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The Malcolm Boat (38CH803): Discovery, Stabilization, Excavation, and Preservation of an Historic Sea Going Small Craft in the Ashley River, Charleston County, South Carolina

Christopher F. Amer  
*University of South Carolina - Columbia*, amerc@mailbox.sc.edu

William B. Barr

David V. Beard

Elizabeth L. Collins

Lynn B. Harris

*See next page for additional authors*

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Description
The following report details the results of an investigation of the remains of a small historic sailing craft, The Malcolm Boat (38CH803), discovered in a mud bank of the Ashley River in 1985. The investigation, conducted in June of 1992, with partial funding support from the South Carolina Department of Archives and History, revealed that the vessel was a small ocean-going hull dating to the last quarter of the eighteenth century and the first quarter of the nineteenth. The analysis presented discusses the vessel's age, method of construction and function as a coastal or possibly inter-islander trader, and places the vessel within a regional maritime historical context. Historical context is provided in the form of the background history of shipbuilding in South Carolina and a preliminary typology of local small craft. Methods of site stabilization for intertidal zone sites are discussed with recommendations for future work in this new area of investigation in the state.

Keywords
Excavations, Ashley River, Sloops, Shipbuilding, Charleston County, South Carolina, Archeology

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Authors
Christopher F. Amer, William B. Barr, David V. Beard, Elizabeth L. Collins, Lynn B. Harris, William R. Judd, Carl Naylor, and Mark M. Newell

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in the Ashley River, Charleston County,
South Carolina

Christopher F. Amer
Principal Investigator

Mark M. Newell
Project Manager

Authored by:
Christopher F. Amer
William B. Barr
David V. Beard
Elizabeth L. Collins
Lynn B. Harris
William R. Judd
Carl A. Naylor
Mark M. Newell

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Abstract

The following report details the results of an investigation of the remains of a small historic sailing craft, The Malcolm Boat (38CH803), discovered in a mud bank of the Ashley River in 1985. The investigation, conducted in June of 1992, with partial funding support from the South Carolina Department of Archives and History, revealed that the vessel was a small ocean-going hull dating to the last quarter of the eighteenth century and the first quarter of the nineteenth. The analysis presented discusses the vessel's age, method of construction and function as a coastal or possibly inter-islander trader, and places the vessel within a regional maritime historical context. Historical context is provided in the form of the background history of shipbuilding in South Carolina and a preliminary typology of local small craft. Methods of site stabilization for intertidal zone sites are discussed with recommendations for future work in this new area of investigation in the state.
Acknowledgements

An archaeology field project is a complex operation which involves the support and active participation of many more people than one sees actually digging around in the mud and swatting voracious flying insects. This is no less the case with the Malcolm Boat Project. Many people helped to turn the distorted remnants of a Colonial sloop into this report. It is appropriate that they be acknowledged at this time.

First, I would like to thank the staff of the South Carolina Department of Archives and History (SCDAH) for approving the grant which provided matching funding for the project. To Dr. Bruce Rippeteau, Director of the South Carolina Institute of Archaeology and Anthropology (SCIAA), I offer my appreciation for his, and his administrative staffs, continued support of the research goals of the Underwater Archaeology Division. Thanks are also due to the South Carolina State Budget and Control Board (SCB&CB) and the Charleston County Parks and Recreation Commission (CCPRC) for granting permission to excavate the vessel, whose bow lies in CCPRC property while the stem extends into land administered by the SCB&CB. These two agencies also signed 10-year covenant agreements with the SCDAH to provide for the continued monitoring and protection of the site by the SCIAA's Underwater Archaeology Division. I would like to acknowledge also the role played by Sharon Besley of the University of South Carolina's System Legal Department in providing legal advice and correspondence, and in securing these agreements.

A special word of appreciation should be extended to Mr. Jeffrey Schryver, Director of CCPRC, who personally delivered sand and bags, provided by the CCPRC, to the site during the 1987 temporary stabilization effort. The final stabilization of the site was accomplished between 1992 and 1993 with over 10 cu. m (13 cu yds.) of sand and hundreds of bags provided by the Charleston County Public Works Department, headed by Mr. James Rogers. A debt of gratitude is owed Mr. Rogers and his staff for both the materials and for work "over and above the call of duty" in delivering the sand right to the site over a road which they literally had to construct for that purpose. Thanks also go to Mr. James Beatty of Hertz Equipment Rental for loaning us a front end loader to move sand during the 1992 stabilization efforts.
A high measure of gratitude goes to the volunteers who braved the deep mud, pesky insects and the ever encroaching tide in the interest of science and understanding. They include Ricki and Tom DeWert, Dana Phillips, Jennifer Cummings, Judy Wood, Norman Powell, and William (Billy) Judd. Special thanks go to Billy Judd for his technical observations and assistance both during the excavation and throughout the analysis. His drawings speak for themselves. Everything the volunteers went through the staff of the Underwater Archaeology Division also endured, and then some. They, too, deserve a vote of thanks.

Last, but not least, I would like to acknowledge the contribution of Mr. James Malcolm. Had it not been for Mr. Malcolm reporting the site to SCIAA in 1985 an important chapter in the maritime history of South Carolina may have been forever blank.

Christopher F. Amer
Deputy State Archaeologist for Underwater
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Introduction

The Underwater Archaeology Division of the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina operates as both a cultural resource management and a research operation. Cultural resource management functions range from assessing commercial development impacts to known and possible sites to the rescue of endangered resources from destruction by natural forces or vandalism. Archaeological research follows a planned data gathering strategy in the form of a regional research design still under development and designed to begin filling in the blank pages of our state’s history.

The Malcolm Boat project contributed to both of these missions. The site was clearly endangered by erosion and public interference as its exposure by tides and boat wake continued. The site also had the potential of making a major contribution to our knowledge of small craft design and construction in the state (as in fact it did). Formal study of small craft in the state began in 1984 and continues as a major research interest of the Underwater Archaeology Division. The report that follows details an important contribution to an area of South Carolina history about which little is known and for which special recognition is due to James Malcolm for speedily reporting the find.

Project History

In January of 1985, Charleston resident James Malcolm was searching the east bank of the Ashley River for new finds to add to his fossil collection when he discovered the remains of a wooden vessel eroding from a mud bank (Figure 1). Malcolm contacted the South Carolina Institute of Archaeology and Anthropology (SCIAA) about the find, and two members of the Underwater Archaeology Division, Mark Newell and John Fertig, were dispatched to assess the find.

The remains are located near an abandoned boat ramp on the Ashley known locally as “Boy Scout Landing.” The site consists of a small mud bank covered mostly with *Spartina alterniflora* and a foreshore area of coarse gravel and sand. The bank is rapidly eroding as a result of tidal action and motor boat wake. When examined in February of 1985, approximately 1m of the end of the vessel was visible on the beach. Exposed timbers included the tips of futtocks and the remains
of a shelf clamp and hull planking (Figure 2). Approximately 40 cm of the upper strakes of the vessel had eroded away and loose structural timbers were found nearby. Preliminary probing revealed additional structural timbers and the bottom planking of the hull under some 15 cm of sand and mud.

Fragments of eighteenth century pipe bowls (Noel-Hume 1969:296-308) and dark green glass fragments of the early eighteenth century (Dumbrell 1983:62-72) were recovered from the overburden on the vessel, and may or may not have been associated with the vessel itself. An important feature noted during the examination of the vessel was the absence of metal fastenings in the vessel structure--often an indication of early construction.

The construction appeared to be of live oak frames, pine planking and cypress treenails--and of sufficient significance to warrant further study to determine the nature and age of the site. A datum point was established on one corner of the boat landing slab, and measurements and vectors were taken to sections of the exposed remains.

According to Malcolm, a section of the vessel had been previously exposed on the foreshore by digging--whether by Malcolm or other fossil hunters was unclear. It was then decided to reexpose these remains to determine further details about the vessel construction and the extent of the remains. A 1 m square area was excavated revealing a section of the vessel close to the stern showing a keelson notched for a bilge pump, several ceiling planks, first futtocks, and hull planking (Figure 3). The remains confirmed the initial impression of a vessel constructed from local timbers. The construction, extensive use of wooden fastenings and a general absence of metal gave a possible date of late eighteenth, early nineteenth century. The extent of the remains indicated that a major portion, if not all, of the rest of the craft was buried beneath the mud bank. This was confirmed by probing through the mud along the keelson for a distance of 7 m. The exposed remains were photographed, measured, sketched, and then reburied. One loose futtock that had washed out of the stern depression prior to the inspection was recovered and stored at the SCIAA Conservation Facility in Columbia.

A South Carolina Archaeological Site Inventory Record form (68-1 Rev.85) was filed for the site under the name of "The Malcolm Boat" and the designation 38CH803 was assigned by SCIAA's Information Management Division. An immediate request was made to the South Carolina State General Assembly for $20,000 in emergency funds for the investigation and stabilization of the site. This 1986 request was not funded. Plans were then made for the temporary stabilization
of the site to prevent further erosion of the stern. Approval for this work was given in 1987 by the South Carolina Coastal Council, South Carolina Department of Health and Environmental Control, and U.S. Army Corps of Engineers on condition that permanent stabilization be completed within one year. During the course of these preparations for the work, the land on which most of the wreckage rested was acquired by the Charleston County Parks and Recreation Commission. Officials at the Commission, headed by Mr. Jeffrey Schryver, cooperated with the temporary preservation effort by quickly providing legal access to the property, and by making sand and sandbags available for the erosion protection.

The task of filling the sandbags was completed by Carl Naylor and Peggy Brooks of SCIAA’s then newly created Underwater Antiquities Management Program and Joseph Beatty of the Underwater Archaeology Division. Staff of the Charleston County Parks and Recreation Commission then delivered these bags to the site. Newell and SCIAA staff returned to the site in the summer of 1987 and found that, in the intervening 18 months, some 2 m of the mud bank had eroded with the loss of this amount of the upper sections of the wreck.

The sandbags were placed around the outer perimeter of the vessel remains on the foreshore, and then over the exposed timbers and the face of the mud bank (Figure 4). Using the datum point established in 1986, the location of the sandbags was added to the site map. Photographs and video documentation of the process were also completed.

Upon completion of the temporary stabilization, a second request was made to the South Carolina State General Assembly for $20,000 for investigation and permanent stabilization of the site. This request also failed to receive funding.

During the period 1988-1990, the site was monitored to determine the continued effectiveness of the sandbagging operation. It was originally assumed that decay of the fiberglass sandbags would occur within six months to one year from installation. Instead, it was found that the bags remained intact, possibly due to the light cover of sediment and daily immersion by tides which may have provided protection from UV radiation. Many of the sandbags, including those on the foreshore area where impact from tidal wash and boat wake was strongest, were found to be sprouting Spartina grass. This indicates a possible long term application for this type of sandbag.

In 1990, three grant applications were submitted by members of the Underwater Archaeology Division to the South Carolina Department of Archives and History for maritime archaeological projects. One of these included an
application by Newell for $10,000 partial support for investigation and stabilization of the Malcolm Boat site, an additional $13,000 being provided by SCIAA. None of these applications were selected for funding in the 1991 grant year--but these same applications were invited for the 1992 funding year. Of the three applications, the Malcolm Boat project was selected for funding. Work began on the final phase of the project in the summer of 1992.
Historical Background

Historical Overview -- Area History

The Ashley River is navigable by small boats as far as 30 miles (48 kilometers) upstream from the city of Charleston. Above this point, the river forms a large swamp. Accessibility by water made settlements along the river desirable. The soil on the sides of the river is light, sandy and infertile.

These settlements were therefore occupied by the wealthier residents of the South Carolina who either carried on business in Charleston or derived their incomes from more fertile lands elsewhere. Most of the residences survived until the Civil War when they were burned or destroyed by the Federal army (Smith 1988:107-108).

The Malcolm Boat site (38CH803) appears to be situated on the Whitehouse land tract (Figure 5). The only indication of the possible uses of the Whitehouse land tract is a notice for the sale of a property believed to be this tract that was published in the South Carolina Gazette on December 22, 1758. This notice mentions the cultivation of a limited amount of rice, corn, and indigo. It also suggests that lumber was an important product:

... besides planting there is at least 12,000 Cords of Wood, a great Part of which is not a Quarter of a Mile from a Landing where a Boat of 160 Barrels may load at any Tide; Several Hundred Cords of Bark may be stripped in the Season; it is remarkably convenient to supply the markets of Charleston and the Ferry with provisions of all kinds...

A warrant for this 1,170 acres (473.5 hectares) of land was first issued to John Jefford in 1677 (Salley, Jr. and Olsberg 1973:149). After his death in 1695, a formal grant was made to William Cantey (South Carolina Department of Archives and History, Columbia, South Carolina, Secretary of State Records, Propriety Grants, vol. 38:286-287). This tract was transferred to the second Landgrave Thomas Smith in 1703. Smith added 67 1/2 acres (27.3 hectares) from the bordering southern Andrews land tract (South Carolina Department of Archives and History, Columbia, South Carolina, Secretary of State Records, Propriety
Grants, vol. 39:430). From this property 737 acres (298.3 hectares) were transferred as part of a marriage settlement to his son, George, in 1716, and the remaining 500 1/2 acres (202.5 hectares) to Colonel William Scott. The latter also acquired some adjoining land, and at this point the 720 acre (291.4 hectares) tract is known as the Whitehouse” (Charleston County Register of Mesne Conveyance [C.C.R.M.C.], Charleston, Book Z, No. 5:236). In 1787, a portion of this land, and later the whole tract, was sold to Christopher Williman. At Williman's death in 1813, the land was divided equally between his two daughters, Mrs. Mary Peters and Mrs. Margaret Bethune. In 1824, Mrs. Bethune sold to Dr. James O. Macdonald who conveyed the property to John and Patrick O'Neill in 1836. In 1868, the Charleston, South Carolina, Mining and Manufacturing Company acquired the Whitehouse tract (C.C.R.M.C., Book H15:250)

This property remained a possession of the Charleston company until 1937. It was referred to as the Goodrich Tract which consisted of Whitehouse and the bordering northern tract, Ashley Wood and Jericho. From 1937 until 1985 the property went various changes of hand. In 1985 the Charleston County Parks and Recreation Commission purchased 20 acres (8.1 hectares) of the Goodrich Tract from Morgenstern properties for $165,000 (C.C.R.M.C., Book H1 48-58). Currently, it is still the possession of Charleston County Parks and Recreation Commission.

Shipbuilding in South Carolina

Once a viable population center had been established at Charleston, South Carolina, exploitation of land based resources immediately followed in the form of naval stores, ship's timbers, and experimental agricultural crops (Carpenter 1973:11). As with their homeland, the English used the available river systems to traverse the coastal plains and to press inland to sources of supply.

The range of craft used to travel these river systems appears to have resulted from a combination of various influences rather than the traditions of the English alone--the log boat traditions of the indigenous population (Lefler 1967:103), the log boat traditions of West Africa (Kemble 1984:43; Nicola O'Niell, personal communication 1989), possible influences from Germany and France and, as water transportation reached into the upland regions, the mountain traditions of Finland and Portugal.
Some of the earliest vessels were designed to meet the immediate needs of transportation from point to point in the coastal region. These were either dugouts or larger vessels of plank construction on a dugout keel—the pirogue (Chapelle 1951:18; Fleetwood 1982:30-31). As the plantation system developed, there was a greater need for large burthen vessels capable of carrying raw materials and agricultural produce into coastal ports and also to return supplies and imported goods back to the rich inland plantation communities. This particular need was answered by the coasting schooners, broad beamed vessels ranging in length from 17 to 20 m, yet with a shallow draft of little more than a meter (Simmons and Newell 1989:65-80; Steffy 1976:127). Coastings schooners design reflected yet another local influence on design and construction—that of the environment. Many of the coastal plain rivers of South Carolina are slow moving and shallow, filled with sand bars and empty into harbors with entrances obstructed by shallow bars. The coasting schooners of the Southeast may also have antecedents in Baltic areas where similar environments existed (Carl Olaf Cederlund, personal communication 1991).

Early development of rice as an export crop (Doar 1936:51-53) and the introduction of the tidally irrigated rice field (Smith 1988:59) gave rise to the construction of the Carolina rice flat—a distinctive adaptation of European barge designs melded with log boat construction techniques (Newell 1986:4) in which a longitudinally split log formed the chine-girder of the craft. Plank built barges with composite chine-girder construction were also being built as early as 1760 (Public Records Office, London, United Kingdom, FE962.M.F. WO 34/60) and appear to have been used on plantations at the same time as the solid chine-log barges.

By the end of the eighteenth century, cotton and tobacco plantations had been established in upland, Piedmont areas of Georgia and South Carolina (Jones and Dutcher; 1890). In these areas, rivers were narrow, fast running, and shallow. The size and shape of cotton bales and tobacco hogsheads, coupled with these environmental conditions, led to the development of mountain boat designs that were extremely long and extremely narrow (Carson 1879:750; Carter 1977:92; Terrell 1988:146-147; Weld 1969:210). This vessel design also may have strong connections with Baltic craft.

The rise of England's great canal age in the latter half of the eighteenth century (Rolt 1973:27) contributed to the introduction of canal technology into North America. Inland navigation provided the answer to one of South Carolina's greatest natural waterway problems—that most principal water routes fed into the
Atlantic Ocean thereby requiring boats to be exposed to the open sea during trips between coastal ports. Coasting schooners designed for shallow rivers did not fare well in open ocean environments, and lost lives and cargoes were a constant problem (Simmons and Newell 1989:9). The opening of the Santee Canal connected the huge Santee River system with Charleston via inland routes and gave rise to entirely new classes of vessels in the state--canal boats. At least three types of canal boats have been identified: traditional boats of the “narrow boat” style typical of English canals, “cotton boxes” designed to carry cotton to Charleston and to be nested inside each other on the return journey to reduce tolls, and “temporary barges” built in such a manner as to limit damage to its components, enabling the barge to be dismantled and sold for lumber in Charleston (Newell 1989:72-88).

Phosphate mining gave rise to the last of South Carolina’s locally built craft. These were derivations of the rice flat form and were built to transport heavy machinery and phosphate rock in the marine phosphate beds of the coastal plain (Mappus 1935). The craft are distinguished by extremely heavy construction. Nearly all of these craft were destroyed by hurricanes which ravaged the coastal plain of South Carolina in the 1890s.

Early Shipbuilding Activity

In a letter written in 1680, Maurice Mathews, one of the colony’s original settlers and eventually its surveyor-general and Commissioner to the Indians, noted that, “ther[e] have been severall vessells built here, and there are now 3 or 4 upon the Stocks” (Mathews 1954:159). This is perhaps the first written record of boatbuilding in South Carolina and probably refers to “vessells” capable of at least coastal trading. The myriad amount and variety of small skiffs, launches, barges, boats, and canoes needed by the colonists would hardly be worth mentioning.

More evidence of early shipbuilding in the colony comes from the ship registers. Under English law, vessels used for inter-colonial or transoceanic trading were required to be registered (Labaree 1967:782-783). Few of these records remain (Crowse 1984:221-222). However, dispersed amongst the colony’s early records of deeds, inventories, bills of sale, and wills are several registers for the year 1698. Of these 15 remaining registers, only four are for vessels built in “Carolina.” These are the 30-ton sloop Ruby and the 50-ton sloop Joseph both built in 1696, the 30-ton brigantine Sea Flower built in 1697, and the 30-ton sloop Dorothy & Ann built in 1698 (Charleston County Probate Court Records
Growth of Ocean-Going Vessel Construction

As the colony grew and began to thrive, so did the boat and shipbuilding industries. While not comparable with the shipbuilding activities of the northern colonies, shipbuilding became South Carolina’s largest manufacturing industry (Weir 1983:161). And, just as important, was its impact on the local economy. In addition to shipwrights, the construction of a vessel needed the services of joiners, coopers, blacksmiths, timber merchants, painters, chandlers, glaziers, carvers, plumbers, sailmakers, blockmakers, caulkers, and oarmakers, among others (Goldenberg 1976:55-56).

The extant ship registers show that between 1735 and 1775, more than 300 ocean-going and coastal cargo vessels, ranging from five to 280 tons burthen, were built by South Carolina shipbuilders. This included ships, snows, brigantines, schooners, and sloops (Olsberg 1973). These names referred to the vessel’s rig, that is, its mast and sail arrangement, and vessels were seldom mentioned without accompanying it with its type. This preoccupation with a vessel’s rig is understandable. Denoting the rig distinguishes the schooner Betsy from the brigantine Betsy or the sloop Betsy. Even more, those tall wooden masts and billowing sails of the various rigs were easily their most recognizable feature, and the first part of a vessel that appeared as it approached over the horizon.

Undoubtedly, Carolina-built vessels were quite similar in most ways to those being built in Britain and the other colonies. The wide, rounded hull shape of the ocean-going cargo carrier, with its blunt bow and tapering stern at the waterline
meant to imitate the shape of a duck gliding through water - and square stern cabin, had become, like the rigs themselves, fairly standard and widely copied by shipbuilders after centuries of development, innovation, and imitation. Since many of the shipwrights of colonial South Carolina were trained in the best English shipyards or in other parts of America, this is hardly surprising. John Rose, the Hobcaw shipbuilder, had learned his trade on the Thames at the Deptford Naval Yard (Rogers and Chesnutt 1979:518). His partner, James Stewart, had apprenticed at the Woolwich Naval Yard, also on the Thames (Fleetwood 1982:39), and many of the other prominent South Carolina shipbuilders had learned the art of shipbuilding before arriving in the colony. Georgetown shipwright Benjamin Darling had come to South Carolina from New England (Hamer and Rogers 1970:304). Charles Minors who built vessels in Little River came from Bermuda (Rogers 1974: 20n), while Robert Watts who set up his shipbuilding business at the remote Bloody Point on Daufuskie Island, where he built the 170-ton ship *St. Helena* in 1766 and the 260-ton ship *Friendship* in 1771, had come to South Carolina from Philadelphia (Rogers and Chesnutt 1979:510).

Nevertheless, it would be hard to imagine that local shipwrights and boatbuilders weren't being influenced by local conditions and preferences, and modifying the basic designs so that their vessels accommodated the needs of their customers.

**Shipyards and Shipwrights**

As the colonists spread out along the waterways, so did the shipbuilding efforts. The ships registers list construction sites along most of South Carolina's rivers--at places such as Pon Pon, Dorchester, Bull's Island, Dewees Island, Wadmalaw, Combahee, and Pocotaligo. But the major shipbuilding areas centered around Charleston, Beaufort, and Georgetown.

Most shipbuilding in Charleston took place outside the city proper. The three areas near town that became shipbuilding centers were James Island, Shipyard Creek, and Hobcaw.

Although no shipyard sites have been located on James Island, the colonial ship registers indicate a good amount of shipbuilding on the island. Between 1735 and 1772, more than 30 vessels list James Island as their place of construction in the ship registers. This includes the 130-ton ship *Charming Nancy*, built in 1752.
for Charleston merchants Thomas Smith Sr. and Benjamin Smith (Olsberg 1973:212).

Shipyard Creek, now part of the naval base near Charleston, was another shipbuilding site during the colonial period (Smith 1988:50). Many of the ships listing Charleston as their place of construction in the ship registers were probably built on Shipyard Creek.

During the last half of the eighteenth century, Hobcaw Creek, off the Wando River, became the colony's largest shipbuilding center, boasting as many as three commercial shipyards in the immediate vicinity. The largest shipyard in the Hobcaw area, indeed in all of colonial South Carolina, was the one started on the south side of the creek in 1753 by Scottish shipwrights John Rose and James Stewart (CCRMC, Book N-N: 426). After making a considerable fortune, Rose sold the yard in 1769 to two other Scottish shipwrights, William Begbie and Daniel Manson (CCRMCR, Book M-3:240). In 1778, Paul Pritchard bought the property and changed its name to Pritchard's Shipyard (38CH1049)(CCRMCR, Book Z-4:155). During the American Revolution, the South Carolina Navy Board bought control of the yard and used it to refit vessels of the South Carolina Navy (Salley 1912:197). After the Revolution, ownership of the yard reverted to Pritchard and the property stayed in the Pritchard family until 1831 (CCRMCR, Book A-10:543).

Another shipwright who owned a yard in the vicinity of Hobcaw Creek during South Carolina's colonial period was Capt. Clement Lempriere (Rogers 1980:15). The exact location of his yard is unknown, but in all likelihood it was near or at Remly Point (Fraser 1976:123).

A 1786 plat of the Hobcaw Creek area reveals the site of the shipyard of David Linn (38CH444) located on the north side of the creek (Scurry and Brooks 1980). Linn had been a shipbuilder in Charleston as early as 1744 and purchased the Hobcaw property in 1759 (CCRMCR, Book R-4:183-198).

Georgetown and Beaufort also developed shipbuilding industries during the colonial period. The South Carolina ship registers indicate Georgetown had a thriving shipbuilding industry from 1740 to about 1760. More than 30 vessels list Georgetown as the site of construction during these years, including the 180-ton ship Francis built in 1751 (Olsberg 1977:226). The Francis was probably built by Benjamin Darling since his was the largest shipyard in Georgetown at the time (Rogers 1970:47).

The South Carolina Gazette for September 28, 1765 notes that:
within a month past, no less than three scooners [sic] have been launch'd at and near the town of Beaufort, one built by Mr. Watts, one by Mr. Stone, and one by Mr. Lawrence; besides which, a pink stern ship, built by Mr. Black, will be ready to launch there next Monday, and very soon after, another scooner, built by Mr. Taylor, one by Mr. Miller, and one by Mr. Toping; there is also on the stocks, and in great forwardness, a ship of three hundred tons, building by Mr. Emrie; and the following contracted for, to be built at the same place, viz, a ship of 250 tons, and a large scooner, by Mr. Black; another large ship and a scooner by Mr. Watts; two large scooners, by Mr. Lawrence, and on by Mr. Stone.

The ship registers verify this abundance of shipbuilding and indicate a proliferation of construction activity between 1765 and 1774.

It would be wrong to assume that all this shipbuilding was taking place at large commercial shipyards. Shipyards during this period ranged from the well-established yard such as John Rose's on Hobcaw which employed perhaps 20 persons building large ships, to the vernacular variety where one or two persons built small sloops and schooners without any help, and worked elsewhere between construction jobs. And this doesn't include the handyman who built a canoe or small sailing skiff for his own personal use.

While specific records concerning small boatbuilding do not exist, the newspapers of the time are filled with advertisements indicating a wide variety of locally made watercraft for sale. These small craft virtually littered the local waterways. In 1751, Governor James Glen noted that, “Cooper River appears sometimes a kind of floating market, and we have numbers of canoes, boats and pettiaguas that ply incessantly, bringing down the country produce to town, and returning with such necessary as are wanted by the planters” (Merrens 1977:181).

Live Oak, Yellow Pine, and Long Life

The early boatbuilders as well as shipwrights found local woods to be excellent building materials. The massive, naturally curved live oak for the vessel's main timbers, and the tall, yellow pines for planking and decking were as ideally suited for the small skiff as for the large three-masted ship.
The South Carolina Gazette for September 28, 1765, after noting the vessels being built by South Carolina shipwrights, claims that, “as soon as the superiority of our Live-Oak Timber and Yellow Pine Plank, to the timber and plank of the Northern colonies, becomes more generally known, ’tis not to be doubted, that this province may vie with any of them in that valuable branch of business . . .” And, six years later, the South Carolina Gazette for August 8, 1771 reports that there had been several recent orders for Carolina-built ships from England as “Proof that the Goodness of Vessels built here, and the superior Quality of our Live-Oak Timber to any Wood in America for Ship-Building, is at length acknowledged.” Of course, the South Carolina Gazette's enthusiasm may have been somewhat of an eighteenth century public relations effort, but there were others with no, or at least less visible, ulterior motives who praised Carolina-built vessels.

Henry Laurens, the owner of many vessels built both in South Carolina and elsewhere, was one who promoted the superiority of the Carolina vessels and the skill of local shipwrights. In 1765, while discussing the cost of shipbuilding in South Carolina with William Fisher, a Philadelphia ship owner, he notes that, “the difference in the Cost of our Carolina built Vessels is not the great objection to building here. That is made up in the different qualities of the Vessels when built or some people think so.” He adds that a vessel built in Philadelphia “would not be worth half as much (the hull of her) as one built of our Live Oak & Pine...”(Rogers, Jr. 1974:429). Writing to his brother James from England in 1774, in reference to acting as an agent in having a ship made in Carolina for a Bristol merchantile firm, he admits his hope that a South Carolina-built ship on the Thames would assure that “our Ships built of Live Oak & Pine will acquire the Character & Credit which they truly Merit” (Rogers, Jr. and Chesnutt 1981:214-215).

Live oak and pine construction, along with the other popular shipbuilding timbers, were frequent advertising points in a vessel’s sale. On May 21, 1754, the South Carolina Gazette ran a typical ad of this sort. It was for the sale of a schooner that would carry 95 to 100 barrels of rice. The ad notes that the vessel is “extraordinary well built, live oak and red cedar timber, with two streaks of white oak plank under her bends, the rest yellow pine.”

Live oak was an obvious and common choice for shipbuilding, yet cedar, although less abundant, was also a favorite shipbuilding material due to its ability to resist the infamous teredo worm, also known as the shipworm. In 1779, when the
state of South Carolina sought to have a 42 ft pilot boat made, the specifications recommended that, “the whole of the frame Except the flore [floor] Timbers be of Cedar” (Salley 1913:38).

These woods also made for vessels with long lives. At a time when the average life expectancy of a wooden vessel was about 15 years (Albion 1926: 85), Carolina-built ships boasted usual lives of 20 to 30 years (Smelser and Davisson 1973:17). In 1766, the 20-ton schooner Queenley was registered to trade between South Carolina and Georgia. The Queenley was built in 1739 in South Carolina, 27 years earlier. When the 15-ton schooner Friendship was registered for trade in 1773, it was already 28 years old, having been built at Hobcaw in 1745 (Olsberg 1977:258, 226). The South Carolina Gazette ran a story in 1773 that the aptly named 125-ton ship Live Oak was “constantly employed in the Trade between this Port and Europe.” The Live Oak had been built on James Island 24 years earlier. This quality of southern timber even reached the ears of Alexander Hamilton who wrote in his Federalist Papers that, “the difference in the duration of the ships of which the navy might be composed, if chiefly constructed of Southern wood, would be of signal importance…” (Hamilton 1941:67).

**USS John Adams**

The high point of South Carolina wooden shipbuilding occurred on June 5, 1799 with the launching of the 550-ton frigate John Adams at the Paul Pritchard Shipyard on Shipyard Creek. The Adams carried twenty-six 12-pound cannons and six 24-pound carronades, making her the first U.S. Navy vessel to be armed with carronades. She was built with a variety of native South Carolina woods. The floor timbers and futtocks were of live oak. The upper timbers were of cedar. The keel and keelson were of Carolina pine, while the masts and spars were of long-leaf pine. The deck beams were hewn from yellow pine logs cut along the Edisto River. In 1803, she saw action off Tripoli against the Barbary Powers. During the War of 1812, she spent most of her time blockaded in New York Harbor. In 1863, at the age of 64, she was ordered to join the South Atlantic Blockading Squadron off South Carolina. Her long and illustrious career ended in 1867 when she was sold out of the Navy and sent to the breaker's yard (Dunne 1987).
Decline of Wooden Ships

The wooden shipbuilding industry declined during the first half of the nineteenth century. This was due to a general economic decline in South Carolina and, of course, the development of steamships and steel-hulled vessels (Coker 1987:193). However, small wooden vessels--yachts, fishing boats, pilot boats, barges, canoes, skiffs, launches, dugouts, batteaux, etc.--were still being constructed and used on the river and coastal waterways of the state. This small boat industry continued into the twentieth century (Fleetwood 1982).
South Carolina Vessels -- A Preliminary Typology

Space limitations preclude an extended discussion of the preliminary vessel typology for South Carolina. This may be found in Newell 1992c and is summarized below:

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>Characteristic and Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prehistoric Dugout</td>
<td>4,500 B.P. - 1690 Resinous or easily workable woods. Crudely worked by burn and scrape method, crudely formed bow and stern, usually wedge shaped. Range in length from 3 m to 20 m, beam from .5 m to 2 m. Smaller craft used for riverine travel. Larger craft often finely worked and used for ocean travel. 4,500 B.P. (?) to Contact period.</td>
</tr>
<tr>
<td>Historic Dugout</td>
<td>1690 - present Same woods as prehistoric craft, bald cypress preferred. Easily distinguishable from prehistoric craft by “Europeanization” of design including carving of European shell forms with shaped bow, transom sterns, wash strakes, and keel. Workmanship shows use of metal tools. Used for riverine travel and racing hulls driven by black crews. Contact period to present.</td>
</tr>
<tr>
<td>Built-Up Dugout</td>
<td>1690-1860 Usually large dugout hulls to which one or more wash strakes have been added, often edge doweled to gunwale and supported by internal knees. Used as Plantation Boats somethimes for personal and pleasure transportation by plantation owners, also as racing boats.</td>
</tr>
</tbody>
</table>
Pirogue
1690-1860
Flat-bottomed (may have slight deadrise), transom-stered ship hull of conventional appearance, but built up from a keel and garboard strake carved from a single log. Keel is usually of cypress, planking of pine, and frames of live oak. Appears to be vessel type favored by African and Indian crews. Similar type of vessel was used in rice fields of the Niger Delta. Length averaged 20 m, beam 5 m, depth of hold 1 - 1.5 m. Operated in riverine environments, but also capable of ocean travel.

Coasting Schooner
1690-1870s (?) Flat-bottomed, transom-stered ship hull of conventional European design and construction. Earlier types used king planks, later types used shallow keels. Shell form designs featured extended maximum beam fore and aft of center of vessel to maximize cargo capacity. Built of pine and live oak. Operated in riverine areas and coastal regions, possibly with leeboards.

Sea-Going Vessels
1700-1870s(?) Conventional historic period ocean-going ship hulls with deep drafts and round hull forms. Built to traditional European designs at coastal shipyards and typically ranged in tonnage from 50 to 300 tons. Most of these vessels were used for export trade to Europe and were often sold on arrival. Some smaller examples were built for, and used by, local plantations, possibly for extended coastal and Caribbean travel.

Mountain Boats
1780-1890s Extremely long, narrow-beamed, and lightly built vessels used to transport tobacco hogsheads and cotton bales down upland rivers. Steered with extremely long stern sweep and poles. Frames and planks of pine. Beam averaged 2 m,
length ranged from 15 m to 23 m. Best documented type is the Petersburg Boat used on upper Savannah River. Vessels sometimes journeyed to lower coastal plain.

**Flatboat Forms:**

**Ferry Craft**

1690s-1970s

Basic flat design adapted for use on ferry crossings, typically 20 m in length and approximately 5m in width. Constructed with cypress chine-girder sides (usually earlier craft) or planked with 2-3 strakes. Designs featured low ramp angle, approximately 20°, and two stanchions on one side containing pulleys to hold a rope which ran across the river. Craft were built of cypress, pine, and live oak.

**Rice Flats**

1750s(?)-1860

Basic flat design adapted for use in wide and narrow rice field canals. Constructed with cypress chine-girder sides or planked with 2-3 strakes. Chine-girders appear to have been used throughout the antebellum period. Earlier vessels may have had curved, scow-like profiles; later craft had angled ramps (30° - 20°). Construction of pine, cypress, and live oak, featured transverse planking (with one or two exceptions), heavy header logs, internal stringers, and rake timbers. Common size ranged from beam of 4 m to length of 15 m.

Narrow variety of same design also documented, beam of 1 m, length of 9 m. Used to transport harvested rice, mud, and materials on rice plantations. Also used to transport various cargoes on local rivers, usually propelled by tide.

**Phosphate Barges**

1875-1899

Massively constructed barge forms designed for the South Carolina marine phosphate industry, 1870-1899. Sizes ranged from beams of 5 - 7 m and lengths of 20 - 30 m. Construction featured extremely heavy stringers and chine-
sills (up to 35 cm sided and molded) and steeply angled ramps (typically 54°). Also featured heavily cast iron fittings, bitts, and bilge pumps. Most of these craft were destroyed in the hurricanes of the late nineteenth century. Operated in lower coastal plain environments where marine phosphate beds were mined.

**Industrial Barges**

1880s-1940s

Both small and large industrial barges were built in the late nineteenth, early twentieth centuries. Most extant examples were built for the Pinopolis Dam project in the 1930s. Featured lighter weight timbers, decks, often double sheathed, wire nails, and transom stems reinforced for push power.

**Canal Craft:**

**Canal Boat**

1793-1860s

Conventional English canal boat design probably first built for the Santee Canal, 1793-1800. Beam of 3m length of approximately 20 m, with covered cargo area accessed by hatches.

**Cotton Box**

1800-1860

Type of craft unique to the Santee Canal, 3m beam approximately 15 m length, and built with a wedge-shaped cross section which enabled one vessel to be “nested” in another. Designed to carry cotton bales and specifically to reduce toll fees when empty on return journey. May also have been used on later South Carolina canals.

**Canal Flat**

1793-1860

Basically a rice flat adapted to canal use by reducing the beam to approximately 3 m.
Ethnology of Southern Small Craft

The dugout—a craft common to most temperate zone cultures around the world—was one of the first vessels to ply local waters. The advent of colonization forged rapid changes in this craft as Europeans sought to adapt local craft and as Native Americans were themselves able to use metal tools provided by Europeans. This is the point at which the understanding of local craft becomes clouded. The Native Americans certainly developed the dugout and possibly a variety of pirogue—but Europeans also had their own dugout traditions and a long standing history of ship and flat construction which echoed the entire range of European ethnic origins from the English and Irish to the Swedes, Poles, and French.

The importation of labor from West Africa to South Carolina plantations also brought a major influx of agricultural and craft skills ranging from knowledge of the rice culture to boatbuilding traditions (Donnan 1930, Vlatch 1978, Littlefield 1989). Isolation of these components of small craft studies in relation to the ethnology of the region cannot be achieved until a full understanding is developed of the West African contribution. Slave labor was sought from West African regions because of the similarity in climate, topography, and the specific skills of the populace in growing rice, tobacco, and indigo (Matthews 1966:53). The topography, low lying delta and riverine areas such as the Scarries River Delta in Sierra Leone and the Niger Delta in Nigeria, gave rise to strong African watercraft traditions.

There is little doubt that these traditions had a role in the design and construction of some watercraft types in South Carolina. It is apparent from the archival record that the plantation carpenters were the slave craftsmen generally expected to include construction of boats and flats in their work (Joyner 1977:64). There was also a strong tradition of the use of African and African American labor in early American shipbuilding industries. What is not clear from the archival record is to what extent early shipbuilding utilized imported skills of Africans trained in the construction of West African craft such as the Niger Delta pirogues or the Bullom boats of Sierra Leone. It is apparent from the archival record that plantation owners and shipwrights apprenticed slaves to train in the methods used by white European owners of colonial and antebellum shipyards (Easterby 1954, Joyner 1977). The practice of slave apprentices in the shipwright's trade was not originally favored. In 1744, English shipwrights petitioned the South Carolina Legislature to ban the practice of training slave labor (Easterby 1954:547-550), in
much the same way as white coasting vessel patrons objected to the use of all slave crews. The problem was in fact overcome by legalizing the widespread use of slave labor in the shipyards.

In both northern and southern states, shipbuilding was a major industry conducted by small scale enterprises controlled and managed by a working master carpenter (Rubin 1970:34). The general shortage of skilled labor in the colonies helped establish the practice of training slave labor in shipyards. As early as 1767, the sale of slaves formerly apprenticed to a ship's carpenter is recorded in Blandford, Virginia (Pinchbeck 1926:29). Pinchbeck (1926:31) also states that Virginia slave owners apprenticed young slaves to white shipbuilders to learn the trades of ship “ironers,” ship blacksmiths, ship carpenters, ship axemen, ship sawyers and ship riggers.

Local archival evidence cited by Easterby (1954) and Joyner (1977) suggests that the practice was just as common in the south. By 1833 there were eight master shipbuilders working in Charleston and 100 ships carpenters. Of these, less than 20 were white (Hutchinson 1941:103). The number of skilled slave blacksmiths serving the shipbuilding industry was probably as high. Advertisements for blacksmith work commonly indicate wharves as locations for blacksmith's shops (South Carolina Gazette, 21 May 1753). While the case for importation of West Africans specifically for their boatbuilding skills has yet to be found in the archival record, there are several suggestions that this may have been true for blacksmiths. West African tradition and skill in metal working is well known, and in certain areas, blacksmiths belonged to guilds and often assumed positions of royalty or priesthood (Christian 1972:49). Henry Laurens, one of South Carolina's most prolific letter writers, wrote that a planter and slave importer dispatched a newly imported slave to the governor of East Florida in 1765 with the comment that the slave was a blacksmith and that “... if he as wrought any in his own country he will soon be improved in his knowledge by practice under a White man” (Littlefield 1981:107). That West Africans were apprenticed to Charleston blacksmiths is also indicated in the archival record (Deas 1941:27).

The hope that West African workmanship may be detected in the archaeological record is yet to be realized due to the undoubted mix of imported African skills and the skills taught in European managed shipyards. The entire question of ethnography of local craft will not be answered until both the number of vessels studied is expanded, and comparative data is developed on West African and European boatbuilding of the same period.
Historic period dugouts were most likely the first craft to exhibit European influences in changes in hull design. The dugout proves to be one of South Carolina's most enduring locally built watercraft, being made and used well into the twentieth century (Creel 1984:40).

One of the most immediate changes in dugout tradition was made by the Native American population which began to use European metal tools provided in trade from early colonists (Swanton 1946). These craft appear to have been immediately adopted by the European settlers who induced Native Americans to make dugout canoes for them (Vlatch 1979:97).

Various changes began to occur after the Contact period. The basic shape of the dugout was modified to conform to European concepts of functional vessel form. Stems were made rounder and fuller, and some were also squared off, bows were shaped and pointed, and splash boards added to the gunwale at the bow (Ivers 1972:123).

The result was a hull form showing major European influences in construction and shape. The craft still had the basic appearance of a dugout and retained this form into the twentieth century, being produced in the Pee Dee region of the state as late as 1980. Creel's (1984:42) account of the production of one of these late dugouts provides information on techniques which are thought to have changed little over time.

In addition to this basic dugout form, the craft also underwent radical refinements which produced vessels indistinguishable in shell form from traditionally formed plank-built boats. Historian Michael Alford documented several such craft which were used on South Carolina plantations prior to 1860. A similar craft made in 1870 is also representative of this degree of refinement. Another example was documented by researchers Lynn Harris and Mark Newell in Conway, South Carolina. Yet another was found being used as a planter in the garden of a canal side home in Horry County, South Carolina.

The addition of wash strakes or splash boards to the gunwale of these craft was yet another refinement. These were used to achieve considerable increases in the loading capacity of the craft. Different fastening methods appear to have been used depending upon the purpose of the additional planking. Some craft had wash strakes lightly held in place by edge to edge treenails, while others exhibited several built-up strakes held in place by both edge to edge nailing and the use of internal standard knees. The practice has also created some confusion in the historical record concerning the differentiation between the built-up dugout and the pirogue.
historical accounts often leaving much doubt as to which type of craft is being discussed.

The "Europeanization" of prehistoric dugout forms has been advanced by some researchers as clear evidence of a single ethnic influence, the work of English shipwrights or of slaves trained in the English tradition. In fact, there is strong evidence for many of these changes in form in African tradition. The dugout is known throughout West Africa and, most significantly to this study, especially so in rice producing regions of West Africa such as Sierra Leone from which South Carolina acquired slaves (Smith 1970:515).

There is similar confusion in the published record about the ethnic origins of the pirogue. The type has been claimed as indigenous to the West Indies (Vlatch 1979:98) but there is clear evidence that the type was also built in West Africa (Smith 1970:521). To add to the confusion, both ethnic groups are identified with this type of vessel in the archival record. In her master's thesis, The Historical Background of the Brown's Ferry Vessel, Rowena Nylund (1989) cites numerous references to pirogues under the command of a black patron and crew. Similarly the Journals of the Indian Commissioners, published by the South Carolina Department of Archives and History, cites numerous references to the early use of "perigoes" by Native American crews to transport pelts down river and on ocean voyages to Charleston.

A discussion on the historical background of the flatboat form in South Carolina has been extensively presented in Newell 1992c. Discussion here is therefore limited to construction detail and origin.

Field research is revealing much information about the various barge-form craft used by South Carolina's rice culture. The catastrophic end of the plantation era in 1860 resulted in hundreds of sites where craft were simply abandoned. They may still be found largely as they were left, and a definitive study can only be produced after further documentation of a much larger number of craft than have been studied to date.

"Split Log," or what we now know as "ile" barges, may have been one of the earliest and most enduring watercraft designs introduced into South Carolina for use as ferry craft with the advent of colonization, and later as craft on tidal rice culture plantations.

These vessels were basically flat, rectangular platforms of shallow draft and minimal freeboard, propelled by hand or tide, and designed to operate in the relatively calmer waters of South Carolina rivers, most often as ferries. The
presently known archaeological record consists mostly of these same designs found in rice plantation contexts where the archival record shows they were used on large and small irrigation canals for a variety of purposes (Clifton 1978:82-83). Called barges, flats, and lighters, they were the major vessel type on South Carolina rice plantations and a classic example of the way in which function and environment dictated design.

Archival research tells us that both plank-built and chine-girder barges were used on local plantations (Clifton 1978:125; Doar 1970:34), and this is also confirmed by the remains of both plank and chine-log forms observed in the field. The craft documented to date by archaeologists in South Carolina were built by two distinct methods: plank-on-frame construction and chine-girder construction. Plank-on-frame is somewhat similar to European ship construction in that planks are attached to internal supports such as keelsons, lodging, hanging and standard knees and cross braces. The important difference is that these framing elements are not first assembled to create a form to which the planking is then attached as in most ship construction (ancient shell-first method excepted).

Ile construction is an ancient European method that may have been re-invented in colonial America. Vessels of this type have a single split log which serves as the two principle structural elements. The log, usually of extreme diameter and length, is split and carved to form each side of the flat as described by Doar (1936). The base of the log is carved to include the "chine" of the vessel, the point where the hull shape changes from the bottom of the vessel to the side, hence the name "chine-girder."

The first known mention of historic craft converted from cypress logs is in 1702 (Lefler 1967:103), and the latest account dates to the nineteenth century (Doar 1936:45).

How and when the process of adaptation of the large cypress tree to ile use was invented is not known. The cypress was already in use by the Native American population for dugout construction by the burn and scrape method (Hulton 1984: Figure 16), and it has been hypothesized that the expanded dugout and chine-girder barge of the historic period were both African-European adaptations of these aboriginal craft (Vlatch 1978:97). Alternatively, it has been suggested that the design was introduced into South Carolina by Hugenot immigrants (Alford 1991:14 and Damian Goodeburne, personal communication, 1989). As early as the seventeenth century, Lawson describes the use of cypress for vessel construction.
(Lefler 1967:103). It seems more likely that this reference is to ship-hulled periaguas.

The earliest rice plantations (Heywood 1937:8) utilized a method of reservoir irrigation. Even though these plantations used rice fields dug from lowland swamps, they may not have used canal systems large enough to accommodate flats. It can only be said with certainty that flats were utilized on river edge, tidally irrigated rice fields. The process of tidal irrigation may have been introduced late in the seventeenth century (Littlefield 1981:101), or early in the eighteenth century (Hetrick 1979:7), and certainly by 1737 (Smith 1988:37). The upland reservoir system, plagued by lack of water and depleted fertility, appears to have been abandoned in favor of tidal irrigation by mid-century. Tidal irrigation changed the hydraulic dynamics of the rice plantation and more intimately connected the operation with the nearby river (Doar 1936:8). This dependence may have naturally led to the adaptation of flats from ferries to rice canal use.

Doar’s comment about the use of smaller flats for light work may be significant. A vessel examined at Conway is drastically narrower than any other plank or chine-girder built flat documented to date in South Carolina (Newell 1992d). This is the first evidence for two significantly different sizes of this type of flat, a 1:9 side to length ratio compared to the common 1:3 ratio of other recorded flats. The Wachesaw and Richmond Hill plantations, both in the general area of the original discovery, operated rice fields on Richmond Island on the opposite side of the Waccamaw River (Michie 1990:53), so the smaller flats of the type described by Doar (1936) may well have been used in this area. Large chine-girder flats have been located in the river off both plantations.

The plank-built barge was constructed in South Carolina concurrently with the ile flat. It also appears to have been used on plantations which also built ile flats, although why both construction methods were employed at the same time is not known. It might be expected that plank-built barges would have been a later response to diminishing availability of large lumber sizes. The development of tidally irrigated plantations in the late eighteenth and early nineteenth centuries increased the acreage of swampland cleared for rice cultivation, perhaps with a resultant increase in the availability of large swamp cypress. For this reason, the norm of adaptation of smaller lumber sizes when forest depletion reduced availability of larger sizes did not occur. The reason why we see ile methods employed alongside plank-built methods is not therefore readily apparent. Ile construction would have been more labor intensive than plank-built, but the method
might have been more suited to the traditional West African skills of the slaves who built them (Doar 1936:97-107). Plank-built barges also tend to be smaller in overall length than chine-log craft. A plank barge built to the lengths observed in chine-logs would have required the more traditional European shipwright's skills in scarphing plank joints and carving knees for internal supports (although elements of all of these skills do appear to some extent in chine-log barges).

An early reference to the construction of plank-built ferries by Europeans appears in 1760, in orders issued to a military Director of Carpenters on July 21, 1760 at Oswego, New York, by English General Jeffrey Amherst:

Thirty feet long by twelve feet wide, her waste (sic) to be two feet deep, the Bottom to be made of Timber hew'd five Inches thick and as broad as they'll work; the joints to be made close enough to be Caulked, about six floor timbers, Six Inches Square to be let into the bottom two Inches; the Sides to be made of Pine, if to be had, She must be flamed off, fore and aft, that Cattle may be easily got in and out, the Blocks on which she is built to be high enough to be Caulked underneath (PRO, M.F.W.O 34/60).

Ferry craft that were the contemporaries of rice culture craft appear to have differed from them only in small detail. The low angle of the rake, length, and beam were all similar. Obvious differences were the addition of stanchions for cross-river ropes which were used to pull the ferries from one bank to the other. Ferry craft survived long after the plantation culture, and changes in design then began to occur, such as the increased strength of floors to accommodate the heavier weight of cars and trucks (Newell 1992c:89).

The Civil War probably ended barge construction on South Carolina plantations, even though some attempted to operate after the freedom of the slave work force. Some of the last large, wooden, industrial barges to be built in the state came from the carpentry shops of the Santee-Cooper Public Service Authority. Charged with the task of creating a hydro-electric project in the Santee Basin, this organization built the Pinopolis Dam just above the headwaters of the Cooper River in 1930. A fleet of barges was built on the Cooper for the purpose of transporting fill and machinery for the dam. These ranged from small 6.7 m (22 ft) barges of simple construction to the large machinery carrying flats of over 12.2 m (40 ft). Both types were push barges with vertical transom sterns.
A revival of the “plantation barge” may have occurred at this time when the abandoned rice fields became popular duck hunting preserves. This widespread adaptation of the plantations ensured continued survival of the dike system over the pre- to post-war years. Upkeep of the dikes generated a new need for craft suited to this purpose. The planked-up flat was again the design of choice.

In the late 1940s, such a flat, called a mud barge, was constructed on the banks of the abandoned rice mill canal at Mepkin Plantation (38BK767), then a hunting preserve maintained by the Baruch family.

The recently completed Pinopolis Dam had greatly increased the water flow of the Cooper River (at the expense of the Santee River) with the result that sections of the main riverside dike of Mepkin Plantation had begun to erode. In response, Santee Cooper dispatched a team of its own carpenters to the plantation to build a barge to carry new fill to the eroding dikes (Grant Tinker, personal communication 1991).

The one common feature of South Carolina flats, ferries, and barges is their transverse or athwartship planking. Only one exception has been encountered in ten years of field research. During this period, numerous research trips have been made to England to begin the process of identifying origins of design and construction techniques. As common as these craft are in England, it was originally assumed that some preliminary similarities would be readily recognized by authorities in the field. It was quickly learned that utilitarian small craft such as barges and flats are largely undocumented in England, and that the construction techniques used in South Carolina are, to the best of the limited knowledge of those consulted, without counterpart in England.

Typical examples are chine-girders and athwartship planking. An early assumption in the research program was that these features would be found in the historical record in England. According to Peter Marsden, head of the Archaeology Department of the Museum of London, these features were unknown in England (personal communication 1990). Damian Goodeburne, a specialist on early carpentry techniques and tool marks at the Museum of London, expressed a belief that athwartship planking on flats was a purely American invention of the early nineteenth century (personal communication 1989).

Various other sources were consulted ranging from the National Maritime Museum to the ethnographic collections of the British Museum. One of the most promising archival sources proved to the holdings of the Scottish Institute of Maritime Studies (SIMS) at the University of St. Andrews, Scotland. SIMS is
developing one of the best collections in the United Kingdom on international vernacular craft studies. It was here, in a paper produced by noted Polish researcher Jerzy Litwin (1988), that a reference was found to athwartship planking on local craft. The vessel was a small ferry of a type called a “Galarek” and found in the Vistula River region of Poland. Litwin’s plan of the craft show construction techniques remarkably similar to ferry vessels and flats documented in South Carolina.

With regard to sea-going craft, there is considerable archival and archaeological evidence in South Carolina of a substantial tradition of much larger hulls being built at an early stage to transport rice to European markets. These were hulls of European design ranging from 100 to 200 tons, and they were often sold at their point of destination, along with the cargo they carried. At the same time, or possibly at a later date when inter-colony and local trade associations were developed, a smaller type of sea-going hull was designed and built. It is apparent that some plantations owned and operated these small, deeper draft ocean-going hulls that were able to negotiate the lower reaches of rivers such as the Ashley and the Cooper (Newell 1986:3). One such vessel (38BK845), at the abandoned dock of Dean Hall Plantation on the Cooper River, appears to be a deep draft, rounded hull with extremely heavy framing. A similar vessel (38BK856), lies at the landing of Lewisfield Plantation near Monck’s Corner, supposedly the victim of a Revolutionary War encounter between British forces and rebels led by Wade Hampton (Amer and Thompson 1989).

The ship registers show that the Carolina-built, ship-rigged vessel was, in general, of moderate size, yet larger than ships being built in the other shipbuilding colonies. South Carolina shipwrights were certainly able to build large ocean going ships. The 280-ton ship Queen Charlotte, built in 1764 by John Emrie, and the 260-ton ship Atlantic, built at Port Royal in 1773, are two examples. However, ship-rigged vessels built in South Carolina during this time averaged 180 tons. A ship in the 150 to 200 ton range seems almost the unanimous choice of South Carolina ship owners, with more than half of those built in the state in that range. While these ships were of rather moderate size, it may come as a surprise that South Carolina shipwrights turned out ships that were, on the average, 40 percent larger than those being produced in other colonies. From available port records, we find that ships built in the other colonies averaged only about 130 tons burthen (Goldenberg 1976:131-255).
The third vessel of this type, is the “Malcolm Boat” (38CH803). These vessels, some of which may not have been locally built, appear to be examples of traditional European building techniques. Evidence, archival and archaeological, has yet to be produced to show the full extent to which these smaller ocean-going vessels were owned by planters for use in open ocean trade to east coast ports and the Caribbean.

During the early to mid-eighteenth century, an industry building larger ocean ships developed. These vessels had their design origins in the traditions of Europe, and most particularly, England. They were often built by English and Scottish shipwrights for the export trade and were sold in Europe along with the cargoes they carried from the Carolinas. The history and construction of these vessels is also covered in other publications, although a definitive work has yet to be produced. The majority of hulls during the early part of the eighteenth century appear to have been these smaller vessels ranging in size from six to 30 tons (Coker 1987:47-48) or 25 to 30 tons, a trend that was also true for the rest of the American colonies (Chapelle 1935:11). While it may be safely assumed that many of these vessels were modeled after popular European types, this cannot be determined as fact from the archival record. The Navigation Act of 1696 required that vessels in the colonies be registered and the ignorance of many recorders resulted in a single vessel being listed as several different types during its lifetime. This variation in name may have had much to do with changes in rigging as well, brigantines being rigged as brigs and as schooners for example. The rigging of these small craft must be deduced from general, rather than regional, sources, other than the few maritime views of South Carolina ports that still exist. At present, the South Carolina ship registers offer some of the best background information for this type of hull.

Perhaps the epitome of the South Carolina-built ship was the Heart of Oak, built at the Hobcaw yard of John Rose in 1763. Not only did its 180 ton size prove typical of the size of locally built ships, but the quality of its workmanship would be proven over a successful career spanning more than 10 years. The Heart of Oak's illustrious career began almost immediately after her launching. The South Carolina Gazette for May 21, 1763 reports that, "the fine new ship Heart-of-Oak, commanded by Capt. Henry Gunn, lately built by Mr. John Rose at Hobcaw, came down (to town) two days ago, completely fitted, and . . . 'tis thought she will carry 1100 barrels of rice, be very buoyant, and of an easy draught." An "easy draught" in 1763 could be considerable. Lloyd's Register for 1764 lists her as having a
draught of 14 ft fully loaded. During the colonial period it was generally accepted that at low tide, only 12 ft (3.7 in.) of water covered the deepest channel through the offshore bar (Uhlendorf 1938:325; Merrens 1977:281), and in 1748, Governor James Glen noted that, “Charles-Town Harbour is fit for all Vessels which do not exceed fifteen feet draught” (Milling 1951:92). This meant that the Heart of Oak, with its "easy draught," had to be careful indeed when it crossed the bar fully loaded. Rose was a passenger on the Heart of Oak’s maiden voyage when it sailed for Cowes on June 22, 1763. He was traveling to England in an attempt to recruit shipwrights to come to South Carolina. There can be little doubt that he used the Heart of Oak as an example of the excellent shipbuilding materials and craftsmanship available in the state. He returned in the Heart of Oak in February 1764. His efforts were considered a failure (Hamer and Rogers 1972:186, 209, 262). In April 1763, when the Heart of Oak was registered, John Rose listed himself as sole owner; however, by June of that year, one-fourth of the ship was owned by Henry Laurens who, in 1766, valued his one-quarter interest in the Heart of Oak at £4,000. This sum can perhaps be put into perspective by noting that, at the same time, he valued Mepkin Plantation, his 3,000 acre property on the Cooper River, at £7,000 (Rogers and Chesnutt 1978: 611, 613).

One thing is certain, South Carolinians had a preference for schooners. South Carolina shipwrights built more schooners than all other types of vessels put together. The ship registers indicate that the two-masted, fore-and aft-rigged schooner, ideal for coastal trading vessels, averaged about 20 tons burthen and accounted for about 80 percent of the registered South Carolina-built vessels. This appears somewhat astonishing, especially when compared to records from the other colonies where the schooner accounted for only about 25 percent of the vessels built. Elsewhere in the American colonies, the one-masted sloop rig, such as the Malcolm Boat appears to be, was the most popular rig, accounting for roughly one-third of all vessels registered in the colonies (Goldenberg 1976:131-255).

This penchant for schooners is perhaps a result of the coastal trade which formed a large part of the commerce in and out of Charleston. In addition to a lively Atlantic and Caribbean trade, South Carolinians carried on an extensive and active coastal trade. Rice, indigo, lumber, naval stores, and the other products of the coastal plantations and settlements had to be transported to Charleston for trans-shipment to England and elsewhere. Similarly, the products from England and Europe that arrived in Charleston had to be distributed back to these colonists who were starved for manufactured goods of all kinds. This coastal trade required a
small, fast, shallow-draft vessel that was maneuverable enough to sail among the coast's sea islands. The small coasting schooner being built by South Carolina shipbuilders fit the bill perfectly. Looking at the records of port arrivals and departures for a one year period from June 1765 to June 1766, we find the majority of cruises for schooners involved short coastal runs, while sloops were being used for short ocean cruises, such as those to the Caribbean and Bermuda (South Carolina Gazette:June 2, 1766).

The introduction of sailing craft of traditional design and construction into the Carolinas has been covered in a number of excellent publications ranging from Rusty Fleetwood's (1982) *Tidecraft* to P.C. Coker's (1987) *Charleston's Maritime Heritage 1670-1865*. Both the archaeological record examined by the authors and the archival record on which the above works are based indicate a wide variety of small craft in use in the area from its earliest times, to the mid-nineteenth century when sail craft were being supplanted by steam vessels and railways.

Many of these small riverine sailing craft had their design origins in the smaller craft of European environments such as ketches, pinks, cutters, sloops, and pinnaces. (Coker 1987:46-45; Fleetwood 1982:21:23). These vessels were sized in the 20 to 50 ton range, and were built purely for local riverine and short coastal travel.

The demand for these smaller hulls was fueled by the expanding plantation system during the early years of the eighteenth century. Early exploitation of the colony through the Indian, fur, and naval stores trades followed the river systems. The subsequent rise of the plantation system followed these same routes and the resulting export trade was almost entirely dependent upon the river system for transportation to coastal ports (Lewis 1984 54-61:Figures 3.13, 3.16 - 3.17).

The different demands of the plantation system, ranging from rice culture craft and purely local transportation needs, to the more substantial vessels for long distance riverine transportation, gave rise in large part to the diversity of craft in the colony. While many of these vessels were not ship type hulls, the archaeological record shows that traditional ship hull techniques were in fact used for quite small local craft. The “Transom Boat,” a vessel found as part of the Santee Canal Sanctuary (38BK102) in Biggin Creek is a probable example of the kind of sprit or lug-sailed small craft that may have been widely used in small rivers and creeks (Newell 1989:47-49, Figure 59). Similarly, a small fishing vessel recorded on the beach of Hunting Island (38BU157) in 1987 may be typical of the small decked coastal craft used in the nineteenth century (Amer 1992; Newell 1988:8).
Of these craft, some general statements can be made. They are beamy and shallow, square-ended, and usually flat-bottomed with a skeg. Construction is plank on frame generally utilizing yellow pine for the carvel planking, and live oak for major framing pieces with additional use of cypress. This local wood also seems to have been the wood of choice for treenails.

While most early craft appear to have been built at shipyards, the plantation system clearly developed an ability to produce small craft ranging from plantation barges to sloops (Zierden 1985:34). The construction methods used by shipyards and plantations, judging from the archaeological record, were relatively crude during the early eighteenth century. General descriptions of the process of converting the colony's rich stands of native timber into sawn planks, shaped knees, and other structural timbers is given in Chapelle (1935:9) and Coker (1987:49-52). The local archaeological record shows that these methods became more sophisticated as the century progressed. A typical example would be the use of few "mold" or control frames in the construction of the approximately 1735 vessel recovered at Brown's Ferry on the Black River (38GE57), compared to the large number of pre-cut control frames used in the Biggin Creek (38BK877) and Mepkin Abbey (38BK48) vessels of approximately one hundred years later.

These vessels, called coasting schooners, appear to be the most popular, and durable, of the ship-built sailing craft produced by South Carolina shipyards and shipbuilding plantations. The shell was designed to be lightly built, yet shallow and beamy enough to maximize cargo capacity in an operating environment which included shallow rivers and coastal harbors with shallow bars at the entrances. The flat bottom of the early eighteenth century and the later shallow keels of nineteenth century vessels were all built parallel to the waterline to facilitate docking at plantation landings where the vessel would rest on the bottom during low tide.

There has been some discussion suggesting that the coasting schooner hull was derived from the pirogue form (Fredrick M. Hocker, personal communication 1991), the term or its derivations being applied to any vessel with this flat-bottomed shape. Considering the single log origin of the pirogue hull, it is more likely that the pirogue was a separate and distinct type of hull which was built and operated concurrently with the flat-planked coasting schooner hull. Clarification of this point is not offered by the archival record in which recorders may, or may not, have accurately identified the two types of vessels in their entries. This hypothesis can only be tested by the discovery of pirogue hulls in the same temporal contexts as coasting schooners where a comparison of construction techniques can be made.
Upland or mountain boats were the product of the mountain regions of most of the eastern seaboard states. This craft was designed in direct response to cargo type and operating environment. Cargoes were heavy and bulky 136 kg (300 lb) cotton bales and 363 kg (500 lb) tobacco hogsheads, yet the rivers were narrow and swift. The resultant craft had an extreme beam to length ratio, a responsive steering system, and light, limber construction.

The basic mountain boat design appears common to other areas of Europe where similar operating environments existed. Design and function parallels are easily found in Findland’s “Tar Boats” (Carl Olof Cederlund, personal communication 1991) and in the wine boats of Portugal’s Douro River (Filgueras 1988). Both types of vessel transported barrels down mountain rivers and utilized a long narrow length with a narrow beam and a large steering sweep. Historian Howard Chapelle (1951:34) credits the form with a Medieval origin in Europe, and particularly in France where the type was known as the bateau. Chapelle believed the craft and its name were adopted by early colonists, and certainly by the French in Canada where the vessel type is known to have been in use from 1680 to well into the nineteenth century.

A similar craft of narrow beam and extreme length called a Durham Boat was used in the American northeast. The craft was in use prior to the American Revolution and is mentioned in numerous sources as the type of vessel used to transport General Washington across the Delaware during the conflict (Ringwalt 1888:13-14). Certainly after the war the vessels were used extensively on the Mohawk River in New York to transport tobacco barrels. According to Ringwalt (1888), the Durham Boats were patterned after early eighteenth century ore boats used by mines on the upper Delaware River.

Author Ruby Rahn (1968:15), using local newspaper sources, also describes a local variation of the craft called Petersburg Boats operating on the Savannah in the early nineteenth century.
Project Area Environment and Geomorphology

The Malcolm Boat site (38CH803) is located beneath a small mud bank approximately 19 km (12 miles) upstream on the Ashley River (Figure 1). Historical documents describe the Ashley River as a comparatively short river which flows through practically level land. It was navigable by small boats up as high as Bacon's Bridge, approximately 48 km (30 miles) from the city of Charleston (Smith 1988:107-108). Compared to other rivers in South Carolina, the Ashley River is more reminiscent of a tidal basin. Initially, colonists denied the possibility that this was a river at all, describing the Ashley as “only an arm of the sea” (Waddell 1988:43).

The Ashley River has an average freshwater inflow of 73.9 m$^3$ per second, with a drainage area of approximately 907 sq. km (350 sq miles). It flows in a southeastward direction and its lower reaches form the western shore of peninsular Charleston. The river is tidal and bordered by marshlands (U.S. Army Corps of Engineers 1976:7). In contrast to the Cooper River, which has a large volume of fresh water suitable for historical crops like rice, the Ashley River is characterized by only a small amount of fresh water influence (Tiner 1977:2). The dominant species for higher salinity marshlands like those bordering the Ashley River are smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*). Smooth cordgrass endures the deepest and longest salt water inundation, whereas black needlerush is subject to less flooding and grows on higher ground.

The wreck is situated in a filled channel of a small slough or creek running up into the marsh on the east bank of the Ashley River. Deposition of the vessel in the mouth of this creek or slough may have caused this siltation effect. The site is bordered by a low forested area having a palmetto understory and dark heavy soils indicative of periodic inundation. Vegetation growing on the marsh mud deposits covering the site consists of several typical salt marsh species (Figure 6). The dominant species are smooth cordgrass (*Spartina alterniflora*), salt grass (*Distichlis spicata*), black needlerush (*Juncus roemerianus*), cattails (*Typha angustifolia*), and big cordgrass (*Spartina cynosuroides*). A low natural levee fronting this marsh also includes a low shrub-like plant called sea-ox eye, *Borrichia frutescens* (Beard 1992).

Approximately 100 m (327 ft) to the north of the site is a high bluff created by a well-drained upland forest consisting of mixed pine and hardwoods. An
historical document describing the vegetation along the Ashley River lists a variety of oak, ash, hickory, polar, beach, elm, laurel, bay, sassafras, dogwood, black walnut, and cedar trees (South Carolina Historical Society 1897:333).

The marshy area in which the Malcolm Boat is imbedded consists primarily of very clayey organic Handsboro mucks and is inundated twice daily with salt water (Eppinette 1990:138-139, 72). Soils adjacent to the site include Coosaw loamy fine sands in the upland areas. The lowlands around the site generally consist of Mouzon fine sandy loams which are less permeable and wetter than the well-drained Coosaw sands (Eppinette 1990:138-139, Plate 39). These soils all overlay a hard substrata of Cooper Marl which was deposited during the Oligocene Epoch (U.S. Army Corps of Engineers 1972)

When the Malcolm Boat was discovered in 1985, it was described as eroding out of the river bank. During 1986 and 1987, periodic inspections of the site by SCIAA revealed that it was evident the wreck was in danger of being totally destroyed by the erosional effects of power boats. It was determined that steps needed to be taken to protect the site. SCIAA personnel covered exposed portions of the site with sandbags. This slowed the deterioration of the vessel itself, but could not prevent the erosion of the surrounding marsh. During the 1992 excavation of the wreck, the growth of the marsh vegetation into the sandbags was apparent. This had served to provide additional protection and support for the timbers.

Marshes are recognized as one of the most productive habitats in the world and are highly vulnerable to disturbance (Tiner 1977:1). The erosional effects of human activities such as continuous boat wake, or infrequent but intensive ditching and dredging--the latter probably being synonymous to archaeological excavation--has been discussed by many wetlands plant biologists (Eleuterius and Caldwell 1981a; Kuenzler and Marshall 1973; Lewis 1982). Small, infrequent, or low intensity disturbances do not result in major environmental changes to a tidally flooded marsh. Repeated or high intensity disturbances which destroy the perennial below ground structures of marsh plants could cause localized shifts in plant species composition. As the excavation of the Malcolm Boat cut into the marsh approximately 1 to 2 m below ground level, this would have disturbed below ground marsh plants, and a future species composition change could be anticipated in this very localized area where the excavation took place.

Initial revegetation in a disturbed salt marsh is accomplished first by smooth cordgrass--later the other species are gradually reestablished. Archaeological site
stabilization in disturbed areas can be undertaken by replanting cordgrass seedlings or transplanting plants formerly removed from the site. Plants can also be transported from other marsh areas. The best time to do this in a climate like South Carolina's is during the months of April and May (Stalter 1968:58, 150). Methods of propagation for cordgrass seedlings are described in a reference by Wodehouse (1974).

The geomorphological dynamics of a marsh are both an advantage and disadvantage for the archaeological management of wrecks. Marshes are particularly sensitive biological environments which are easily disturbed by excavation processes. This is evident from numerous marshland studies. Backfilling and site stabilization are therefore an important planning consideration. Logistical problems in dealing with silty effluent from dredging and screening of artifacts are associated with specific environmental permitting stipulations in South Carolina that also have to be taken into account. Dense plant root systems create problematic and difficult excavating situations. Fieldwork has to be scheduled around tidal windows and preferably during the spring or fall to take advantage of the more favorable climatic working conditions. Replanting marshland plants also requires seasonal planning.

The advantage of a marsh site is the good preservation of organic items such as the barrel staves from the Malcolm Boat, and the leather sailors' palm from the Clydesdale Vessel (38JA201) excavated in the Black River in 1992 (Hocker 1992a). The heavy marsh mud and plant root system provide protection and support the timbers of a wreck. Once the area has been backfilled and plant growth has been reestablished, a wreck in a marsh is probably at less risk from destructive natural disturbances than submerged wrecks in rivers or the ocean which are subject to more excessive fluvial and sedimentary processes. Projects on shipwrecks located on land rather than underwater are less costly operations than their submerged counterparts, and provide an ideal environment for training students.
Research Design

When the Malcolm Boat (38CH803) was first discovered in 1985, it came at a time when few ship-built craft had been formally investigated in the state. The remains of the merchant ship found at Brown's Ferry, on the Black River, had been raised by the Underwater Archaeology Division in 1976. The construction and lines of the hull were recorded and reconstructed by J. Richard Steffy (Albright and Steffy 1979; Steffy 1978a, 1978b). The Brown's Ferry Vessel (38GE57) was the first locally built merchant hull to be so studied. The unique nature of its architecture and design prompted Steffy to declare it "the most important single nautical discovery in the United States to date" (Albright and Steffy 1979:141).

In 1980, the remains of a second, locally built 'freighter' were surveyed by the Underwater Archaeology Division at Mepkin Abby (38BK48) on the Cooper River. Although sharing some construction features with the Brown's Ferry Vessel, the ship investigated at Mepkin Abbey was of a different design, and was estimated to have sunk approximately 100 years later than the former (Wilbanks 1981).

Five years later, a third ship-built vessel was reported to the Underwater Archaeology Division and investigated the following year. Artifacts recovered during the excavation of the boat (38BK856), sunk near Lewisfield Plantation on the West Branch of the Cooper River, suggest that the remains may have been that of a British vessel sunk during the Revolutionary War at that location (Steen 1986).

Several other ship-built vessels, abandoned on the banks of South Carolina's rivers, were recorded in the mid-1980s by William R. Judd, now a research associate at SCIAA. His scale drawings of these vessel remains, including those of a small sailing ship offshore from Magnolia Plantation less than 2 km upstream from the Malcolm Boat site, provided archaeologists with much of the knowledge about ship-built vernacular boat construction at that time.

It was this paucity of knowledge about locally built ships that led to the sensible decision to stabilize the exposed stern of the Malcolm Boat and research its...
The Brown’s Ferry Vessel (38GE57) is now being restudied by Fred Hocker at Texas A&M University. A new interpretation of its construction and form based on more complete data is awaiting publication (Hocker 1985, 1992; Leader 1992). So too, the vessel at Lewisfield Plantation [Little Landing Wreck 1 (38BK856), named after the 1000-acre tract which was renamed Lewisfield in 1765] was reexamined and a new interpretation of this single-masted boat offered (Amer and Thompson 1989). A second boat [Little Landing Wreck 2 (38BK861)], located approximately 1.6 km (1 mile) downstream from Little Landing Wreck 1, was also surveyed and represents the remains of a 14 m long, flat-bottomed sailing craft of local manufacture (Amer and Thompson 1989).

Other relatively beamy sailing hulls dating to the late eighteenth and nineteenth centuries, investigated by the Underwater Archaeology Division since 1985, include the Biggin Creek Vessel (38BK877) (Amer 1989), the Transom Boat, a vessel found in the Santee Canal Sanctuary (38BK102)(Newell 1989), the Hobcaw Creek Plantation Vessel (38CH1289) (Beard 1991), and the Pimlico Wreck (38BK1614) (Harris et al. 1993). More recently, the remains of a 14 m (46 ft) long sailing vessel (38JA201), used to repair a washout of a dike on the Savannah River during the late eighteenth century, was excavated by the Nautical Archaeology Program at Texas A&M University as part of a cooperative agreement with SCIAA (Hocker 1992a). The vessel is probably an example of the large number of coastal sloops that were used to maintain speedy contact between plantations and southern coastal ports during the colonial era.

Other types of sailing craft investigated in the state include the remains of a number of ocean-going ships unearthed from beneath the dunes of South Carolina's beaches at Myrtle Beach, Pawleys' Island, and Isle of Palms, and a “well smack” fishing vessel (38BU157) wrecked on the shore of Hunting Island during the nineteenth century (Amer 1992; Newell 1988). Additionally, studies of other types of locally built watercraft used historically on South Carolina's waterways (Harris 1992; Harris et al. 1993; Newell 1991, 1992c), including steamboats (Harris 1991), ferries, and their associated terrestrial components (Barr 1993), have added significantly to our understanding of trade and transportation, as well as political, economic, and social development in the state. A recent underwater archaeological survey of a section of the historic waterfront of the city of Conway allowed archaeologists a glimpse at the deposited cultural remains of a South Carolina riverine commercial center that flourished during the late eighteenth and nineteenth centuries (Newell 1992b).
Two recent experimental projects have allowed archaeologists to study the design and construction of two types of watercraft used historically on the waterways of the southeast by actually building the craft. A full size replica of a nineteenth-century plantation barge was built using both traditional and modern methods (Newell 1992a), and the timbers have just begun to be assembled for a replica of a Petersburg "mountain" boat (Newell 1992).

This body of knowledge has better equipped the Underwater Archaeology Division archaeologists to assess the remains of watercraft found in the waterways of the state, and determine the significance of each find and the level of documentation needed to adequately record the site.

There is a growing collection of published works on the agricultural products cultivated in colonial South Carolina and the effects of these products on the socio-economic development of the state. Much has been published on the more economically important industries in South Carolina like rice (Carpenter 1973; Dethloff 1988; Doar 1936) and cotton (Heyward 1937; Watkins 1908), and the folkways of the people who were involved in the cultivation of these crops (Joyner 1977). Most of these works make mention of the watercraft that were used to transport the products to and from market and various points of trade, but they seldom include enough detail to glean much useful information about the design or construction of the craft.

Several works have been published that address the economic beginnings and development of the colony (Clowse 1971, 1981; Stumpf 1971). The latter two works focus on the merchants and mercantile operations that centered around Charleston as "Charleston was the key to reconstructing colonial South Carolina's economic development" (Clowse 1981:iv). Clowse (1981:2) bases his analysis of Charleston-based overseas commerce on the copious and detailed records left by the "functionaries enforcing British mercantile laws and regulations" which he considers to be the "only large body of unexploited comprehensive archival sources for plotting the outlines of colonial trade [in South Carolina]". Coker (1987:35-52) presents a well-rounded history of the evolution of trade in Charleston, emphasizing the ships and products involved and the development of trade practices during the commercial growth of that port. Combined, the works of Coker, Clowse, and Stumpf, based on colonial records, present a fairly comprehensive picture of merchant practices and commercial exploitation in colonial South Carolina. From its earliest beginnings as a colony, there developed in the state a trade network, at first with the Native Americans for pelts, then as the commercial
potential of the colony grew and overseas markets developed, commercial relations were established with the West Indies and other continental colonies. As the rice culture expanded during the early eighteenth century and superseded all other exports, trade with England began to flourish (Stumpf 1971:82-83).

The South Carolina colonial merchants were engaged in a multitude of trade which often made it expedient for them to invest in, or own, their own vessels. Accounts of ownership of trading vessels along with descriptions of the boats, size, and tonnage, as well as trade practices, commodities traded, and destinations pervade the diaries and journals of these colonial merchants (e.g. Drayton 1793; Edgar ed. 1972; Hamer and Rogers 1970; Rogers, ed. 1974; Rogers et al. 1978, 1979, 1981).

A review of published works on the colonial vessels and the shipbuilding industry in colonial South Carolina has been detailed elsewhere in this report.

The Malcolm Boat presented some interesting prospects. Unlike many of the hulls residing beneath the waters of the state which came to untimely ends, evidence suggested that this craft might have been deliberately dragged out of the main thoroughfare of the Ashley River and abandoned. If this was the case, it would afford archaeologists an opportunity to examine a hull which had been used for some considerable length of time, complete with the damage and wear and tear associated with many years of usage. Furthermore, the hull might be essentially complete and provide evidence of a refit and repairs.

Questions that have the potential of being answered by the hull remains relate to the form and function of the craft. These include: What type of vessel was the Malcolm Boat? When and for how long was the vessel operated? Does the hull provide evidence of where the vessel operated? Does the hull represent an inland watercraft, or a hull with the capability of coasting to other American colonies, or plying the open ocean in trade with offshore markets like the West Indies? Was the boat truly abandoned complete or was it stripped of useful components like fasteners and timbers destined for reuse? Do the raw materials that make up the hull reflect local manufacture and, if so, does the design represent local shipbuilding traditions, or an adaptation of contemporary boatbuilding practices imported to the colony utilizing local raw materials? Was the craft built for cargo carrying capability and how much cargo could it carry? We might further ask what the design, selection and use of raw materials, and construction techniques (as inferred by analysis of the construction of the hull) can tell us about the people who designed, built, owned, and used the boat. It is known, for example, that much of
the small craft construction of the mid eighteenth to nineteenth centuries was done by slave carpenters (Kemble 1984:62), but there has yet to be any field documentation of techniques that can be directly attributed to a specific cultural group.

The site itself and its location suggest other questions: Are there artifacts and features in and around the site that provide evidence about date, longevity, and region of use of the boat? Is evidence available that could explain the vessel's presence at that location; is it possible that the vessel was abandoned on, or near, the property of the owner, operator and/or builder? On a broader scale, does the presence of this vessel in the Ashley River support an emerging pattern of abandonment of locally constructed watercraft in the sloughs and creeks of South Carolina's Low Country when the usefulness of those craft's was at an end (Amer and Thompson 1989; Beard 1991)? Furthermore, what can be inferred from the site about socio-economic development, trade, and transportation in colonial South Carolina? For example, the vessel remains lie in an area in which soils are not particularly fertile, but which is very accessible by water to Charleston. Historically the banks of the Ashley River were settled by the wealthier inhabitants of the state who carried on business in Charleston from whence trade with other colonies, the West Indies, and Europe was conducted. Might we infer that the boat may have been used in overseas trade?
Methodology

Excavation methodology for the Malcolm Boat (38CH803) project closely followed that presented in the initial proposal for the work, but for one major departure in technique. Extensive probing during the first day's site evaluation indicated that the upstream or port side of the vessel remains were not as intact as the starboard side. This may have been due to direct exposure to river currents or other factors. In view of this finding, the initial plan to excavate the opposing forward port quarter and stern starboard quarter of the vessel was dropped.

Instead, the entire starboard side was selected for excavation, this approach still leaving a major portion of the site undisturbed as a control and (quite literally) "in the bank" for future study. This also had the unforeseen advantage of providing an open site area to the tides which kept the excavation "flushed" after each day's work.

The evaluation also indicated that the topmost sections of the starboard futtocks were either exposed or very near to the surface of the mud bank. Excavation began with the removal of overburden from these futtock tips in order to expose the shape of the starboard hull. This procedure consisted of carefully removing and stockpiling blocks of marsh grass and sediments for later reintroduction over the site. The heavily matted Spartina roots from existing and previous growth gave the overburden a peat-like quality enabling approximately 20 cm blocks to be cut with shovels and bush axes. Once the stempost of the vessel had been located, a line from it to the center of the exposed stern on the foreshore was used to delineate the approximate centerline of the vessel.

Primary and secondary datums (Figure 7, A and B) were installed on high ground near the site, and a primary datum line was established approximately 2 m from the bow, running approximately perpendicular to the centerline of the boat. A tertiary datum point (Figure 7, D) was located approximately 2 m aft of the stempost of the vessel along the line of the keel, and an intermediate datum point (Figure 7, C) placed at the intersection of the vessel's centerline and the primary datum line.

Using these controls, accurate provenience was kept on hull structure, artifacts, and features while excavating the site. Excavation proceeded in approximately 20 cm levels. During the initial excavation phase, horizontal and vertical control on loose finds was maintained by reference to extant hull structure.
and with a transit set up within the control framework. Hull components were tagged with sequentially numbered cattle tags oriented to grid north, and loose timbers and artifacts were recorded in situ, removed, photographed, and drawn to scale.

Each crew member kept a daily log of activities and notes. These were turned over to the principal investigator at the end of the project. The principal investigator kept a more detailed daily log of activities and notes, and was responsible for ensuring that all forms and catalogs were properly kept by the field staff. All excavation records, photographs, and artifacts are now curated at SCIAA.

Once the entire starboard side of the vessel was exposed, a modular aluminum grid consisting of 2 m-square units was erected and leveled over the site (Figures 8 and 9). Using the grid, the field crew recorded the hull, making plan, profile, and section drawings, and taking numerous photographs and photo montages using a photo tower (Figure 10), to aid in the reconstruction of the vessel. The photo montage also provides additional data for production of an overall site plan, as well as a control for future assessment of site stabilization techniques. Data to enable us to reconstruct the hull lines was recorded by taking offsets from the outside edge of selected frames. Exterior examination of the hull, including the stempost and keel, was made by utilizing existing gaps in the vessel planking, which gave access to the keel and obviated the need for exterior trenches.

Since the vessel itself was the most important artifact on the site, special attention was paid to recording as much detail as possible concerning its construction. A general vessel plan was developed from the compiled data showing all structural members (e.g., keelson, mast step[s], framing, ceiling planks, pump wells, and fastener patterns). Several hull profiles were produced which were used to reconstruct the original hull shape and give some clues as to the type of environment the vessel was intended to operate in. Samples of wood from structural members were taken and analyzed in to determine the species used in the vessel’s construction, conversions and repairs during its life, and to shed some light on its origin.

**Site Stabilization**

Once recording of the vessel was complete, structural members that had been removed and recorded separately were placed along the keelson, and covered
with a layer of burlap and mud. Sandbags containing a mixture of sand and clay were “molded” to the shape of the hull. Loose sand and mud was then shoveled onto the bags to form a small mound over the vessel. The exposed sloping face of the mound was entirely covered with Exxon Geoweb (registered trademark). This is an erosion control material which allows water to enter the protective mound, but will not allow sediment to pass outwardly through the fabric. Mud was then shoveled onto this fabric, and the stockpiled sediments and marsh grass reintroduced to the site in order to attempt further stabilization of the mound.

This method was employed during the Santee Canal Sanctuary study in an attempt to stabilize several vessels encountered during the project (Newell 1989) and on the Clydesdale site (38JA201) (Hocker 1992a). The effectiveness of the stabilization on that project has not been determined at this time. However, Geoweb has been successfully used in erosion control projects such as shoreline stabilization.

The Malcolm Boat site was monitored during the next year to evaluate the effectiveness of these techniques and to measure subsidence. In June of 1993, a final covering of sand, sandbags, and mud was placed on the site to match the grade with that of the surrounding marsh. The site was then reseeded with sprigs of Spartina (alterniflora) (Figure 11).

Preparation of Hull Data

Finished drawings of the Malcolm Boat were produced through the use of field sketches made during the excavation phase. Members of the field crew, individually and in teams (volunteers and SCIAA personnel), were responsible for recording and drawing sections of the vessel and its location. Even though these drawings represent an accurate portrayal of the vessel in situ, there are discrepancies noted from drawing to drawing. This is a common problem when using a number of investigators to record extended features within a site. The discrepancies are interpreted as observer bias (Benard 1988).

Black and white photographs were used in conjunction with the field drawings. These photos were taken at approximately the same time the drawings were made so as to document excavation and recording of the vessel construction. Many of the photographs were arranged into a montage form and used as a reference guide and base for comparison with the field drawings. Both of these
data sets were of importance to, and useful for, an accurate portrayal of the ship in plan and elevation.

The concurrent use of field drawings, photographic montages, and field notes was essential for the incorporation of various aspects from all three sets of information. This allowed corrections and adjustments to be made, thus enhancing interpretation of the site and eliminating to some degree the effects of observer bias.

Finally, SCIAA site files were updated, and an assessment made as to the potential eligibility of the site for inclusion on the National Register of Historic Places. At this time, formal nomination forms have not been completed and submitted for consideration. Recommendations will be made to the appropriate agencies for monitoring, further stabilization, and interpretation of the site.
Field Data

Construction

The hull remains have suffered significant distortion through waterlogging and biological activity, which caused the wood structure to relax and the bottom timbers to conform to the contours of the slough (Figure 12). This situation evidently occasioned substantial fracturing and damage to the frames and planks along the area of greatest keel and keelson distortion (between frames 5 and 13). The situation may also have been exacerbated by burning of the keelson and timbers near the bow (Figure 13).

Keel

For most of its length, the keel lay buried beneath the marsh mud and therefore was not accessible for measurement and observation. However, along the excavated starboard side where the garboard had broken or pulled away from the rabbet, the keel's upper surface and rabbet could be observed (Figure 14). Additionally, the stern excavation of both the port and starboard quarters revealed the keel in its entirety at that location (Figure 15). Excavation down the starboard side of the keel near the bow revealed the keel/stem scarph, and thus defined the forward extent of this timber.

The 11 m long keel was cut from a single piece of southern yellow pine (Pinus spp.) (Appendix C) and finished to approximately .23 m on a side amidships. Forward of frame C, the sided dimension of the keel tapers down to .15 m across its upper surface to match the aft end of the stem to which it is scarphed. At the stern, the keel's sided dimension narrows to .13 m.

The keel's upper surface was dubbed flat for floor attachment and its upper edges were chamfered forming a rabbet to accept the garboards. The bottom of the keel was not fitted with a protective shoe timber. Hence, the bottom of the keel has been much degraded by mechanical and biological action. The lower surface also appears to have been rounded suggesting that the natural shape of the tree was incorporated into the shaping of this timber.

The forward end of the keel terminates in a flat scarph to facilitate stem attachment. The scarph has .36 m long horizontal tables and .11 m nibs. It is fastened with an iron bolt and .025 m treenails. Stopwaters, although not observed
in the scarph, most likely are present. In the stern, the aftmost .29 m of the keel’s upper surface is notched out to a depth of .15 m to accept the lower end of the post (Figure 15).

**Stem**

The stem assembly survives to a height of approximately 1 m, or half its estimated original height. This includes the lower 1.7 m of the stempost and the entire lower apron (Figures 13 & 16). The stempost was fashioned from naturally curved live oak (*Quercus virginiana*), and describes a graceful curve. A split follows the grain of the wood and extends almost the entire extant length of this timber. The stempost is sided approximately .15 m on its inboard surface and tapers to .08 m sided on its forward surface. It is molded .11 m at the after end of the keel scarph, molded .23 m at the scarphs forward end, and from there appears to widen towards its upper extremity. The after edges of the stempost are chamfered and, together with the chamfered forward edges of the apron, form the rabbet for the outer hull planking.

The lower apron is all that remains of this structure which once would have extended to within centimeters of the top of the stem. This 1.65 m long live oak timber is seated atop the forward end of the keel and the lower one-third of the stempost, and butts the forward end of the keelson. The apron is fastened to the stempost and keel with iron bolts and .025 m wooden treenails. It is moulded .11 m throughout its length, is sided .24 m at its base, and tapers to .15 m at its forward end. The upper surface of the apron near its aft end is notched to within .03 m of its lower surface to accept the floor timber of frame E (Figure 17). Forward of this no such modification was provided for cant frames F, G, and H, which are loosely fitted against the apron.

The two garboard strakes were made to fit into the rabbet formed by the chamfered edges of the apron and stempost. A .025 m stopwater bisects the two rabbets at the head of the apron. Its purpose was to deflect water traveling along the seams formed by the rabbets and the butted upper and lower aprons, thereby keeping it from entering the hull.
Framing

Twenty-nine frames or frame locations were recorded along the hull - three cant frames in the bow, 22 square frames along the keel, and four V-shaped floor timbers atop the stern knee (Figure 21). Each square frame was made up of a floor timber and three futtocks.

The floor timbers of the square frames were set along the keel on approximately .40 m centers, although room and space varies from .36 m to .46 m. Cut from both white oak and live oak naturally curved stocks, these timbers vary in dimension from .08 to .09 m sided and molded .07 to .08 m. Each floor timber is fastened to the keel and the keelson with a single treenail placed along the keelson's centerline. From the keel centerline to the floor timber heads, the arms of the floor timbers average approximately .50 m and extend to the turn of the bilge (Figure 22).

Watercourses, also known as limber holes, were cut into the bottoms of floor timbers of each square frame (E through 16). Each floor timber contains two watercourses, one on each side of the centerline of the hull, .07 m from the side of the keel. The holes average .05 m wide and .02 m deep and were formed by two parallel sawcuts, the wood between them being removed with a chisel or similar tool (Figure 23). Watercourses allowed for the passage of bilgewater along the length of the vessel. On the cant frames in the bow and the stern frames, watercourses were not provided. Evidently, the inexact fit of these timbers against the central timbers of the hull provided this function.

On the starboard side of the hull, 64 futtocks survived in their approximate original locations. Futtocks were cut from white oak and live oak stocks, and approximate the dimensions of the floor timbers. Each square frame is built up with a first futtock consistently placed against the forward side of the floor timber and alternating second and third futtocks. The heels of the first futtocks generally are placed .35 m to .55 m from the edge of the keel. Heels of the second futtocks butt the heads of the floor timbers, while those of the third futtocks butt the heads of the first futtocks. Third futtocks constituted top timbers of the boat and their heads would have been located at the gunwale (Figure 22).

Short planks, nailed between the futtocks of frames C, D, E, and 6/7 (Figure 24), suggest this method may have been used to gauge frame spacing during construction.
The sixth floor timber aft of the stem was the midship frame (Figure 25) and would have been the first frame to be erected during construction. It also represented the point of maximum breadth of the boat and served as a guide for framing fore and aft of that location. The components of the midship frame are fastened to each other laterally with .025 m treenails (two treenails per futtock), as are components of frames at alternate locations fore and aft (frames E, D, B, 2, 4, 6, 8, 9, 10, 12 and 14) (Figure 25). Elsewhere, frame components are fastened only to the hull planks and keel. Notably, frame 9 has been so fastened giving a sequence of three fore-and-aft fastened, or molded “made,” frames in a row. This may have been done to help define the shape of the hull during construction and would have strengthened this load bearing location in the boat.

At frames B, 2, 5, 10, and 12, the shipwright inserted additional futtocks into the hull. These futtocks, which were placed against the frames, were not fastened to frame components even when their placement coincided with a fore-and-aft fastened frame. It is likely that these additional futtocks were installed late in the construction sequence of the boat, or added to the vessel during her career to strengthen the hull along its cargo carrying area.

Three incomplete cant frames were recorded in their original locations in the starboard bow. Fashioned from white oak and live oak, each cant frame is fastened solely to the hull planks. Their heels were thinned to fit against, but are not fastened to, the apron (Figure 27).

In the stern, fragments of timbers found atop the stern knee and fasteners in the upper surface of the knee attest to the presence of four V-shaped floor timbers, frames 17 through 20. One incomplete V-shaped floor timber (Timber tag 20) (Figure 28) was recorded in situ in the aftmost frame location. The angle and bevel of its arms approximate those of the transom, confirming its correct location.

Other frame components in the stern were canted to follow the line of planking. These were evidently half-frames and were not attached to the V-shaped floor timbers.

Planks

While seven complete strakes were recorded running from stem to stern, the evidence suggests that the boat had up to 14 strakes per side. The garboard strakes were cut from cypress (Taxodium distichum) stocks and are .22 m wide in the stern, and .025 m thick. Their inboard edges and ends are shaped to fit into the
rabbets at the bow and stern. At the bow and stern, the shipwright was obliged to
twist the garboards almost 90 degrees from the hull's nearly flat bottom to seat them
in the rabbets. This was evidently accomplished in the stern. However, at least on
the starboard side of the hull, forward of frame D, the shipwright had replaced the
single plank with two narrower ones to accomplish the same thing.

Above the garboard strakes, hull planks are of southern yellow pine and
sawn to widths of from .11 m to .22 m and from .025 m to .03 m in thickness. The
one wale, located high on the hull, has a thickness of .05 m. Planks are fastened to
each frame with .025 m wedged treenails (Figure 29) and .006-.008 m square iron
nails. Plank ends are fastened with from two to three nails.

In the stern, the ends of the garboards and second planks were cut and
bevelled to fit the aft-sloping rabbet of the post. However, above that, the plank
ends were cut perpendicular to plank edges to allow them to be nailed into the
bevelled edges of the transom (Figure 30).

Due to the lengths of the strakes in the Malcolm Boat, many in excess of 13
m, most strakes are not continuous, but are made up of two or more planks butt
joined. The shipwright placed such joints beneath frames. Consequently, because
only the interior of the hull was excavated, the location of these joints can only be
inferred by the run of the strakes (e.g., starboard garboard at frame D), or observed
where hull components have rotted away or become distorted (e.g., between frames
3 and 4) (Figure 31).

Keelson

The keelson, like the keel, has become badly distorted, notably between
frames 5 and 13 (Figure 11). The keelson had been extensively burned between
frames 1 and 2, causing that timber to fracture. Burning of half the timber's
thickness between frames B and C has caused further distortion to occur.

The keelson is a single southern yellow pine timber 8.35 m long, .10 m
molded, and sided .17 m. The timber's lower surface is notched to receive the
floor timbers to which it is fastened at each frame location with a single wedged
treenail placed along the centerline of that timber. The shipwright evidently was not
concerned about the potential for splitting along the line of treenails. At its fore
end, the keelson is notched over, and terminates at, frame D, although it is not
fastened to the floor timber of that frame (Figure 32). A similar construction occurs
at frame 16 which marks the aft terminus of the keelson (Figure 33).
Two rectangular mortises were cut into the upper surface of the keelson (Figure 34). Both mortices are .008 m in width and are cut completely through the keelson exposing the floor timbers and treenails beneath. The aftmost mortice, located at frame 3, is .14 m long, while that at the midship frame is .20 m long. The location and dimensions of these mortices suggest they were mast steps. When excavated, the forward of the two mortices was partially filled with wooden blocks.

A rectangular notch measuring .22 m in length and .06 m in width was cut out of the port side of the keelson between frames 13 and 14 (Figure 35). The dimensions and location of the cutout suggest that a bilge pump may once have been situated at that location. Two parallel cuts, scored into the upper surface of the keelson aft of the pump cutout, may have been used by the shipwright to position frames during the construction of the hull (Figure 33).

Ceiling

Seven ceiling planks or plank fragments were recorded in the starboard hull (Figure 36). Ceiling was recorded forward of the midship frame and extends from the keelson, out beyond the turn of the bilge to approximately the lower end of the third futtocks. Two limber planks (Timber tags 124 and 93) were identified, the former in situ between frames E and C, while the latter was found out of context near frame 7. Evidence was not found on the starboard side of the hull for the vessel having been planked internally aft of frame I. However, on the port side, a row of limber planks immediately adjacent to the keelson extend toward the stem, suggesting that the boat was, in fact, fitted with ceiling farther aft.

Ceiling planks were cut from cypress and southern yellow pine and are sawn to a uniform thickness of .015 m. Intact planks and measurements reconstructing plank dimensions indicate that ceiling strakes were made up of planks ranging from 1 m to 2 m and varied considerably in width; existing planks range from .13 to more than .35 m in width. Planks are fastened at each frame with from one to three .005 m square nails, although, twice that number of nails are used to fasten one plank (Timber tag 79) to frame D. Ceiling strakes were made up of planks that were butt joined over frames.

The limber planks and next plank outboard on the starboard side have been burned. The fire, which probably occurred after the hull had been abandoned, was fairly localized and centered on the keelson and limber planks, between frames B and C. The aft end of one limber plank (Timber tag 124) was completely
consumed, while the planks aft and adjacent to it were only charred on their inboard surfaces.

Although several of the ceiling planks recovered are split and burned, the surface features of most of the planks are remarkably well preserved. Telltale saw marks are clearly evident on several planks (Figure 37), while crossed lines inscribed into the inboard surface of one plank (Timber tag 82)(Figure 38) suggest construction marks or possible reuse of that timber.

The remains of a small wooden structure straddles the apron at frame E. The badly eroded .04 m by .08 m timber and attached vertical plank, which is shaped to conform to the rise of the hull, suggest this is the remains of a small bulkhead.

Shelf Clamp

An incomplete length of the starboard shelf clamp was found to be well preserved for approximately half its estimated length (Figure 39). The shelf clamp lay along the inboard surface of the frames, .30 m to .50 m below the extant frame tops between frames 1 and 13. Cut from straight-grained southern yellow pine, this timber is 4.92 m in length, .03 m thick and varies in width from .12 to .14 m. It was fastened to every second frame with a single .008 to .011 m square nail, except at the aft end where twice the number of fasteners were used.

The shelf clamp terminates aft in a finished end, while the forward extremity is broken. The complete shelf clamp, which once extended the full length of the hull, would have been composed of three segments butt joined end to end, and was originally fastened higher on the hull. Notches were cut into its upper edge, at intervals along its length, to accept the ends of deck beams (Figure 40). The notches range in length from .08 m to .11 m and are approximately .015 m deep. The location and dimensions of these notches reflect the location and sided dimensions of the deck beams they once supported. Longer notches, also cut into the shelf clamp's upper surface, were evidently designed to accept the fore-and-aft arms of lodging knees.
Knees and Beams

Two lodging knees were recorded lying in approximately their original positions (Figure 38). The forwardmost knee (Timber tag 2), fashioned from naturally curved white oak, measures .63 m along its fore-and-aft arm, .95 m sided, and is molded .13 m (Figure 41). The knee’s athwartship arm, located at the knee’s forward end, is all but absent, no doubt torn away with the beam it once secured. The knee is notched over frames 4 and 5, and fastened to the hull planks and frames with .025 m treenails and an iron bolt; evidently it was similarly fastened to a deck beam.

A second lodging knee (Timber tag 34) was recorded notched over frames 8 and 9, its athwartship arm facing aft. Fashioned from naturally curved southern yellow pine, the knee measures .60 m along the arms, is molded .09 m, and varies from .11 to .18 m sided (Figure 42). The outboard surface of the knee was bevelled to ensure a tight fit against the inboard surface of the futtocks and hull planks to which it was fastened with treenails and an iron bolt. The soft wood of the knee had been invaded by teredos and the roots of the surrounding vegetation. The athwartship arm had split, no doubt caused when the beam to which it was attached tore away or was otherwise removed.

A single, incomplete length of beam (Timber tag 60) offers the only direct evidence of the vessel having been decked (Figure 43). The beam, cut from the heartwood of straight-grained southern yellow pine, is molded .11 m and varies from .15 to .16 m on its sided dimension. Evidence suggests that the beam, which once spanned the vessel from gunwale to gunwale, had been cut, presumably after the boat was abandoned, leaving 1.49 m of its length to be discovered by archaeologists. Extensive teredo damage along one surface indicates that at least that surface had remained exposed for a period of time after the vessel was abandoned. The remaining finished end of the beam had been notched to fit into one of the .11 m long beam shelf notches, and bevelled to fit tightly against the hull planks. The location of iron and treenail fasteners indicate that the beam was fastened through the hull planks with a single .02 m treenail and to a lodging knee (evidently Timber tag 34) by a treenail and an iron nail. The beam was found near frame 11 which, along with the evidence from the beam shelf, knee, and fasteners, suggests that the original location of the beam was near that frame.
Analysis and Interpretation

Having described, in the previous section, the existing structure of the Malcolm Boat (38CH803), it is necessary to reconstruct on paper the missing portions of the hull and the original appearance of the vessel. These include the port side of the hull, which was left unexcavated, the top of the stem and stern and the missing portions of the starboard side. Decking, mast, boom, bowsprit, and associated rigging components were also absent from the site of the Malcolm Boat and will require educated conjecture to reconstruct. It is also necessary to answer as many of the questions posed in the research design as possible regarding the date, longevity, and region of use of the boat, as well as more general questions regarding the origin of the vessel type, the form and function of the hull, and trade and transportation in colonial South Carolina.

Abandonment

One of the first questions we sought to answer was whether the data supported the hypothesis that the Malcolm Boat had been abandoned. Evidence from the excavation strongly supports this concept, and indicates that the vessel had a lengthy career during which the hull was strengthened and repaired. Her demise may have come when damage from shipworms (*Teredo navalis*) outpaced the owner's ability to repair the worm-riddled hull.

One of the greatest scourges of wooden ships that operate in warm ocean waters has always been shipworms. Generally, the movement of a ship's hull through the water prevents the worms from attaching themselves to the planking (Coker 1987:56). However, once attached, these voracious members of the mollusk family can turn the bottom of an unprotected wooden ship into something akin to Swiss cheese, weakening the structural integrity of the vessel and making it unseaworthy.

Over time, many methods have been used in attempts to protect ship hulls from the damage wrought by these worms. One of the earliest methods was simply to cover, or sheath, the hull with another layer of thin planks. This "false hull" was often separated from the hull by a layer of tallow, sulfur, and horse hair (Goodwin 1987:226). This method appears to have been common in South Carolina during the mid-eighteenth century. Henry Laurens noted that his schooner *Betsey* was
being sent to the shipyard at Hobcaw “to cover the damage done to her bottom by worms.” For this purpose, he ordered sheathing boards of three-quarter inch pine from a mill on Daniels Island (Hamer et al, 1972: 117, 524).

A variation of the “false hull” method was to drive closely spaced iron nails into the wood sheathing which oxidized into a layer impenetrable to the worm. However, the oxide layer encouraged proliferation of other marine growths which affected the vessel’s speed and changed the lines of the ship, rendering the method impractical (Boudriot 1987:241-245).

Another method often employed was to place thin layers of lead sheathing over the hull. Lead proved to be a less than ideal material due to its excessive weight and the fact that it caused an adverse electrolytic reaction when in contact with the iron hull fasteners (Goodwin 1987:226).

The most successful method for protecting wooden ships from worm damage was the introduction of copper sheathing during the early eighteenth century. A variety of experiments were carried out by the Royal Navy which then adopted the process for all navy vessels in 1782 (Goodwin 1987:226-227). The expense of this method, however, generally precluded its use for commercial vessels.

Evidently, the shipwright or owner of the Malcolm Boat was unwilling or unable to protect the hull from the assault of shipworms, evidence of which was recorded during the excavation on the keel and starboard garboard, and first strakes between frames 8 and 13.

As was anticipated, very few artifacts were recovered during the excavation. All of the artifacts recovered can be dated to a period roughly encompassing the last quarter of the eighteenth century and the first quarter of the nineteenth century. The samples are simply too small to attempt any mean dates. This dearth of artifacts, as well as the absence of components of the upper hull, decking, mast and rigging, further strengthens the theory that the vessel was simply abandoned at the site and stripped of any useful materials.

There was also the question of how the Malcolm Boat came to be completely buried in the marsh perpendicular to the river channel. It was originally thought that the vessel had been run ashore, possibly at high tide, and that it had then settled lower and was covered by marsh accretion.

One of the first things noticed about the wreck when we began excavation was that the stern appeared to be lower than the surrounding marl which is exposed along the shore at low tide. Probing indicated that the vessel had settled into a
slough or stream bed cut into the marl. While the dimensions of this channel have not been precisely determined, probing through holes in the bottom of the vessel indicates that it rests on the marl at some points, while at others it settled onto a foot or more of mud which overlay the marl in the channel. The severe warping of the vessel's structure aft of frame 5 (Figure 21) may be the result of the vessel settling over a marl shelf, a common geological formation in the region.

The final clue to this mystery was discovered on an historic plat of the site (Figure 5). This plat clearly shows a small slough just south of a landing associated with the Whitehouse Plantation. A little further downstream is a remnant of the terminus of a canal also shown on the plat. As an area such as this would naturally have a great deal of vessel traffic, it is understandable that the vessel would have been pushed as far into the slough as possible in order to remove it as a hazard to navigation. A similarly abandoned vessel was discovered in Hobcaw Creek in 1991 by a crew building a small dock. This vessel, The Hobcaw Creek Plantation Vessel (38CH1289), also appears to have been stripped prior to abandonment (Beard 1991).

Construction Order

The sequence in which the Malcolm Boat was constructed can be deduced from the preliminary analysis of the preserved remains. The construction of the hull would have commenced with the laying of the keel. The stem was then scarphed to the forward end of the keel and the stem post mortised into its aft end. The rabbet/bevel, which was worked in the sides of the posts and the upper edges of the keel, completed the backbone.

The midship frame, D, was the first “mold frame” to be erected in the hull. This frame, made up of a floor timber and first, second, and third futtocks, was erected approximately one-third of the vessel's length from the bow at the hull's widest point. The shape of the midship frame would have been predetermined by the shipwright, being taken off a half-model, lofted, or shaped by eye. When the best shape was found, the floor timbers and futtocks were fastened together, and the frame erected and treenailed to the keel. The other mold frames, whose shapes governed the final form of the vessel, were assembled in the same manner as the midship frame and fastened along the keel. Twelve of the 22 square frames, or almost half the frames in the hull, were assembled in this manner. By employing a relatively large number of made, or mold, frames the shipwright did not allow for
much flexibility during the construction process, as the shape of the hull was strictly determined by these frames (Greenhill 1988:110-125). However, it did make for a strong hull—perhaps his purpose.

The garboards, wales, and possibly the planks at the turn of the bilge could be fastened, the keelson installed, and the remaining floor timbers set along the keel. Once the hull was “framed up,” deck beams which carried decking fore-and-aft and provided transverse strength, were fastened to the hull. The first two beams to go in would have been those at each end of the main hatchway, as the length and location of these beams determined the size of the largest object that could be carried as cargo (Greenhill 1988:134). Finally, the remaining frames were finished off, the hull planked up and caulked, and the boat completed.

Reconstruction of Hull

Reconstruction of the Malcolm Boat has relied upon several sources, including archival and literary sources, and archaeological remains of this and other vessels. However, it is the hull of the Malcolm Boat that provides us with most of the clues for reconstructing the vessel. For example, the starboard side of the vessel, amidships, is preserved to a height of several centimeters above a thick wale strake. This indicates that probably no more than two or three strakes are missing up to the gunwale. Furthermore, even though much of the hull has separated from the backbone of the vessel along the line of the garboard strake, several of the mold frames retain their original curvature. These two factors allow us to reconstruct the shape of the hull with a fair degree of certainty.

The deck and most of its supporting structure are entirely missing. However, a length of notched shelf clamp, two lodging knees, and an incomplete section of deck beam clearly indicate size and spacing of some of the beams. Mortices in the keelson provide us with evidence of the mast location, while a cutout in that timber at the base of frames 13 and 14 indicates the seating for a bilge pump. It is estimated that all of the transom planks for the starboard side were excavated, although their position on the stern structure needed to be reconstructed.

Where areas of the hull were completely missing and the hull remains provided no evidence to assist in the reconstruction it was necessary to consult contemporary plans and descriptions of late eighteenth century sailing craft. Very little is known about the small, locally built craft that plied the inland waterways of the South and conducted trade with other American colonies and offshore markets.
during the late eighteenth and early nineteenth centuries. Much of what we know about these craft is available through the works of Baker (1966), Chapelle (1951, 1960), and Fleetwood (1982), as well as from contemporary descriptions of the vessels, destinations, and cargos in diaries and journals of the period. Contemporary illustrations of southern ports (e.g., Figure 44) also often provide us with valuable information on these small craft.

Reconstruction of the lines of the Malcolm Boat is, at this stage, incomplete and will be published separately. However, based on the excavated remains of the hull and research of the literature by William Judd, a fairly accurate image was produced of how the Malcolm Boat may have appeared during construction (Figure 44) and when finished off and fully rigged (Figure 46).

Analysis of the remains reveals a round-hulled, keeled vessel with a transom stern. The Malcolm Boat was 12.8 m (41.8 ft) long on deck (LOA) with an estimated waterline length of just over 12 m (39.2 ft). Amidships, the beam of the hull would have spanned approximately 3.6 m (11.8 ft) and tapered aft to a 1.36 m (4.45 ft) wide transom stem. A depth of hold, amidships, is estimated to have been approximately 1.5 m (4.9 ft).

The bow timbers suggest that the vessel had a fairly sharp entry below the waterline and was roomy above. She had a full-bodied midsection which carried aft to the transom, following the traditional “cod’s head and mackerel’s tail” design popular for hulls of the period (Abell 1948:34). The stern had a pronounced skeg and a flat, fairly narrow transom which was moderately raked. The stern of the Malcolm Boat was a good compromise between providing roomy quarters within the hull and seaworthiness for coasting and offshore operation. In form, the transom is reminiscent of the “budget stems” of eighteenth century British barges (Cooper 1955, Figure 4) and of ship’s boats used on British naval vessels during the period (Chapelle 1951, Figure 4; Lavery 1984:122-126). It is certainly not as full as the transoms recorded on some other vessels excavated in South Carolina (Amer 1989; Newell 1989) which reflect adaptations to fulfill a particular function.

A rudder was hung outboard on the sternpost and probably consisted of a fairly wide blade, perhaps similar to that of the vessel excavated at Mepkin Abbey (38BK48) (Wilbanks 1981:155-156, Figure 8). Steering was doubtless accomplished with a tiller.

The various construction features observed on the hull suggest a boat designed with the ability to carry heavy loads, yet weather the open ocean. Numerous mold frames along the length of the hull and additional futtocks installed
in the load-bearing cargo area of the hold provided strength and rigidity for supporting heavy cargo, while flexible end timbers would have allowed the vessel to take seas easily. Additional strength and rigidity were provided by the single-piece keelson, which was notched over, and fastened to, each frame, a practice commonly employed on ships of the period built in Britain, and one that has been recorded on several British-built or British-influenced vessels excavated in North America (Amer 1986; Beard 1989; Cohn 1984). This practice has also been recorded on several historic vessels in South Carolina (Amer and Thompson 1989; Wilbanks 1981) and, again, suggests an influence of British shipwrights on locally built craft.

**Tonnage**

The purpose of tonnage measurements is to determine the payload capacity of a vessel. Throughout time, there have been numerous systems devised to describe the tonnage of ships. These methods rely on either determining actual carrying capacity of a vessel (deadweight) by calculating the displacement of the hull, or by estimating carrying capacity using set formulas (Kemp 1976:235, 249, 876). The tonnage of the Malcolm Boat can be estimated using a number of different methods, each yielding a different value. The vessel's deadweight will be calculated after the hull lines are completed.

Using a formula to calculate the capacity of the complex shape of a wooden hull based on principal dimensions of that vessel presents problems in that the result cannot accurately reflect the actual ability of the hull to carry a given amount of cargo. Most formulas were devised for taxation purposes and for calculating harbor dues payable by a vessel, and therefore represented a rough and ready method of calculating tonnage or burthen (Kemp 1976:876). The actual tonnage of a vessel was often up to 40 percent greater than the figure derived by the formula (Coker 1987:xv). Until 1773, the standard formula for calculating tonnage involved multiplying keel length by the maximum breadth, and multiplying the result by the hold depth and dividing by 94. However, after that date, the British Parliament established more accurate limits of measurement and enacted a new formula called “Builders Old Measurement” (B.O.M.) (Kemp 1976:876). By applying the former formula to the reconstructed dimensions of the Malcolm Boat, a tonnage of approximately 22 tons is arrived at, while the B.O.M. method gives us
an estimate of approximately 24 tons. (See Appendix D for examples of weights and volumes of cargo that could have been carried in the Malcolm Boat.)

The Malcolm Boat would have carried ballast for extra weight to provide stability when not laden with cargo and to ensure the necessary trim fore-and-aft. Ballast might have been placed to trim the vessel by the stern. This would improve steering under sail and would help to counteract the weight of the mast forward. Ballasting of the vessel was likely accomplished using whatever was available to the owner, including stones and bricks. The absence of any ballast material on the site provides further evidence that the vessel was abandoned.

**Rig**

The artist's reconstruction of the Malcolm Boat (Figure 46) shows the vessel with a sloop rig. This rig is not inconsistent with the hull form and the location of the forward mast step at the midship frame and could be easily handled by a small crew. It is also numerous represented in contemporary illustrations of eighteenth century sailing craft, and in historical accounts of boatbuilding in South Carolina during the latter half of the eighteenth century. The presence of a second mortise at frame 4 presents some difficulty with interpreting the vessel's possible rig. It is unlikely that the shipwright would have placed two masts in such close proximity to one another, and the dimensions of either mortise appear excessively large to accept the lower end of a stanchion. Nor would stanchions or similar supporting structures have been necessary on the Malcolm Boat, which had a beam of less than 4 m. It is far more likely that the shipwright or owner found occasion to move the mast at some point in the vessel's career, perhaps changing the rig to reflect a change in the function of the boat.

To enhance the vessel's performance under sail, it is possible that the hull was fitted with leeboards. These devices, while much used in Europe, do not seem to have been popular in North America. However, leeboards evidently were used sporadically on American sailing craft throughout the eighteenth century until centerboards came into common usage during the mid-1800s (Chapelle 1951:38-40). While there is evidence that these fittings were employed in the northern colonies on scows and log-built craft (Chapelle 1951:48, 73), and on shallow draft sloops on the upper reaches of the Hudson River (Baker 1966:110), there appears to be no documentation supporting their use on southeastern-built vessels.
Evidence for these devices, which would have been attached at the gunwale on each side of the hull, was not found on the site.

The Malcolm Boat

The artifacts recovered from the site have indicated a date range for the Malcolm Boat, and various construction features on the hull have suggested certain characteristics of the vessel, including its general appearance and hull layout. Further, evidence from the site points to the vessel having been abandoned. Elsewhere in this report we have outlined the history and development of shipbuilding in the growing colony, and the role environment and economics played in the need for specific sizes and types of watercraft, thereby affecting the form and function of those craft. Further, we have presented a review of the types of vessels that were involved in the colony’s trade and transportation networks, and explored the origins of their designs.

But what of this single vessel, abandoned in a slough in South Carolina’s Low Country? What type of vessel was it? Where was it built and what role did it play in the development of the colony? And what can it tell us of the people who built, owned and operated such workhorses?

The 1780 edition of Falconer’s Marine Dictionary (1970:270) defines a sloop as, “a small vessel furnished with one mast, the main-sail of which is attached to a gaff above, to the mast on its foremost edge, and to a long boom below; by which it is occasionally shifted to either quarter”. The 1815 edition adds, “...having a fixed steering bowsprit, and a jib-stay” (Falconer 1970a:485). The Malcolm Boat matches this contemporary description of a sloop.

There is little doubt that the design of this vessel had its origin in the small sailing sloops found in Europe during the eighteenth century. During that period, many European shipwrights and artisans came to Charleston from Europe bringing with them their boatbuilding traditions and construction practices. Many of these immigrants arrived after 1748, when King George’s War ended. Most were fleeing the upheavals in Europe and were attracted by the rising prosperity in the southern colony. This influx of skilled artisans to South Carolina provided a boom in shipbuilding and ship-refitting that had not been experienced since the period immediately following the Yemassee War (Clowse 1971:90; Coker 1987:48-49).

That the hull of the Malcolm Boat was constructed entirely of locally available wood serves to confirm that the vessel was built locally, perhaps at one of
the colony's shipbuilding areas around Charleston, Beaufort, or Georgetown, or at one of the numerous other smaller construction sites along the coast. From the 1740s to the time of the American Revolution the four active Charleston shipyards alone built many ships, sloops, and schooners most of which were under 50 tons, in the 10 to 20 ton range. Although it is generally acknowledged that during that period South Carolina had a penchant for building schooners (Coker 1987:48), entries in the South Carolina Ship Registers (1734-1780) confirm that a number of small sloops were constructed at local shipyards and locally owned (Olsberg 1973:189-299). Many of these vessels were, what has been termed "coasting schooners," and were involved in trading with the colonies to the north. However, as commercial relations with the West Indies flourished, vessels were built and purchased which had the ability to provide transport for those markets. Sloops were ideally suited to offshore use as the number of sloops constructed in the colonies and Bermuda during the latter half of the eighteenth century attests (Olsberg 1973:189-299).

The Navigation Acts of 1696 required that vessels be registered (Coker 1987:46). No doubt, most boats built in South Carolina during the eighteenth century for trade beyond the colonial confines were first registered at South Carolina ports. However, boats engaged in shipping goods within the colony were not required to carry register. These included a number of small sloops owned by planters (Olsberg 1973:194-195). The Malcolm Boat may have been one of these unregistered sloops. Equally, she could have carried a South Carolina register and played her role in bolstering the economy of the eighteenth century colony.

Can a connection be drawn between the vessel abandoned at the foot of the Whitehouse property and the owners of that property? Most of the eighteenth century residents along the Ashley River were merchants. The Whitehouse owners were no exception. Two owners of that property, Landgrave Thomas Smith and his son George, were both major investors along with other prominent South Carolina merchants, including Henry Laurens, in vessels during the years 1757-1767 (Clowse 1981:Tables C-73, C-74). As many as 16 vessels, in which they had invested cleared Charleston during those years (Clowse 1981: Table C-62) with commodities that included rice, tar and pitch, deerskins and indigo (Clowse 1981:Table C-66).

Unfortunately, without direct evidence to confirm that the owners of the Whitehouse property also owned the Malcolm Boat, and without a name for the
vessel or evidence of the cargo she carried to tie her to a particular trade route, we can only speculate about her origin, career, and ownership.
Artifact Analysis

One hundred and fifteen artifacts were recovered from the Malcolm Boat site (38CH803). The artifact inventory includes wine bottles, glass and ceramic fragments, pipe stems and several modern items (see Appendix C). From the few diagnostic artifacts, a date range from the late 1700s to the early 1800s has been estimated for the original abandonment of the vessel (Table 1) (Noel-Hume 1969; Stanley South, personal communication 1993).

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Description</th>
<th>Date Range</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>38CH803-57</td>
<td>Wine Bottle Base (complete)</td>
<td>1800</td>
<td>Noel Hume 1969: 68</td>
</tr>
<tr>
<td>38CH803-58</td>
<td>Wine Bottle Base (complete)</td>
<td>1800</td>
<td>Noel Hume 1969: 68</td>
</tr>
<tr>
<td>38CH803-62</td>
<td>Bone Button Backing</td>
<td>1726-1865</td>
<td>South 1964</td>
</tr>
<tr>
<td>38CH803-97</td>
<td>Annular Slipped Yellowware</td>
<td>1800s-Modern</td>
<td>Stanley South, personal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>communication 1993</td>
</tr>
<tr>
<td>38CH803-21</td>
<td>Buff Paste Lead Glazed Slipware</td>
<td>1800s</td>
<td>Stanley South, personal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>communication 1993</td>
</tr>
<tr>
<td>38CH803-89</td>
<td>Molded Glass</td>
<td>1800s</td>
<td>Stanley South, personal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>communication 1993</td>
</tr>
<tr>
<td>38CH803-99,100</td>
<td>Brown Salt-Glazed Stoneware</td>
<td>1800s</td>
<td>Stanley South, personal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>communication 1993</td>
</tr>
</tbody>
</table>

As the Malcolm Boat appears to have been deliberately abandoned, the relative absence of diagnostic artifacts is not surprising. No doubt the owner would have removed any possessions which he deemed of value before leaving the craft. Since the vessel lay exposed for some time after abandonment, any other objects remaining in the hull became subject to mechanical and biological degradation, or may have been removed at a later time.

Glass

The majority of artifacts (N=70) from the wreck are glass fragments, most of which are small and non-diagnostic. The shape, color, (Table 2) and thickness of the glass indicates that most of it is modern. With seven pieces of glass, the portion of the bottles from which they came can be identified (Table 3). Three of these are diagnostic, dating to the late 1700s or early 1800s (Table 1).
Glass Color

<table>
<thead>
<tr>
<th>Color</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>24</td>
</tr>
<tr>
<td>Clear</td>
<td>25</td>
</tr>
<tr>
<td>Clear with Frost</td>
<td>1</td>
</tr>
<tr>
<td>Green: Light</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>7</td>
</tr>
<tr>
<td>Dark</td>
<td>9</td>
</tr>
<tr>
<td>Purple</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Glass Portion</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragment</td>
<td>63</td>
</tr>
<tr>
<td>Bottle Necks</td>
<td>3</td>
</tr>
<tr>
<td>Bottle Bases</td>
<td>4</td>
</tr>
</tbody>
</table>

Ceramics

Of the few ceramic sherds present on the site (n=6), all of which were fragments. Rim, body or base could not be determined, but type identifications are listed in Table 4 (Figure 47).

<table>
<thead>
<tr>
<th>Ceramic Types:</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annular Slipped Yellowware</td>
<td>1</td>
</tr>
<tr>
<td>Buff Paste Lead Glazed Slipware</td>
<td>3</td>
</tr>
<tr>
<td>Brown Salt-Glazed Stoneware</td>
<td>1</td>
</tr>
<tr>
<td>Creamware</td>
<td>1</td>
</tr>
</tbody>
</table>

Also present at the site were two pipe stems and one fragment of a pipe bowl. Because of the small number of pipe stems, dating was not appropriate.

Organic Artifacts

The anaerobic environment preserved several organic artifacts. Among these are a rope fragment and several small pieces of shell and bark. Wooden artifacts relating to the construction or operation of the vessel were also discovered,
including half of a pulley block shell (38CH803-61) (Figure 48) and a treenail (38CH803-105). These items are discussed in the section on vessel construction.

The remains of a small cask (38CH803-102) were discovered within the bilges of the vessel between frames 11 and 13. Reconstruction of the cask indicate it was between 177.8 mm and 203.2 mm high, and approximately 152.4 mm in diameter. It consisted of at least 12 staves, the cask head, and numerous fragments of wooden hoops. While the staves were discovered together, they were not intact, thus the approximation in measurements. The staves generally show croze grooves at one end, which would have served to support the solid circular cask head. One stave (38CH803-102/260) has a hole near the end opposite the croze groove (Figure 49).

The cask contained a mixture of mud, and a very sticky and strong smelling substance. A sample of this mixture was taken to the South Carolina Department of Health and Environmental Control for analysis. The results of this analysis are not yet available. One possibility is that the substance is cyprus basalm (Lefler 1967:193). Research into the origin and form of the cask has, as yet, failed to uncover historical or archaeological documentation of casks of the form and size represented by this artifact.

**Miscellaneous Artifacts**

Several other artifacts were discovered among the remains of the Malcolm Boat. Among them were a lead ball (38CH803-94), possibly used as a weight, a button (38CH803-96) and a bone button backing (38CH803-62), and a pewter spoon (38CH803-52). The bone button backing dates to between 1726 and 1865. The spoon, one of the only complete artifacts, is 109.22 mm long and 30.48 mm wide at the bowl. Such spoons often contain diagnostic information in the bowl. The bowl of this spoon is currently filled with organic matter, which will be removed so that diagnostic information can be obtained.

**Conservation.**

All materials recovered from the Malcom Boat site and the records of the excavation were returned to SCIAA for processing and curation. Artifacts were cleaned, catalogued, drawn, photo-documented, and curated. Organic artifacts, such as rope or wood, were stored in water, which was changed periodically to
assist in the removal of salt and other minerals from the artifact. Glass which was being damaged from exposure to air was also stored in fresh water to prevent further exfoliation. All materials requiring specialized conservation were treated at the SCIAA conservation facility.

Conservation measures are in progress for the cask and the pewter spoon. The first stages of conservation—that of drawing, measurement, and photography—have been completed for both artifacts. The conservation plan for the spoon is to clean it by hand and then determine what further efforts are necessary. The intended conservation for the cask staves is to impregnate them with polyethylene glycol 400, which will provide a support system for the wood, and then to remove the water by using a vacuum assisted freeze dryer to stabilize the wood.

Summary

The artifacts from the Malcolm Boat site are relatively few in number and do not provide a great deal of information. The small number of diagnostic artifacts reinforces the hypothesis that the vessel was deliberately abandoned. The relatively large number of modern artifacts clearly supports the idea that the site was disturbed. Fortunately, the few diagnostic artifacts were sufficient to narrow down the date of the vessel’s abandonment to an approximately 60-year time span.
Conclusions

The major goals of the Malcolm Boat Project were accomplished through the four week field session and subsequent research. The site was excavated to the degree that enabled us to recover the architecture and lines of the hull, and to reconstruct, with some degree of certainty, the original appearance of the vessel. Interpretation of the data from the site has allowed us to assess the significance of this historic vessel and place it within an historical and archaeological context in South Carolina. Last, but not least, the project afforded archaeologists an opportunity to work with, and train, avocational archaeologists and other members of the public. Volunteers were trained in the principles and techniques of archaeology, which afforded them an understanding of the necessity of appropriate treatment of submerged historic resources, including limited recovery of remains and in situ preservation of the site.

The Malcolm Boat (38CH803) is significant on a number of levels and considered eligible of nomination to the National Register for Historic Places. The vessel’s abandonment and location are helping to confirm an emerging pattern of small craft disposal in the many small creeks and sloughs of the state’s Low Country when their usefulness was at an end. The boat’s construction is not inconsistent with contemporary boatbuilding practices that had been imported to the New World from Europe and developed during the colonial period, while utilizing the abundant colonial woods ideally suited for shipbuilding. The boat also tends to confirm, along with the many other vessels investigated in South Carolina, the extensive use of transoms noted in historical sources. The Malcolm Boat was a locally built, and probably locally owned, sloop that was capable of going beyond the protected inland waters of the colony and conducting trade as far away as the Caribbean. It is one of the first vessels studied in South Carolina that demonstrates this capability and, as such, is opening a new chapter in South Carolina’s maritime tradition.
Recommendations

The excavation and stabilization of the Malcolm Boat site (38CH803) was the first project of its kind to be conducted in South Carolina. The comparatively minimal amount of time and expense involved clearly indicates to the authors that the methods employed are preferable to the complete removal and conservation of such vessels. Experience, admittedly viewed with the benefit of hindsight, shows that virtually the same information can be recovered from excavation and stabilization as by recovery and conservation for a fraction of the cost. It is recommended that similar discoveries should be treated in the same manner and only considered suitable for removal and conservation after passing the most rigorous review with respect to historical value and uniqueness in the archaeological record.

The project also was the first of its kind undertaken with funding from the South Carolina Department of Archives and History (SCDAH). Considerable time has been spent by the staff of both agencies on revision of standard SCDAH procedures to meet the special requirements of this type of investigation and preservation. It is recommended that both agencies review the project with respect to developing standard procedures for underwater and intertidal sites in order to make the most of the new experience gained on this project.

Considerable time was also spent in securing the appropriate permissions of the State Budget and Control Board for work in the intertidal zone, which falls under this body’s jurisdiction. It is recommended that the board now consider granting SCIAA a blanket authorization to investigate, record, and preserve the state’s cultural resources in all intertidal zones.

Specific recommendations with respect to the Malcolm Boat site are covered by the covenant agreements negotiated between SCDAH and the land owners, the Charleston County Parks and Recreation Commission, and the State Budget and Control Board.

Finally, it is recommended that the discoverer of the Malcolm Boat site, James Malcolm, be permanently recognized on any future signage placed on the site for his contribution to the preservation of a major portion of South Carolina’s maritime history.
Figure 1. USGS quadrangle map of Johns Island showing Malcom Boat (38CH803) area (SCIAA).
Figure 2. Eroded sections in stern of vessel as first seen in 1985 (SCIAA).
Figure 3. Discoverer James Malcolm with the vessel remains (SCIAA).
Figure 4. 1987 sandbagging operation completed (SCIAA).
Figure 6. Vegetation on site prior to 1987 sandbagging operation (SCIAA).
Figure 7. Plan of Malcolm Boat Site (38CH803) (Christopher F. Amer, SCIAA).
Figure 8. Modular 2 X 2 m grid being assembled over the site (SCIAA).

Figure 9. Malcolm Boat site totally submerged at high tide (SCIAA).
Figure 10. Aluminum frame photo tower used for photo-documentation of the vessel (SCIAA).
Figure 11. View of site after completion of stabilization procedures. (SCIAA)
Figure 12. View of the remains of the vessel from astern showing distortion of the keelson (center) and hull timbers. (SCIAA).
Figure 13. Sketch of the excavated starboard side of the Malcolm Boat (38CH803) (William R. Judd, SCIAA).
Figure 14. Exposed upper surface of keel, between frames A and C, showing the planking rabbet cut into its upper edge (SCIAA).
Figure 15. Excavation along the port side of the keel in the stern revealed the sternpost notched into the keel (SCIAA).

Figure 16. View of the remains of the starboard side of the stem assembly. The stempost is at upper right and apron at upper left (SCIAA).
Figure 17. The upper surface of the apron is notched to accept the floor timber of frame E (SCIAA).

Figure 18. Starboard side of stem assembly, showing the stempost (center, Timber tag 8), aft end of the stern knee (Timber tag 9), a rudder gudgeon (aft of sternpost), and a transom plank (left) (SCIAA).
Figure 19. Stern knee with remains of V-shaped floor timbers still attached to its upper surface. Note planking rabbet in starboard moulded surface (SCIAA).
Figure 20. Outboard surface of the reconstructed starboard half of the transom (Timber tags 23, 24, 149). Nail holes are highlighted by white pins. (SCIAA).
Figure 21. Plan and inboard elevation views of the excavated starboard hull. Reconstruction of the heights of the stem and stern, the lower surface of keel and sheer line have been added to the elevation view (Christopher F. Amer and William B. Barr, SCIAA).
Figure 22. Excavated starboard hull showing hull framing and floor timber heads terminating at the turn of the bilge (SCIAA).

Figure 23. Close-up showing detail of a watercourse on a fractured floor timber. Note the treenail hole which partially bisects the watercourse (SCIAA).
Figure 24. Short planks nailed between frames C/D and D/E (upper left), possibly used during vessel construction to gauge frame spacing (SCIAA).
Figure 25. Hull sections taken at frames H, E, D, B, 2, 5, 9, 13, 15, 17, 18, 20, and the transom. (Christopher F. Amer, SCIAA)
Figure 26. Frame 10 showing fore-and-aft treenails of the 'mold' or 'made' frame. Note futtock with visible tool marks (upper left) which was installed later in the vessel's career (SCIAA).

Figure 27. View of cant frames in the bow showing thinned heel of the forward most frame (SCIAA).
Figure 28. V-shaped floor timber (Timber tag 20) in situ near the stern (SCIAA).

Figure 29. Treenails on the Malcolm Boat were wedged with wooden cones driven into their end-grain as these examples in a futtock illustrate (SCIAA).
Figure 30. Hull planking in the starboard stern (SCIAA).
Figure 31. View of hull at frame 3 showing butt joints in hull planking (SCIAA).
Figure 32. The keelson notched over, and fastened to, each floor timber. The fore end of the keelson terminates against the aft end of the apron (Timber tag 89) (SCIAA).
Figure 33. The aft end of the keelson terminates at the stern knee, and above frame 16. Note the parallel cut marks in the upper surface of the keelson (SCIAA).
Figure 34. Two mortises, probably mast steps, cut into the upper surface of the keel. Note
the forward mortise is partially filled with wood blocks (SCIAA).

Figure 35. Close-up of cutout in keelson for a bilge pump (SCIAA).
Figure 36. Ceiling planks in the starboard hull between frames E and 1 (SCIAA).

Figure 37. Telltale evidence of saw marks on the inboard surface of a ceiling plank (Timber tag 79). Note burned areas (right) (SCIAA).
Figure 38. Inscribed lines on inboard surface of a ceiling plank (Timber tag 82) (SCIAA).

Figure 39. Shelf clamp (Timber tag 35) and the two lodging knees (Timber tags 2 and 34) in situ (SCIAA).
Figure 40. Oblique view of outboard surface of shelf clamp showing notches along its upper edge (SCIAA).
Figure 41. Lodging knee (Timber tag 2), upper surface (SCIAA).

Figure 42. Lodging knee (Timber tag 34), lower surface. Note beveled notches to accommodate futtocks (SCIAA).
Figure 43. Deck beam (Timber tag 60). Note notched end to allow beam end to fit between futtocks and seat against hull planking (SCIAA).
Figure 44. "An Exact Prospect of Charles Town, the Metropolis of the Province of South Carolina." (1762) (Courtesy of The Old Print Gallery, Washington, D.C.)
Figure 45. Hypothetical reconstruction of the Malcolm Boat (38CH803) during construction (William R. Judd, SCIAA)
Figure 46. Hypothetical reconstruction of the Malcolm Boat (38CH803) hull, complete and sloop rigged (William R. Judd, SCIAA).
Figure 47. Sherds of brown salt-glazed stoneware (Catalog No. 38CH803-99 and 100) (SCIAA).

Figure 48. Fragmentary shell of a pulley block (Catalog No. 38CH803-61) (SCIAA).
Figure 49. Close-up of hole in cask stave (Catalog No. 38CH803-102/260) (SCIAA).
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Appendix A. Principal Scantlings and Dimensions of the Malcolm Boat (38CH803)

Length

between perpendiculars ........................................(est) 12.8 m (41 ft, 10-1/4 in)
waterline .........................................................(est) 12 m+ (39 ft, 2-3/4 in+)
on the keel ......................................................(est) 11 m (35 ft, 11-5/8 in)

Breadth (Beam) at midship beam ..................................(est) 3.6 m (11 ft, 9-1/4 in)

Height - from rabbet to sheer at bow ...........................(est) 1.8 m (5 ft, 10-5/8 in)
from rabbet to sheer amidships .................................(est) 1.6 m (5 ft, 2-3/4 in)

Depth of Hold ...................................................(est) 1.5 m (4 ft, 11 in)

Tonnage

for taxation and harbor dues .................................(est) 22 T
“Builders Old Measurement” (B.O.M.) .........................(est) 24 T

Length-to-Beam ratio (between perpendiculars) ...........(est) 3.5:1

Keel - of Southern yellow pine, sided and molded c...........23m (9 in)

Stempost - Live oak.

Apron - Live oak.

Frames - Live oak

Floor Timbers and Futtocks, sided c. .08 to .09 m (3-1/8 to 3-1/2 in) and molded c. 0.07 to 0.08 m (2-3/4 to 3-1/8 in)

Room and Space - .36 to .46 m (1 ft, 2-1/8 in to 1 ft, 6 in)

Hull Planking - Cypress garboards and Southern yellow pine planks, .025 to .03 m (1 to 1-1/8 in) thick

Keelson - of Southern yellow pine, sided .17 m (6-5/8 in) and molded .1 m (4 in)

Ceiling Planking - Cypress and Southern yellow pine, .015 m to .02 m (5/8 to 3/4 in) thick
Appendix B. Wood Sample Analysis of Wood Samples from the Malcolm Boat (38CH803)

Wood Identification from The Malcolm Boat site (38CH803)
by Dr. Frank H. Tainter, Forestry Department
Clemson University, Clemson, South Carolina

1. Keel - Southern yellow pine (*Pinus* spp.)
2. Sternpost (Timber tag 123) - Live oak (*Quercus virginiana*)
3. Apron (Timber tag 74) - Live oak (*Quercus virginiana*)
4. Sternpost (Timber tag 8) - White oak (*Quercus alba*)
5. Stern knee (Timber tag 9) - Live oak (*Quercus virginiana*)
6. Transom plank (Timber tag 24) - Southern yellow pine (*Pinus* spp.)
7. Transom plank (Timber tag 149) - Southern yellow pine (*Pinus* spp.)
8. Floor timber (Timber tag 97) - Live oak (*Quercus virginiana*)
9. Floor timber (Timber tag 106) - White oak (*Quercus alba*)
10. Floor timber (V-shaped) (Timber tag 20) - Live oak (*Quercus virginiana*)
11. First futtock (Timber tag 142) - White oak (*Quercus alba*)
12. Second futtock (Timber tag 56) - White oak (*Quercus alba*)
13. Third futtock (Timber tag 55) - Live oak (*Quercus virginiana*)
14. Fourth futtock (Timber tag 3) - Live oak (*Quercus virginiana*)
15. Added futtock (Timber tag 131) - Live oak (*Quercus virginiana*)
16. Garboard (Starboard forward end) (Timber tag 122) - Cypress (*Taxodium distichum*)
17. Garboard (Starboard aft end) (Timber tag 10) - Cypress (*Taxodium distichum*)
18. Hull plank (Timber tag 116) - Southern yellow pine (*Pinus* spp.)
19. Hull plank (Timber tag 15) - Southern yellow pine (*Pinus* spp.)
20. Wale (Timber tag 36) - Southern Yellow Pine (*Pinus* spp.)
22. Ceiling plank (Timber tag 82) - Cypress (*Taxodium distichum*)
23. Ceiling plank (Timber tag 124) - Southern yellow pine (*Pinus* spp.)
24. Shelf clamp (Timber tag 36) - Southern yellow pine (*Pinus* spp.)
25. Lodging knee (Timber tag 2) - White oak (*Quercus alba*)
26. Lodging knee (Timber tag 34) - Southern yellow pine (*Pinus* spp.)
27. Beam (Timber tag 60) - Southern yellow pine (*Pinus* spp.)
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<td>Washed and Labeled</td>
</tr>
<tr>
<td>37</td>
<td>Glass, Clear</td>
<td>Between Frames 18-19</td>
<td>15.5 mm</td>
<td>14 mm</td>
<td>4 mm</td>
<td>1.2 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>38</td>
<td>Glass, Clear</td>
<td>Between Frames 18-19</td>
<td>23 mm</td>
<td>12 mm</td>
<td>4 mm</td>
<td>1.2 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>39</td>
<td>Glass, Clear</td>
<td>Between Frames 18-19</td>
<td>14 mm</td>
<td>8 mm</td>
<td>4 mm</td>
<td>.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>40</td>
<td>Glass, Clear</td>
<td>Between Frames 18-19</td>
<td>12 mm</td>
<td>12 mm</td>
<td>2 mm</td>
<td>.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>41</td>
<td>Glass, Medium Green</td>
<td>Between Frames 18-19</td>
<td>23 mm</td>
<td>12 mm</td>
<td>3 mm</td>
<td>.8 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>42</td>
<td>Glass, Medium Green</td>
<td>Between Frames 18-19</td>
<td>18 mm</td>
<td>15 mm</td>
<td>4.5 mm</td>
<td>1.4 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>43</td>
<td>Glass, Dark Green</td>
<td>Between Frames 18-19</td>
<td>29 mm</td>
<td>27 mm</td>
<td>3 mm</td>
<td>3.9 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>44</td>
<td>Glass, Dark Green</td>
<td>Between Frames 18-19</td>
<td>25 mm</td>
<td>19 mm</td>
<td>4 mm</td>
<td>2.7 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>Number</td>
<td>Description</td>
<td>Location</td>
<td>Length</td>
<td>Width</td>
<td>Thickness</td>
<td>Weight</td>
<td>Status</td>
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<td>-------------------------------</td>
</tr>
<tr>
<td>45</td>
<td>Glass, Purple Tint</td>
<td>Between Frames 18-19</td>
<td>68 mm</td>
<td>52 mm</td>
<td>8 mm</td>
<td>45.4 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>46</td>
<td>Shell Fragment</td>
<td>Between Frames 18-19</td>
<td>10 mm</td>
<td>7 mm</td>
<td>1 mm</td>
<td>&lt;.1 g</td>
<td>None</td>
</tr>
<tr>
<td>47</td>
<td>Wood / Bark Fragment</td>
<td>Between Frames 18-19</td>
<td>9 mm</td>
<td>6 mm</td>
<td>1 mm</td>
<td>&lt;.1 g</td>
<td>None</td>
</tr>
<tr>
<td>48</td>
<td>Wood / Bark Fragment</td>
<td>Between Frames 18-19</td>
<td>7.5 mm</td>
<td>6 mm</td>
<td>1 mm</td>
<td>&lt;.1 g</td>
<td>None</td>
</tr>
<tr>
<td>49</td>
<td>Wood / Bark Fragment</td>
<td>Between Frames 18-19</td>
<td>7.5 mm</td>
<td>5 mm</td>
<td>1 mm</td>
<td>&lt;.1 g</td>
<td>None</td>
</tr>
<tr>
<td>50</td>
<td>Screw· Modern</td>
<td>Between Frames 18-19</td>
<td>38 mm</td>
<td>9 mm</td>
<td>9 mm</td>
<td>3.6 g</td>
<td>Washed</td>
</tr>
<tr>
<td>51</td>
<td>Portside Keelson</td>
<td>Opposite Timber 70</td>
<td>84 mm</td>
<td>23 mm</td>
<td>22 mm</td>
<td>32.7 g wet</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>52</td>
<td>Pewter Spoon (weighed wet)</td>
<td>Base of Timber 63</td>
<td>140 mm</td>
<td>12-39 mm</td>
<td>3-12 mm</td>
<td>60.2 g</td>
<td>See Artifacts Analysis Section</td>
</tr>
<tr>
<td>53</td>
<td>Slate</td>
<td>Next to Timbers 40-41</td>
<td>103 mm</td>
<td>46 mm</td>
<td>8 mm</td>
<td>42.9 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>54</td>
<td>Slate</td>
<td>Next to Timbers 106-107</td>
<td>98 mm</td>
<td>60 mm</td>
<td>9 mm</td>
<td>80.9 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>55</td>
<td>Slate</td>
<td>Next to Timbers 106-107</td>
<td>88 mm</td>
<td>48 mm</td>
<td>9 mm</td>
<td>48.3 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>56</td>
<td>Pipe Stem</td>
<td>Aft Keelson</td>
<td>38 mm</td>
<td>9 mm</td>
<td>8 mm</td>
<td>3.6 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>57</td>
<td>Base of Bottle, Dark Green</td>
<td>Aft of Timber 94</td>
<td>119 mm</td>
<td>97 mm</td>
<td>33 mm deep</td>
<td>489.5 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>58</td>
<td>Base of Bottle, Dark Green</td>
<td>Between Timbers 57-58</td>
<td>107 mm</td>
<td>91 mm</td>
<td>30 deep</td>
<td>429.2 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>59</td>
<td>Bottle Neck, Dark Green</td>
<td>Base of Timber 38</td>
<td>10 - 89 mm</td>
<td>25 - 30 mm</td>
<td>25 - 30 mm</td>
<td>61.9 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>60</td>
<td>Pipe Stem</td>
<td>Between Timbers 58-59</td>
<td>35.5 mm</td>
<td>10 mm</td>
<td>9 mm</td>
<td>4.3 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>61</td>
<td>Pulley Block Shell Half</td>
<td>30 cm Forward of Apron Scarf</td>
<td>140 mm</td>
<td>137 mm</td>
<td>26 mm</td>
<td>320.1 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>62</td>
<td>Bone Button Backing</td>
<td>Between Timbers 57-58</td>
<td>14 mm</td>
<td>14 mm</td>
<td>2 mm</td>
<td>.4 g</td>
<td>Washed</td>
</tr>
<tr>
<td>63</td>
<td>Wood</td>
<td>Below Timber 51, Aft of 52</td>
<td>147 mm</td>
<td>46 mm</td>
<td>42 mm</td>
<td>105.9 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>64</td>
<td>Metal Object</td>
<td>Below Timber 51, Aft of 52</td>
<td>121 mm</td>
<td>39 mm</td>
<td>33 mm</td>
<td>131.2 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>65</td>
<td>Rope Fragment</td>
<td>Between Timbers 105-106, Aft Side</td>
<td>210 mm</td>
<td>Unavailable</td>
<td>Unavailable</td>
<td>UA</td>
<td>Stored in Clean Water - Very Fragile</td>
</tr>
<tr>
<td>66</td>
<td>Glass, Brown</td>
<td>Screened SW l</td>
<td>40 mm</td>
<td>20.5 mm</td>
<td>4 mm</td>
<td>3.1 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>Number</td>
<td>Description</td>
<td>Location</td>
<td>Length</td>
<td>Width</td>
<td>Thickness</td>
<td>Weight</td>
<td>Status</td>
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</tr>
<tr>
<td>67</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>20 mm</td>
<td>12 mm</td>
<td>3 mm</td>
<td>.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>68</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>19.5 mm</td>
<td>13 mm</td>
<td>2 mm</td>
<td>.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>69</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>12.5 mm</td>
<td>12 mm</td>
<td>3.5 mm</td>
<td>.8 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>70</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>14.5 mm</td>
<td>13 mm</td>
<td>2.5 mm</td>
<td>.4 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>71</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>15 mm</td>
<td>7.5 mm</td>
<td>3 mm</td>
<td>.3 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>72</td>
<td>Glass, Medium Green</td>
<td>Screened SW 1</td>
<td>64 mm</td>
<td>25 mm</td>
<td>13 mm</td>
<td>4.9 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>73</td>
<td>Glass, Medium Green</td>
<td>Screened SW 1</td>
<td>24 mm</td>
<td>22 mm</td>
<td>4 mm</td>
<td>3.3 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>74</td>
<td>Glass, Medium Green</td>
<td>Screened SW 1</td>
<td>14 mm</td>
<td>11 mm</td>
<td>3.5 mm</td>
<td>.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>75</td>
<td>Glass, Medium Green</td>
<td>Screened SW 1</td>
<td>13 mm</td>
<td>7 mm</td>
<td>2 mm</td>
<td>.1 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>76</td>
<td>Glass, Dark Green</td>
<td>Screened SW 1</td>
<td>18 mm</td>
<td>14.5 mm</td>
<td>2.5 mm</td>
<td>.8 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>77</td>
<td>Glass, Dark Green</td>
<td>Screened SW 1</td>
<td>12 mm</td>
<td>11 mm</td>
<td>4 mm</td>
<td>.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>78</td>
<td>Glass, Clear - Base</td>
<td>Screened SW 1</td>
<td>40.5 mm</td>
<td>23 mm</td>
<td>5 mm</td>
<td>5.4 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>79</td>
<td>Glass, Clear - Neck</td>
<td>Screened SW 1</td>
<td>27.5 mm</td>
<td>39 mm</td>
<td>8 mm</td>
<td>5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>80</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>42 mm</td>
<td>19 mm</td>
<td>5 mm</td>
<td>4.7 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>81</td>
<td>Glass, Clear - Base</td>
<td>Screened SW 1</td>
<td>16.5 mm</td>
<td>19 mm</td>
<td>4 mm</td>
<td>3.7 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>82</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>27 mm</td>
<td>25.5 mm</td>
<td>3 mm</td>
<td>1.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>83</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>23 mm</td>
<td>12 mm</td>
<td>3 mm</td>
<td>1.4 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>84</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>16 mm</td>
<td>12.5 mm</td>
<td>5 mm</td>
<td>1.2 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>85</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>23 mm</td>
<td>22.5 mm</td>
<td>4 mm</td>
<td>4.8 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>86</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>89 mm</td>
<td>53 mm</td>
<td>7.5 mm</td>
<td>49.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>87</td>
<td>Ceramic, Brown Salt-Glazed</td>
<td>Screened SW 1</td>
<td>21.5 mm</td>
<td>17 mm</td>
<td>6 mm</td>
<td>2.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>88</td>
<td>Ceramic, Creamware (crazing)</td>
<td>Screened SW 1</td>
<td>60 mm</td>
<td>51 mm</td>
<td>7.5 mm</td>
<td>26.2 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>Number</td>
<td>Description</td>
<td>Location</td>
<td>Length</td>
<td>Width</td>
<td>Thickness</td>
<td>Weight</td>
<td>Status</td>
</tr>
<tr>
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<td>---------------------------------</td>
</tr>
<tr>
<td>89</td>
<td>Plastic, Pink</td>
<td>Screened SW 1</td>
<td>18 mm</td>
<td>17 mm</td>
<td>.4 mm</td>
<td>.8 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>90</td>
<td>Fish Hook - Metal, modern</td>
<td>Screened SW 1</td>
<td>25.5 mm</td>
<td>9 mm</td>
<td>3 mm</td>
<td>&lt;.1 g</td>
<td>Washed</td>
</tr>
<tr>
<td>91</td>
<td>Slag?</td>
<td>Screened SW 1</td>
<td>16 mm</td>
<td>15.5 mm</td>
<td>9 mm</td>
<td>1.6 g</td>
<td>Washed</td>
</tr>
<tr>
<td>92</td>
<td>Spent Bullet Casing - modern</td>
<td>Screened SW 1</td>
<td>15 mm</td>
<td>8 mm</td>
<td>7 mm</td>
<td>.5 g</td>
<td>Washed</td>
</tr>
<tr>
<td>93</td>
<td>Shell Fragment</td>
<td>Screened SW 1</td>
<td>9 mm</td>
<td>6 mm</td>
<td>2 mm</td>
<td>&lt;.1 g</td>
<td>Washed</td>
</tr>
<tr>
<td>94</td>
<td>Lead Ball/Weight</td>
<td>Screened SW 1</td>
<td>14.5 mm</td>
<td>14.5 mm</td>
<td>14.5 mm</td>
<td>15.7 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>95</td>
<td>Glass, Dark Green</td>
<td>Screened SW 1</td>
<td>12 mm</td>
<td>10 mm</td>
<td>2.5 mm</td>
<td>.9 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>96</td>
<td>Small Button? - Metal</td>
<td>Screened SW 1</td>
<td>7 mm</td>
<td>7 mm</td>
<td>2 - 5 mm</td>
<td>.4 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>97</td>
<td>Ceramic, Rim/Neck-Beige/Cream/Brown</td>
<td>General Surface off Stern</td>
<td>72 mm</td>
<td>75 mm</td>
<td>7 - 13.5 mm</td>
<td>53.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>98</td>
<td>Glass, Clear</td>
<td>General Surface</td>
<td>65.5 mm</td>
<td>45 mm</td>
<td>7 mm</td>
<td>24.6 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>99</td>
<td>Ceramic, Brown with Writing &quot;Brau &quot;</td>
<td>General Surface</td>
<td>92 mm</td>
<td>59 mm</td>
<td>9 mm</td>
<td>69.5 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>100</td>
<td>Ceramic - Stoneware</td>
<td>General Surface</td>
<td>86.5 mm</td>
<td>43 mm</td>
<td>8.5 mm</td>
<td>56.2 g</td>
<td>Washed and Labeled</td>
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<tr>
<td>101</td>
<td>Unknown (Poss. Stone / Building Material)</td>
<td>General Surface</td>
<td>129 mm</td>
<td>101 mm</td>
<td>63.5 mm</td>
<td>970 g</td>
<td>Washed and Labeled</td>
</tr>
<tr>
<td>103</td>
<td>Slate</td>
<td>By Garboard Strake</td>
<td>71 mm</td>
<td>55 mm</td>
<td>5 mm</td>
<td>36 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>104</td>
<td>Slate</td>
<td>By Garboard Strake</td>
<td>73 mm</td>
<td>44 mm</td>
<td>12 mm</td>
<td>23.3 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>105</td>
<td>Treenail?</td>
<td>Screened SW 1</td>
<td>44 mm</td>
<td>22 mm</td>
<td>21 mm</td>
<td>9.8 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>106</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>74 mm</td>
<td>36 mm</td>
<td>4 mm</td>
<td>19.7 g</td>
<td>Washed and Stored in Clean Water</td>
</tr>
<tr>
<td>107</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>30 mm</td>
<td>17 mm</td>
<td>4 mm</td>
<td>15.2 g</td>
<td>Washed</td>
</tr>
<tr>
<td>108</td>
<td>Glass, Clear with Slight Green Tint</td>
<td>Screened SW 1</td>
<td>27 mm</td>
<td>7 mm</td>
<td>4.5 mm</td>
<td>1.9 g</td>
<td>Washed</td>
</tr>
<tr>
<td>109</td>
<td>Slate</td>
<td>Screened SW 1</td>
<td>44 mm</td>
<td>30 mm</td>
<td>5 mm</td>
<td>8.1 g</td>
<td>Washed</td>
</tr>
<tr>
<td>110</td>
<td>Fossil, Mandible, Fish</td>
<td>Screened SW 1</td>
<td>13 mm</td>
<td>6 mm</td>
<td>4.5 mm</td>
<td>.7 g</td>
<td>Washed</td>
</tr>
<tr>
<td>Number</td>
<td>Description</td>
<td>Location</td>
<td>Length</td>
<td>Width</td>
<td>Thickness</td>
<td>Weight</td>
<td>Status</td>
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</tr>
<tr>
<td>111</td>
<td>Wood</td>
<td>Screened SW 1</td>
<td>49 mm</td>
<td>20.5 mm</td>
<td>12 mm</td>
<td>6.4 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>112</td>
<td>Wood</td>
<td>Screened SW 1</td>
<td>45.5 mm</td>
<td>26.5 mm</td>
<td>12 mm</td>
<td>9.9 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>113</td>
<td>Wood</td>
<td>Screened SW 1</td>
<td>48 mm</td>
<td>19 mm</td>
<td>11 mm</td>
<td>5.8 g</td>
<td>Stored in Clean Water</td>
</tr>
<tr>
<td>114</td>
<td>Glass, Clear</td>
<td>Screened SW 1</td>
<td>27 mm</td>
<td>13 mm</td>
<td>3 mm</td>
<td>1.6 g</td>
<td>Washed</td>
</tr>
<tr>
<td>115</td>
<td>Glass, Brown</td>
<td>Screened SW 1</td>
<td>12 mm</td>
<td>8 mm</td>
<td>2 mm</td>
<td>.4 g</td>
<td>Washed</td>
</tr>
</tbody>
</table>
Appendix D Vessel Capacity Analysis

Some Thoughts on the Carrying Capacity of, and Possible Cargo Carried by, the Malcolm Boat (38CH803)

By William R. Judd, Research Associate
South Carolina Institute of Archaeology and Anthropology

This appendix presents some figures on quantities and tonnage of rice barrels and bricks carried on Drayton's sloop, per his diary (Drayton 1791-1799). I believe his sloop and the Malcolm Vessel to be similar in size.

I weighed two different bricks, one of regular size (8 in L x 3 5/8 in W x 2 3/8 in H = Wt 4 1/2 lbs) and one of the large English size (9 in L x 4 1/2 in W x 2 1/2 in H = Wt 5 1/2 lbs) - both circa 1800. I chose the larger brick for weight and bulkiness. As can be seen in Illustration A, 3200 bricks (the number of bricks carried in Drayton's sloop on one voyage, 13 September 1794) stacked 3 ft-7 1/2 in high only covers an area 10 ft long by 4 ft, 3 in wide. The total weight of the stack is nine tons. In reality, the bricks would not have been stacked as shown, but spread out like ballast for stability. The Malcolm Boat, being approximately 11 m (35 ft, 2-3/4 in) on the keel and with a breadth of approximately 3.6 m (11 ft, 9-1/4 in), had a burden of 22 to 24 tons. The vessel was obviously capable of carrying more than twice the amount of bricks stated as having been carried in one load on Drayton's sloop.

Illustration B addresses the largest quantity of rice barrels carried by Drayton's sloop (89 per his diary, dated 19 April 1797) and their weight. Shown are is nine barrels making up one row, stacked in two tiers, for a total of 81 barrels. The running area needed for 81 barrels is 8.26 m (27 ft). Additional barrels could be placed in the combes, forward and aft, and some on deck, to total the 89 barrels. The weight of 89 barrels is estimated as 25.632 tons, or a little more than the Malcolm Boat's estimated carrying capacity. The Malcolm Boat, using the tonnage estimates of from 22 to 24 tons, was capable of carrying a load of barrels similar to that of Drayton's sloop.

I believe the sloop was the plantation workhorse, similar to the delivery truck today. It could be manned by two people (Drayton 4 February 1799) and carried everything under the sun. The following items were carried on Drayton's sloop from day to day (Drayton 1791-1799):

Hogs
Turkey
Hay

Fowl (chickens)
4 Calves
Corn
Rice  
Cotton Seed  
Potatoes  
Indigo  
Lumber  
1200 Shingles  
Barrels of Tar  
Blades (Machinery)  
River Sand  
Staves, Mortars, and Scantling

Oats  
Flour and Chaff  
Salt  
Bricks  
Wine  
Ammunition  
Cords of Wood  
Lime  
Oyster Shell
Illustration A. Capacity of the Malcolm Boat to carry bricks.
Illustration B. Capacity of the Malcolm Boat to carry barrels.
### Appendix E. Glossary of Ship Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft</td>
<td>Toward the stern of a vessel.</td>
</tr>
<tr>
<td>Amidships</td>
<td>The middle of a vessel.</td>
</tr>
<tr>
<td>Apron</td>
<td>A piece of curved timber fixed behind the lower part of the stem, immediately above the foremost end of the keel.</td>
</tr>
<tr>
<td>Ballast</td>
<td>Heavy material such as iron or stone, carried in a vessel’s hold for the purposes of lowering her center of gravity and increasing stability.</td>
</tr>
<tr>
<td>Beam</td>
<td>(1) The breadth or width of a vessel at her widest point. (2) One of the transverse members of a ship’s frames on which the decks are laid.</td>
</tr>
<tr>
<td>Block</td>
<td>A wooden device used to increase the mechanical power applied to ropes or to lead the running ropes to convenient positions for handling.</td>
</tr>
<tr>
<td>Bolt</td>
<td>Cylindrical pin of iron for fastening and securing the different parts of a vessel.</td>
</tr>
<tr>
<td>Burthen</td>
<td>The payload or cargo-carrying capacity of a vessel; the tonnage volume of the hold.</td>
</tr>
<tr>
<td>Butt</td>
<td>The squared end of any plank in a vessel’s side which unites with the end of another, continuing its length.</td>
</tr>
<tr>
<td>Camber</td>
<td>A slight curve of a hull timber.</td>
</tr>
<tr>
<td>Cant Frames</td>
<td>The frames at the ends of a vessel which are not perpendicular to the keel; those at the stem slant forward, while those at the stern slant aft.</td>
</tr>
<tr>
<td>Carvel</td>
<td>The method of construction whereby the strake edges are flush with one another, thus presenting a smooth surface.</td>
</tr>
</tbody>
</table>
Ceiling The inside planks of a vessel.

Chainplates Metal fastenings for attaching mast shrouds to the sides of the hull.

Chamfer The flat surface created by slicing the square corners or edges of a timber.

Deadrise The angle between the bottom of the hull and a horizontal plane.

Deadweight The carrying capacity of a vessel beyond its own weight.

Deck Beam An athwartship timber that supports a deck.

Depth of Hold The centerline distance between the top of the floor timbers and the top of the midship beam.

Draft The depth of the hull below the waterline.

Drift Bolt An iron fastening which is driven into a hole drilled slightly smaller than the bolt diameter, thus gripping the wood by pressure alone.

Floor Timber The lowest, central timber of a frame, which crosses the keel and is bolted to it.

Forward Toward the bow of a vessel.

Frames Single or composite structures mounted perpendicular to the keel to strengthen and give shape to the hull; comprised of floor timbers and futtocks.

Futtocks The upper timbers of a frame.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garboard</td>
<td>The external planking strake that is closest to the keel on each side.</td>
</tr>
<tr>
<td>Gudgeon</td>
<td>A metal bracket attached to the sternpost on which the rudder is hung by means of a pintle.</td>
</tr>
<tr>
<td>Gunwale</td>
<td>The uppermost wale or strake on a vessel's side.</td>
</tr>
<tr>
<td>Half Frame</td>
<td>A frame that does not cross the keel, but rises up from either side of it.</td>
</tr>
<tr>
<td>Heel</td>
<td>The after end of the keel and the lower end of the sternpost.</td>
</tr>
<tr>
<td>Hull Lines</td>
<td>A set of three drawings showing lines which describe the shape of a vessel.</td>
</tr>
<tr>
<td>Keel</td>
<td>The backbone of a vessel, to which the stem, stern, frames, and garboards are attached.</td>
</tr>
<tr>
<td>Keelson</td>
<td>An internal longitudinal timber, set atop the floor timbers directly over and parallel to the keel, which serves to reinforce the hull and support the heels of the mast.</td>
</tr>
<tr>
<td>Knee</td>
<td>A timber or metal bar fashioned into a right angle to provide strengthening and support at locations where ship's timbers intersect.</td>
</tr>
<tr>
<td>Limber Holes</td>
<td>Holes or notches cut in the floor timbers on either side of the keel to permit free passage of bilge water to the lowest point in a vessel.</td>
</tr>
<tr>
<td>Leeboards</td>
<td>An early type of drop keel, usually made of wood, and pivoted at its forward end on each side of a flat-bottomed or shallow draught sailing vessel.</td>
</tr>
<tr>
<td>Lodging Knee</td>
<td>A knee which is fixed horizontally between the forward, or aft, side of a beam and the ship's side.</td>
</tr>
<tr>
<td>Maststep</td>
<td>A structure into which the foot of the mast is fitted, its purpose being to distribute the weight of the mast over the keelson.</td>
</tr>
</tbody>
</table>
Midship Beam  The frame which determines the extreme breadth of a vessel, indicated by the symbol

Mortice  A cavity, usually rectangular, cut in the surface of one piece of timber to receive the shaped end of another piece, and so form a joint.

Molded  The measurement of height or width as seen in the body plan of a vessel. The moulded breadth of a vessel is the measurement athwartship to the outer face of the frames.

Plank  An individual longitudinal timber attached to the outer frame faces.

Port  The left side of a vessel when one is facing forward.

Rabbet  A groove cut into the keel, stem, or sternpost into which the external planking is seated.

Scantlings  The dimensions of any piece of timber with regard to its breadth and thickness in shipbuilding.

Scarf(Scarf)  A lapped joint connecting two timbers or planks together.

Sheave  The wheel or pulley in the mortice of a tackle block over which the rope runs.

Sheer  The sweep or longitudinal curvature of the hull as seen from the side.

Sided  The measurement across the outer frame faces or tops of longitudinal timbers.

Square Frame  A frame that is perpendicular to the keel and extends across both sides of the hull.

Stanchion  An upright supporting post.

Starboard  The right hand side of a vessel when one is facing forward.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stempost</td>
<td>An upward-curling timber attached to the forward end of the keel, and into which the two sides of a vessel's bow are united.</td>
</tr>
<tr>
<td>Stern Knee</td>
<td>A knee which reinforces the join between the keel and stempost.</td>
</tr>
<tr>
<td>Sternpost</td>
<td>A perpendicular timber secured at its lower end to the after end of the keel; its upper end supports the transom.</td>
</tr>
<tr>
<td>Stopwater</td>
<td>A wooden dowel driven across the seam of a scarf to deflect water travelling along the seam and to prevent the timbers from shifting.</td>
</tr>
<tr>
<td>Strake</td>
<td>A continuous line of planks extending from the stem to the stern.</td>
</tr>
<tr>
<td>Tonnage</td>
<td>(See Burthen).</td>
</tr>
<tr>
<td>Transom</td>
<td>The transverse timbers at the stern of a vessel which give shape to the quarters and form the stern.</td>
</tr>
<tr>
<td>Treenail</td>
<td>(Trunnel) A wooden fastening used to join hull timbers.</td>
</tr>
<tr>
<td>Trim</td>
<td>The way in which a vessel floats on the water in relation to her fore-and-aft line.</td>
</tr>
<tr>
<td>Turn of the</td>
<td>Bilge The area of the hull where the bottom curves to the side.</td>
</tr>
<tr>
<td>Wale</td>
<td>A thick planking strake which strengthens the side of a vessel.</td>
</tr>
<tr>
<td>Water Courses</td>
<td>(See Limber Holes).</td>
</tr>
</tbody>
</table>