAVYDB	NAVYDB DANFS SHON	
USS Commodore Jones	VA	STURGEONTOWN	CHESTERFIELD	JAMES RIVER	NAVYLIST	NAVYLIST DANFS PHS	
USS Commodore Stock	VA	TRENT'S REACH	CHESTERFIELD	JAMES RIVER - MAIN CHA	DANFS	DANFS	
USS Congress	VA	NEWPORT NEWS	NEWPORT NEWS	HAMPTON ROADS	NAVYDB	NAVYDB DANFS SHON	
USS Coquette	VA	PORT ROYAL	CAROLINE	RAPPAHANNOCK RIVER	NAVYDB	NAVYDB	
Cornwallis Cave Wreck	VA	YORKTOWN	YORK	YORK RIVER	ARCHAEOLC	NMI ARCHAEOLOGICA	
USS Cumberland	VA	NEWPORT NEWS	NEWPORT NEWS	HAMPTON ROADS	DETERMINA	NMI DETERMINATION C	
CSS Curtis Peck	VA	DREWRY'S BLUFF	CHESTERFIELD	JAMES RIVER	NAVYDB	NAVYDB DANFS PHSC	

Figure 39. Database under construction in Microsoft Access.

Database fields include:

SITE_DESIG	State of Virginia official site designation.
UTM_ZONE	UTM zone.
UTM_EASTING	UTM Easting coordinate in meters.
UTM_NORTHING	UTM Northing coordinate in meters.
LAT	Latitude in degrees minutes seconds.
LONG	Longitude in degrees minutes seconds.
LATDEC	Latitude in decimal degrees for projection in ArcView.
LONGDEC	Longitude in decimal degrees for projection in ArcView.
X	Easting in VA state plane coordinate system, NAD83.
Y	Northing in VA state plane coordinate system, NAD83.

SP_AREA	Designation identifying whether the state plane coordinate is in VA state plane North or VA state plane South system.
LORAN_C	Loran-C coordinates if known.
OWN_MGR_AG	The title holder with jurisdiction over the wreck.
ADDRESS	Address of the owner/manager/agency.
ADD2	Address of the owner/manager/agency.
CITY	City of the owner/manager/agency.
STATE	State of the owner / manager / agency.
ZIP	Zip of the owner/manager/agency.
PHONE	Phone number of the owner/manager/agency.
SURVEY	Who previously located and surveyed the site and when.
YES	The site has been previously located and surveyed.
NO	The site has not been previously located and surveyed.
VES_NAME	Name of the vessel assigned by the Navy.
PREV_NAME1	Previous name(s) of the vessel.
VES_TYPE	Type of vessel.
MAST_NUM	Number of masts according to the historic record.
RIG	How the vessel was rigged according to historic record.
LENGTH	Length of the vessel according to the historic record.
BEAM	Beam of the vessel according to the historic record.
DEPTH	Depth of hold of the vessel according to historic record.
DRAFT	Draft of the vessel according to the historic record.
GROSS_TON	Vessel gross tonnage according to the historic record.

NET_TON	Vessel net tonnage according to the historic record.
DISP_TON	Vessel displacement tonnage according to historic record.
HULL_MAT	Hull material according to the historic record.
ENGINES	Number and type of engines according to historic record.
BOILERS	Number and type of boilers according to historic record.
PROPULSION	Method of propulsion according to the historic record.
HOW_ARMED	Number and type of armament on the vessel according to the historic record.
YR_BUILT	Year the vessel was built.
BUILT	Where the vessel was built.
BUILDER	Who built the vessel.
WRECK_DATE	Year the vessel sank.
USE_AT_LOSS	Navy's use of the vessel at the time of loss.
CARGO_CARY	Type of cargo carried.
POPULAR_NM	Popular or local name for the vessel.
LOC_STATE	State where wreck is located.
LOC_CITY	Closest city to the site (if possible).
COUNTY	County the site is in.
LOCATION	Body of water the wreck is in or adjacent to.
LOC_SOURCE	Source of information on the location.
PARK_SANCT	Name of park or sanctuary the site is in.
INFO_SOURC	Sources of information.
LAMBERT	Lambert.
TOWNSHIP	Township/Range.

PRESENT	Percentage of remains still present. Five possible responses: UNKNOWN, 0-25%, 26-50%, 51-75%, 76-100%. Also include condition of remains. Four possible responses: INT=intact, SCA=scattered, BUR=buried, EXC=excavated. (ex. 0-25% SCA BUR)
INIT	Naval Historical Center ID number.
CLASS	Naval class of the vessel.
ORIGIN	Country of origin.
SERVICE	Two or three letter code indicating which navy. USN=United States Navy, CSN=Confederate States Navy, USA=United States Army, CSA=Confederate States Army, RN=British Royal Navy CN=Continental Navy, GN=German Navy, JIN=Japanese Imperial Navy, SP=Spanish Navy, FR=French Navy, RUS=Russian Navy, GKN=Greek Navy, CHI=Chinese Navy, CAN=Canadian Navy, NOR=Norwegian Navy, PRV=Private, UNK=Unknown.
DISPOSIT	Final disposition of the vessel.
COMMENTS	Information about the cause of the loss and other relevant information.
LOC_CNTRY	Country with current jurisdiction over waters the wreck is in.
HULL_NUM	Navy hull number if relevant.
TYPE_MC	Maritime Commission ship type designation.
LOSS_LIFE	Number of lives lost.
ARCH_EXCA	Has the site been excavated, when and by whom.
SITE_SUB	Depth of water at the site.
REMAINS	Indicate by YES or No if there is specific knowledge about remains at the site and list by code those types of remains. (ex. YES. HULL DECK BALL)
	Codes: CULT - Associated material at the site--excepting the vessel, her tackle and equipment.

HULL - Hull.
 DECK - Decks.
 SUST - Superstructure.
 MAST - Masts.
 RIG - Rigging.
 ENG - Engines/boilers.
 AUXM - Auxiliary machinery.
 BALL - Ballast.
 ARMS - Armament.
 ANCH - Anchors.
 CARG - Cargo.

THREATS

Indicated if site is threatened by YES or NO and list the nature of the threat by code.

Codes:

SALV - Salvage
 DRED - Dredging
 LOOT - Looting
 COLL - Collecting
 DEVE - Development
 DETE - Deterioration
 VAND - Vandalism
 EROS - Erosion
 SHFI - Shellfishing

AMAST_NUM

Number of masts from archaeological evidence.

ARIG

Rig from archaeological evidence.

AHULL_MAT

Hull material from archaeological evidence.

ENG_SRC

Engine type according to archaeological survey.

PROP_SRC

Method of propulsion according to archaeological survey.

ARM_SRC

Number and type of armament according to archaeological survey.

USE_SRC

Use at loss according to archaeological survey.

CARGO_SRC

Cargo according to archaeological survey.

ALENGTH

Length from archaeological evidence.

ADEPTH

Depth of hold from archaeological evidence.

ADRAFT	Draft from archaeological evidence.
ABEAM	Beam from archaeological evidence.
CITATIONS	Publications including site reports, articles, papers, etc.
VES_IDEN	<p>Set of 4-letter codes which indicates if vessel identity is firmly established and the source of identification, vessel name and vessel type.</p> <p>Codes:</p> <p>IDKN=Identity Known. Vessel identity is firmly established</p> <p>IDUK=Unknown. Vessel identity is uncertain.</p> <p>IDAR=Archaeological. Source of identification was archaeological in nature (that a survey or excavation was carried out).</p> <p>IDHI=Historical. Source of identification was historical in nature.</p> <p>IDOR=Oral. Reputable oral history/tradition positively identifies the vessel.</p> <p>IDOT=Other. Other positive evidence (such as a listing on a map, or similar historical evidence) was used to determine the vessel's identity.</p> <p>NAAR=Source for vessel name is archaeological.</p> <p>NAHI=Source for vessel name is historical or written record.</p> <p>TYAR=Source for vessel type is archaeological.</p> <p>TYHI=Source for vessel type is historical or written record.</p>
NR_NAME	Name of National Register listing (if wreck is part of a larger listing).
REFNUM	National Register reference number, the code assigned by the Keeper for internal tracking.
INV_SIGNIF	<p>Indicate by code, where applicable, if wreck is part of a state inventory, the date it was listed on the inventory, if it is listed on the NPS Cultural Sites Inventory, its National Register status, its level of significance and if it has been designated as a National Historic Landmark (ex. STINV1975 NRSTATUS=2 SL=NATIONAL NHL)</p> <p>Codes:</p> <p>STINV=State Inventory</p> <p>CSI=Cultural Sites Inventory</p> <p>NRSTATUS=National Register status. Seven categories have been identified for this inventory:</p> <p>0=No status/undetermined;</p>

- 1=Entered, Documented (by the National Register);
- 2=Entered, Not Documented;
- 3=Determined Eligible, Keeper;
- 4=Determined Ineligible, Keeper;
- 5=Determined Eligible, State Historic Preservation Officer SHPO);
- 6=Determined Ineligible, SHPO.

SL=Significance level and refers to the level of significance determined at the time of nomination to the National Register, or the level assigned upon entry into the National Register. For this inventory, significance level categories are: National, Regional, Local.

NHL=National Historic Landmark.

CONTACT	Who to contact for more information, phone number and date of last contact.
DATE	Date of last record update.
VES_LOCATE	Numeric code indicating level of detail and accuracy of location description. Codes: <ul style="list-style-type: none"> 1=Verified. The exact location of the wreck is known and documented. 2=Historic. There are historical references to the wreck's location. Description is more exact, ie contains coordinates or distances from landmarks. 3=Historic. There are historical references to the wreck's location. Description is general or vague. Ex.: Sunk off San Diego, California; Lost en route to the Philippines. 4=Known but no coordinates available. 5=Conflicting. Sources give conflicting location data. 6=Unknown. There are no references to the wreck's location. 7=Vessel listed as salvaged, scrapped or sold. (Always check comments field for more detail. For example, a location may appear precise but it may only be a vessel's last known location.
WRECK_MO	Month of the wreck.
WRECK_DAY	Day of the wreck.
LOSTCAUSE	Cause of the loss of the vessel.
PHOTO	Link to photo of the vessel.

PHOTO_SOURCE	Source of photo of the vessel.
GIS_LAT	Latitude used to plot location in the GIS.
GIS_LON	Longitude used to plot location in the GIS.
PDF_LINK	Link to PDF report on vessel.

The database files are in Microsoft Access 2000 format. The best image of the vessel, when available, is embedded in the database. The advantage of this approach is the ability to have an image readily available and to automatically have the picture appear in the photo frame of the Access report. The disadvantage is that it greatly increases the file size of the database. Microsoft Access has a built in file size limit of 2 gigabytes. This necessitated splitting the database in half with wrecks with a first letter of A through M in one half and N through Z in the other. The total database size is 2.21 gigabytes. In order to recombine the databases, it would be necessary to remove the embedded images.

User Interface

It is assumed that the user has at least a basic familiarity with ArcView – the ability to zoom, move about the map, activate queries and hotlinks. Each site location is dual color-coded to expedite data interpretation (Figure 40). The first color code, designated by the inner circle, represents the chronological designation for the time period in which the ship sank. The center of each circle was located in accordance with the best coordinates available for each individual site. The second site-specific designation is the outer-colored circle. The color of this circle depicts the confidence in and source of the information used to locate the vessel in the GIS.

Chronological Period Designations:

1524 – 1606	Exploration
1607 – 1775	Colonial
1776 – 1781	Revolutionary War
1782 – 1811	Federal
1812 – 1814	War of 1812
1815 – 1859	Antebellum
1860 – 1865	Civil War
1866 – 1913	Late Nineteenth Century
1914 – 1918	World War I
1919 – 1940	Early Modern
1941 – 1945	World War II
1946 – 2002	Modern

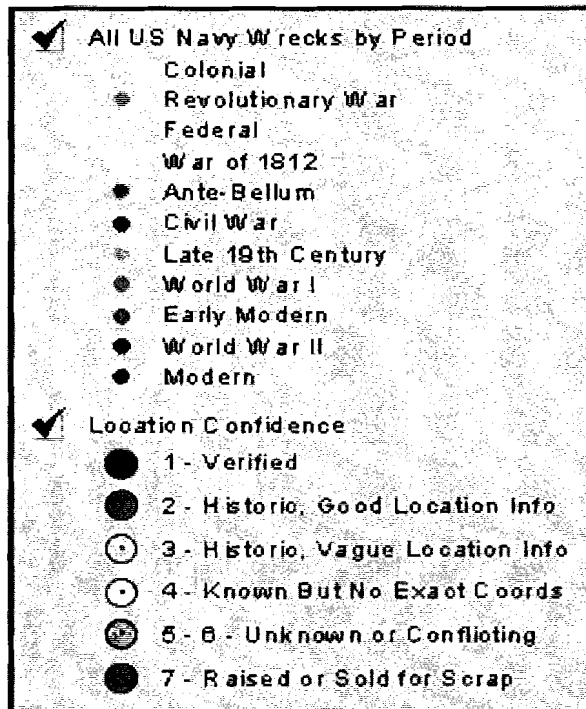


Figure 40. Table from the GIS showing the color codes and what they represent.

Information on each site in the NHC/VA GIS can be obtained in several ways. Like traditional GIS projects, the user can select the relevant theme and use the identify tool in ArcView to access information linked to that theme. In the NHC/VA GIS, querying the wreck period designation or location confidence theme with the identify tool will display data from the database used to create the GIS in a tabular format. In order to access other types of information, it is normally necessary to select a different theme from the table of contents on the left side of the screen, and again query the location.

The NHC/VA GIS contains a unique approach to make accessing information much more efficient and user-friendly. A script was created to allow the use of the ArcView hotlink tool to access a site-specific Adobe Acrobat report. This report includes not only the information from the database in an easy to interpret format, but also includes other available information including photographs, ships plans, historic maps, archaeological reports, reference materials, e-books and side scan sonar images.

In order to facilitate the viewing of period-specific subsets of sites, scripts were written and separate views were created in which only wrecks from each chronological period are displayed. These separate views can most readily be accessed through the use of the buttons on the right side of the top toolbar. The views may also be accessed directly from the view list.

Future Possibilities for the Naval Historical Center/State of Virginia GIS

The GIS developed by I²MR should prove to be a valuable management tool for the NHC and the State of Virginia. The NHC/VA GIS provides an effective means to preserve, store, display and analyze multivariate spatial data sets, and to instantaneously access information which has frequently been difficult or cumbersome to acquire. One of the most important aspects of the NHC/VA GIS is that design, implementation and maintenance become part of an ongoing process that constantly expands and updates the system. Now that the geographical foundation has been developed, the amount of data that can be associated with specific features is limited only by ever expanding research.

Nearly any future data can be incorporated into the NHC/VA GIS through the modification of either the database or Acrobat report. Any of the fields in the database can be easily updated to incorporate new findings regarding the vessels. Additional photographs, video footage, reports, historic accounts, historic maps or virtually any other multimedia file can be easily linked to from or incorporated into the Acrobat reports. As more data is added to the GIS, the more effective the program will be in supporting future management and research activities.

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Appendix A

Memorandum of Agreement:
Naval Historical Center and Virginia Department of Historic Resources

COOPERATIVE AGREEMENT
Between
the Department of the Navy
and
Virginia Department of Historic Resources

This agreement is made this 4TH day of AUGUST, 1998 by and between the United States Navy, Naval Historical Center, hereinafter referred to as the "Navy," and the Virginia Department of Historic Resources, hereinafter referred to as the "Department."

Whereas, the government of the United States of America, represented by the Navy, is responsible for the wrecks of U.S. Navy warships and aircraft wrecks and so protects and manages those wrecks as submerged cultural resources in compliance with United States historic preservation laws and regulations of the Navy; and

Whereas, the Department is the State of Virginia's agency responsible for preserving, protecting, and enhancing sites significant in the history, architecture, archaeology, engineering, and culture of the State, to encourage others to do so, and to promote interest in and study of such matters, and to that end is authorized and required to carry out programs and activities to protect, preserve, document, exhibit, interpret, and encourage preservation of historic properties in the state; and

Whereas, this agreement recognizes these mutual interests in the Navy's historic resources located in the waters of the State of Virginia; and

Now therefore, the parties do mutually agree as follows to a policy of cooperation and shared responsibility for the protection and management of the Navy's historic shipwrecks in the waters of the State of Virginia:

1. Purpose: The purpose of this agreement is to provide for a cooperative partnership that allows for the sharing of information to include researching and verifying historical and archaeological data regarding the Navy's shipwrecks within the waters of Virginia and integrating this information into a database format with the mutual goals of managing, protecting, and preserving the Navy's submerged historic shipwrecks in Virginia.
2. Scope of Work: A consultant selected separately by the Navy will provide for the research services under a separate agreement between the Navy and the consultant.

The Department will:

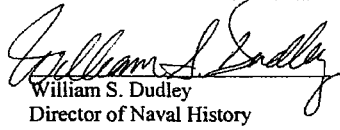
- a. Provide the consultant and the Navy access to all of the Department's records and archives concerning the Navy's submerged historic shipwrecks in Virginia waters.
- b. Coordinate with the Navy and the consultant in the sharing of historical and archaeological information regarding the Navy's submerged historic shipwrecks in Virginia waters from the Department's database inventory and eventually integrate

- this information into the Navy's database inventory.
- c. Protect sensitive information regarding the Navy's historic shipwrecks such as specific location data (latitude/longitude), information about a wreck's cargo, existence of armaments, or knowledge of gravesites, that could endanger these sites by exposing them to non-professional recovery techniques, looters, or treasure hunters.
 - d. Review all work done by the consultant.
 - e. Coordinate with the Navy in regards to federal and state historic preservation laws and permitting activities where a Navy property is involved in Virginia waters.

The Navy will:

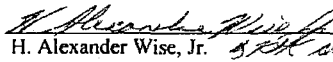
- a. Provide the consultant and the Department access to all of the Navy's records and archives concerning the Navy's submerged historic shipwrecks in Virginia waters.
 - b. Coordinate with the Department and the consultant in the sharing of historical and archaeological information regarding the Navy's submerged historic shipwrecks in Virginia waters from the Navy's database inventory and eventually integrate this information into the Department's database inventory.
 - c. Protect sensitive information regarding the Navy's historic shipwrecks such as specific location data (latitude/longitude), information about a wreck's cargo, existence of armaments, or knowledge of gravesites, that could endanger these sites by exposing them to non-professional recovery techniques, looters, or treasure hunters.
 - d. Supervise and review all work done by the consultant.
 - e. Coordinate with the Department in regards to federal and state historic preservation laws and permitting activities where a Navy property is involved in Virginia waters.
2. Reporting: The consultant will provide the Department with quarterly and annual reports, in accordance with Navy requirements.
 3. Amendments: The work completed under this Agreement is the result of a partnership, and both Parties agree to collaborate on establishing the quality of products to be produced. If either party identifies a deficiency, it shall bring the deficiency to the attention of the consultant and propose steps for correction. The Parties, by mutual agreement at any time prior to the end of the original term, may amend this scope of work or the consultant's scope of work if deemed necessary.
 6. Term: The period of this Cooperative Agreement shall begin on the last date of signing until it is terminated in writing by either Party if it is so determined that either Party has materially failed to comply with the conditions of this agreement.

UNITED STATES NAVY
NAVAL HISTORICAL CENTER


William S. Dudley
Director of Naval History

Date 8/4/98

VIRGINIA DEPARTMENT OF
HISTORIC RESOURCES


H. Alexander Wise, Jr. *H. Alexander Wise, Jr.*

Date 8/12/98