

Lake Champlain Nautical Archaeology Since 1980

By Kevin J. Chrisman and Arthur B. Cohn

Introduction

At first glance Vermont seems an unlikely locale for the study of North American maritime history, but Lake Champlain, the ribbon of fresh-water extending along the state's western boundary with New York, is perhaps the best location on this continent for studying the past 300 years of inland water transportation. The lake's rich archaeological heritage can be attributed to two factors: its strategic location between the Hudson and St. Lawrence rivers, and the cold, dark, preserving conditions beneath the surface of the water. It has been our privilege to study this sunken legacy over the past fourteen years, and to bring to light, through the medium of ship plans, photographs, and publications, some of the ships, artifacts, and history lost over the past two and one-half centuries.

The maritime history of Lake Champlain can be divided into three eras: the era of military struggles and naval squadrons, the era of commerce and merchant fleets, and the era of recreational boating. The first period essentially began with the shot fired by Samuel de Champlain at a band of Iroquois warriors on July 29, 1609. Over the next one hundred and fifty years the skirmishing between Native Americans was transformed into a contest for the North American continent between France and England, a contest that culminated in General Jeffrey Amherst's invasion of French-controlled Lake Champlain in 1759 and conquest of Canada in 1760. Peace on Champlain's waters was short-lived. The outbreak of the American Revolutionary War in 1775 brought eight years of renewed conflict and, in 1776, the Battle of Valcour Island, where the patriot-traitor Benedict Arnold managed to successfully delay a British invasion of the rebelling colonies. The settlement and stirrings of industry and commerce that followed in the wake of the Revolution were interrupted by yet a third conflict on the lake's waters, the War of 1812. Although relatively brief, this war witnessed U.S. Navy Commodore Thomas Macdonough's

victory after a desperate naval battle on the placid waters of Plattsburgh Bay. The conclusion of the war in late 1814 also marked the end of the 200-year era of warfare on Lake Champlain.

The nineteenth century was to be Lake Champlain's "Golden Era" of waterborne commerce. During this period the lake churned with the wakes of hundreds of merchant vessels of all descriptions: steamboats, canal boats, scow ferries, merchant sloops and schooners, horse ferries, tugboats, and untold numbers of lesser craft. Throughout most of the nineteenth century the lake was also on the cutting edge of new maritime technology, the most spectacular and best-remembered being the smoke-belching steamboats that carried tourists, immigrants, businessmen and families up and down the length of the Champlain Valley. Of greater economic importance, although perhaps less-remarked, were the canals, an advance in technology that joined Champlain's waters with the Hudson River in 1823 and the St. Lawrence River in 1843. The Champlain and Chambly canals provided a cheap, dependable connection between Vermont and the rest of North America, and floated an incredible range of materials in and out of the region, including coal, timber, iron ore, grain, hay, stone, and manufactured goods.

The third era in the lake's written history began with the introduction of the railroad to the Champlain Valley in the late 1840s. This new form of transportation initially served as a complement to the existing passenger trade on the lake, but with the introduction of new rail lines and more miles of track the use of Lake Champlain as the region's primary artery of transportation gradually tapered off. Steamers and canal boats would continue to navigate the lake and canals well into the twentieth century, but by the end of the nineteenth the railroad's primacy in the passenger- and freight-hauling business was complete. The twentieth century has seen Lake Champlain emerge, after a period of disinterest and neglect, as a center for recreation, for fishing, for swimming, and especial-

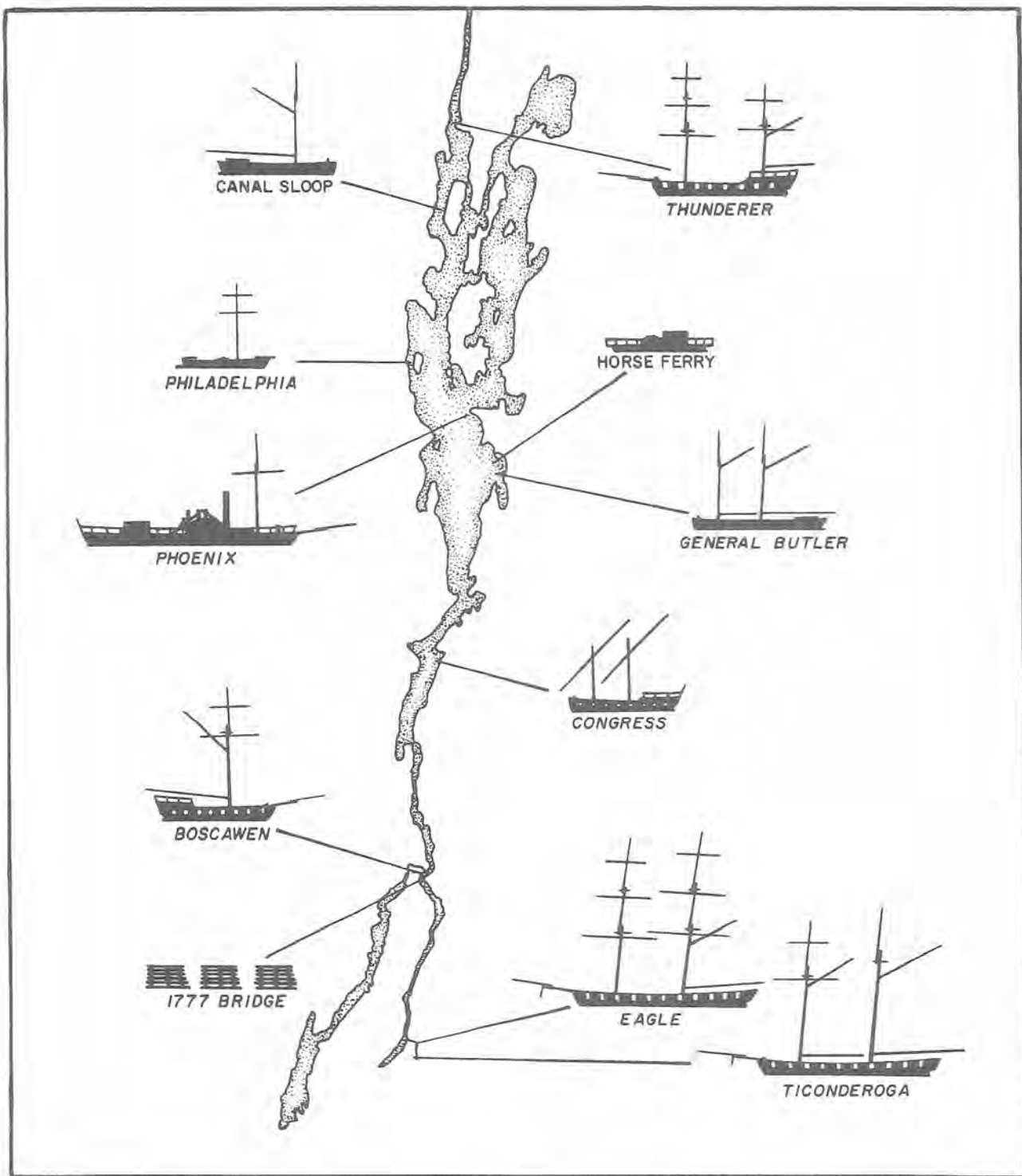


Figure 1. *Historic Ships of Lake Champlain and Their Locations*. Drawing by K. Crisman.

ter for recreation, for fishing, for swimming, and especially for sail and motor boating.

The fleets of warships, steamers, merchant ships and canal boats have long since departed from the surface of the lake, but fortunately for us they have not passed entirely into oblivion. Over the centuries disasters large and small sent scores of vessels to the bottom. Sinkings were occasionally the result of dramatic naval battles or the ever-present hazards of collision, fire, and storm, but the greater number appear to have been the result of decay, neglect, and old-age working on the planks and frames of a wooden hull. Once a vessel went to the bottom, it entered what is essentially a cold, dark vault, ideal for the preservation of wood and other organic materials. Thus, with the passing years the lake bottom has acquired a collection of ships and artifacts, a collection with much to tell us about maritime technology and shipboard life over a span of three centuries. The sunken relics of naval battles and commercial enterprises have always fascinated residents and tourists of the Champlain Valley, but this interest has not always worked to the long-term benefit of the relics. From the middle of the nineteenth-century onward, wrecks sunk in shallow water have been dragged onto land to be inspected; in most cases the wrecks were either cut into souvenir pieces and fashioned into rocking chairs and canes, or simply left out in the weather, where they quickly disintegrated into splinters and dust. Examples of vessels lost or severely damaged in this fashion include Amherst's 1759 brig *Duke of Cumberland*, a gunboat from Benedict Arnold's squadron of 1776, and the first steamboat on the lake, the *Vermont I*. The notable exception to the list of vessels that were destroyed after salvage is Arnold's gundelow *Philadelphia*, sunk during the Battle of Valcour Island in 1776. This vessel was discovered by Lorenzo Hagglund in 1935 and raised to the surface with her mast still standing upright. Hagglund kept the *Philadelphia* intact and under cover, and upon his death in 1960 her ownership passed to the Smithsonian Institution, where she may be seen today.

Development of the new field of nautical archaeology in the 1960s and 1970s and renewed interest in the sunken history of Lake Champlain together contributed to the start of a systematic program of archaeological research on lake shipwrecks in 1980. In that year the non-profit Champlain Maritime Society was formed in Burlington, Vermont, to bring together divers, historians, and archaeologists and facilitate underwater archaeological studies. The Society's inaugural project, the recording of the second steamship on Lake Champlain, the *Phoenix*, served as the

model for all subsequent projects. Heeding the negative examples of early salvage efforts, the Maritime Society did not attempt to bring *Phoenix* or any other wreck to the surface, but instead concentrated on recording them *in situ* with measurements, sketches, photographs, and video footage. In this way the vessels remained in the preserving environment of the lake, while the information they contained could be recovered, analyzed, and shared with both maritime scholars and the general public. The "non-intrusive" approach has thus far proved highly effective for learning about wooden ships, and has at the same time minimized damage to fragile hulls.

As historical and archaeological studies accumulated an increasing quantity of data and maritime-related artifacts, and as interest in lake history expanded, the need for some type of museum to serve as a center for lake research and public education grew ever more apparent. This need was met in 1985 with the formation of the Basin Harbor Maritime Museum, located on the lake at Basin Harbor, Vermont (the name was changed in 1989 to the Lake Champlain Maritime Museum to better reflect the institution's mission). The Champlain Maritime Society merged with the museum in 1987, and the work begun with the *Phoenix* study has continued, with each season's field and archival research steadily adding to our knowledge of ship design and construction, shipboard life, and regional military and economic history.

In the decade and a half since the *Phoenix* project, researchers working for the Maritime Society and Maritime Museum have been able to locate and study examples of nearly every type of vessel that ever floated upon Champlain's waters (Figure 1). The many spectacular finds are making it possible to write a new and more detailed history, one that concentrates on the ships and on the people, some famous and many unknown, who sailed upon the "mountain waves" of Lake Champlain. The following is a chronological look at the recent archaeological studies both above and below the waters of Lake Champlain, beginning with the earliest wreck yet excavated, the French and Indian War sloop *Boscawen*.

THE ERA OF WARFARE ON LAKE CHAMPLAIN

The French and Indian War

A Vermont Division for Historic Preservation-Champlain Maritime Society survey of the waters between Fort Ticonderoga, New York, and Mount Independence,

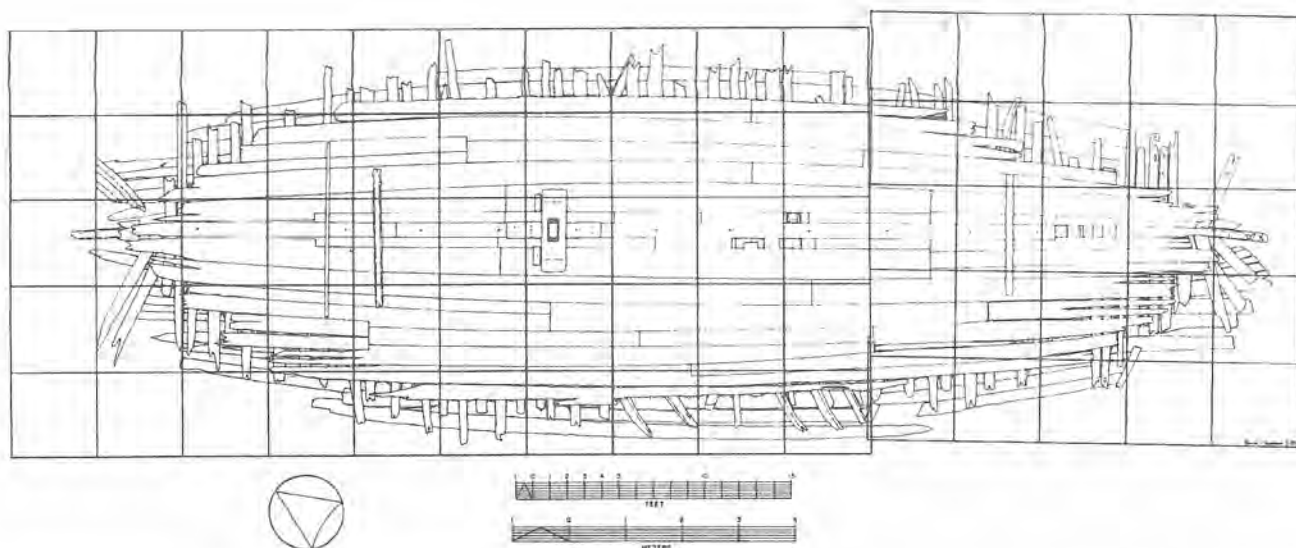


Figure 2. Plan of the British Sloop *Boscowen*, as Excavated in 1984-1985. Approximately forty percent of the original hull structure was still intact on the bottom of the lake. Drawing by K. Crisman.

Vermont, in 1983 revealed, among other things, the remains of three small, and clearly very old wooden vessels (Fischer, ed. 1985:37-39). Test excavations in the largest of the vessels yielded a small collection of ship's hardware and military items which, together with the hull's construction and the location of the site, indicated that the wreck was almost certainly of an eighteenth-century vintage, and probably dated to the French and Indian War period. This was truly a momentous find, for it was the earliest wreck yet discovered in the lake, and was in fact among the first large ships to be built in the Champlain Valley.

In the crucial year of 1759, the fifth year of the French and Indian War, British General Jeffrey Amherst led an army from New York down Lake George to its outlet at Ticonderoga. The outnumbered French forces at Fort Ticonderoga (called Carillon by the French) and at nearby Fort St. Frederic blew up their works and retreated northward, counting on their small naval force of three sloops and a schooner to prevent the British from advancing into Canada. Amherst had foreseen the need for his own navy on the lake and brought with him cannon, rigging, colonial shipwrights, and Royal Navy Captain Joshua Loring. During the late summer and early fall of 1759 two warships took shape at the landing below Fort Ticonderoga, the 18-gun brig *Duke of Cumberland* and the 16-gun sloop *Boscowen*. Loring sailed with these in

early October and quickly gained control of the lake after forcing the French to scuttle their three sloops. The lateness of the season delayed Amherst's conquest of Canada until 1760. After the war a portion of the British fleet was decommissioned at Ticonderoga and allowed to sink at anchor.

Because almost nothing was known about the design, construction, and shipboard arrangements of any French and Indian War lake ships, the Maritime Society decided to excavate the large vessel found in 1983 (this vessel was believed to be the sloop *Boscowen*). This project was a joint venture between the Maritime Society and the Fort Ticonderoga Museum, with permission for excavation granted by the State of New York. Between 1984 and 1985 a total of nine weeks were spent systematically digging out the interior of the wreck, recording artifacts, and measuring hull timbers. Although the vessel was abandoned rather than sunk while in service, it nevertheless yielded a remarkable range of artifacts, including rigging elements, munitions, tools, and the personal belongings of the crew (Krueger, et al. 1985; Crisman 1988:142-147).

The hull remains (Figure 2) indicated that the *Boscowen* was strongly if hurriedly built, employing white oak throughout and adequate numbers of iron bolts and spikes and wooden treenails to fasten the timbers together. The sloop was originally about 75 to 80 feet

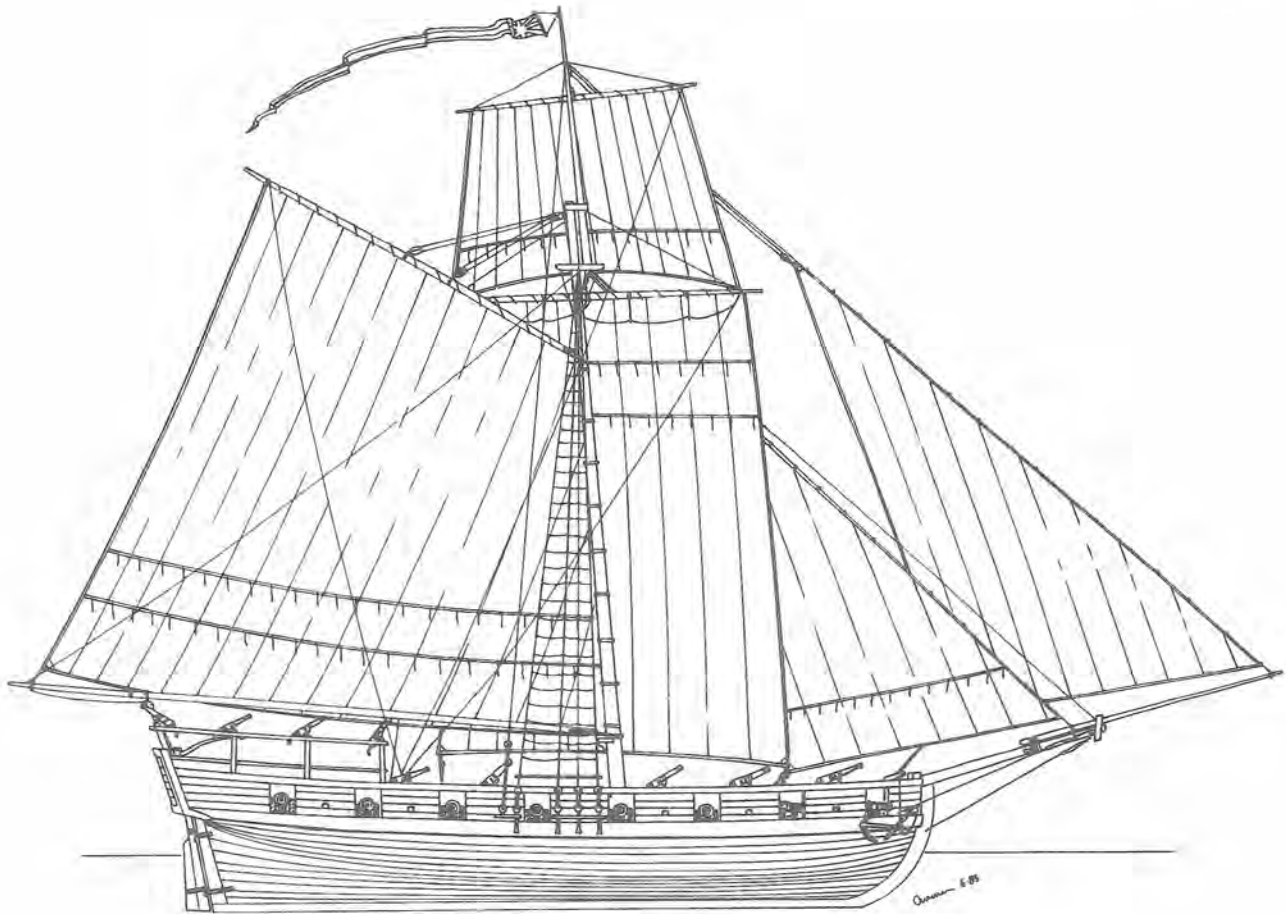


Figure 3. A Conjectural Profile of the French and Indian War Sloop *Boscawen*. Drawing by K. Crisman.

(22.86 - 24.38 m) in length on deck, and about 24 feet (7.31 m) in breadth (Figure 3). This little warship must have been incredibly crowded with her complement of 110 soldiers and sailors. Research on the *Boscawen* continues (the artifacts are currently the subject of four master's theses in the Nautical Archaeology Program at Texas A&M University), and it is clear that the hull and artifacts will continue to yield new insights into colonial-era shipbuilding and the naval contest on the lake in 1759.

The Revolutionary War

The Revolutionary War witnessed a desperate shipbuilding race on Lake Champlain during the summer and early autumn of 1776, as American forces under General Benedict Arnold attempted to stave off a British invasion

of the Champlain Valley by hastily assembling a motley fleet of sloops, schooners, row galleys and gundelows at Skenesboro (now Whitehall), New York. Their opponents at the same time constructed a superior fleet of warships at St. Johns, Quebec, and in early October advanced down the lake. The two squadrons confronted one another on the western side of Valcour Island, and after a day-long battle the outgunned and battered fleet of Arnold fled down the lake, where most of the ships were subsequently captured or scuttled (Cohn 1987:97-112). Although a tactical defeat for Arnold, the battle did delay the British invasion for an entire year. In the summer of 1777 the British again advanced down the lake, captured the American fortifications at Fort Ticonderoga and Mount Independence, but then met utter defeat and capture at the Battles of Bennington and Saratoga. The 1776-1777

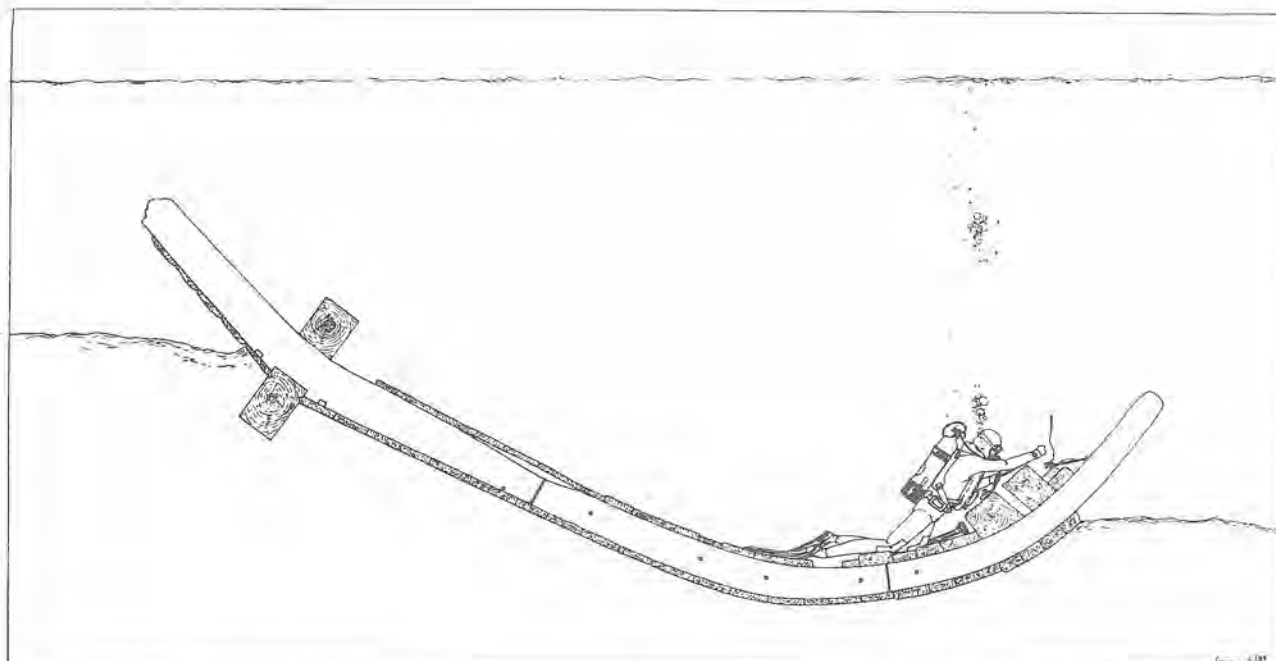


Figure 4. A Section View of the U.S. Navy Brig *Eagle* at the Midship Frame, View Aft. This transverse section shows the shape of the widest frame on the hull. The *Eagle* fell over on her port side as she sank; the keel and keelson (the bottom of the hull) are visible on the left, while the diver is measuring some of the deck-supporting timbers at the top of the port side. Drawing by K. Crisman.

campaigns on Lake Champlain were undoubtedly crucial to the American victory in this war.

The 1776 naval engagements left the debris of Arnold's fleet scattered down the central portion of the lake, and many of the sunken hulls were salvaged in earlier decades by historians and souvenir-hunters. In addition to the intact gundelow *Philadelphia*, recovered wrecks included the schooner *Royal Savage*, two additional *Philadelphia*-class gundelows, and parts of Benedict Arnold's flagship, the galley *Congress*. With the exception of the *Philadelphia* none of these hulls now exists in other than fragmentary condition. In 1984 a Champlain Maritime Society-sponsored sonar survey re-located the remnants of Arnold's *Congress* in Vermont waters, but further archaeological study of the galley's hull has not yet begun.

Other Revolutionary War-era wrecks remain to be discovered. The British radeau *Thunderer* was reportedly wrecked off Alburg, Vermont, in 1777, but surveys in the general area of her loss have not yet pinpointed her location (Cohn, ed. 1984). A joint Lake Champlain Maritime Museum-Woods Hole Oceanographic Institution sonar survey of the central lake in 1989

searched for one or two *Philadelphia*-type gundelows scuttled by Arnold in deep water; a number of nineteenth-century finds were revealed by the sonar, but the gundelows have not yet been found.

The same Vermont Division for Historic Preservation-Maritime Society survey that located the sloop *Boscawen* in 1983 also produced evidence of the floating bridge that connected the American fortifications of Mount Independence and Fort Ticonderoga in 1777. The evidence consisted of about twenty stone-covered log caissons on the lake bottom which were used to anchor the bridge sections in place. Survey divers also found cannon shot near the Vermont shore, but the study of these finds was limited to preliminary mapping and detailed measurements of one caisson (Fischer, ed. 1985:41-46; Crisman 1986:16-19). Work on the 1777 bridge and the muddy lake bottom surrounding Mount Independence resumed in 1992 after Vermont State Police arrested an Indiana diver who was looting artifacts from the site. The new initiative combined sonar and magnetometer surveys with diver inspections; systematic examination of the lake bottom produced a 12-pounder iron cannon, the iron wheel from a gun carriage, a complete French mus-

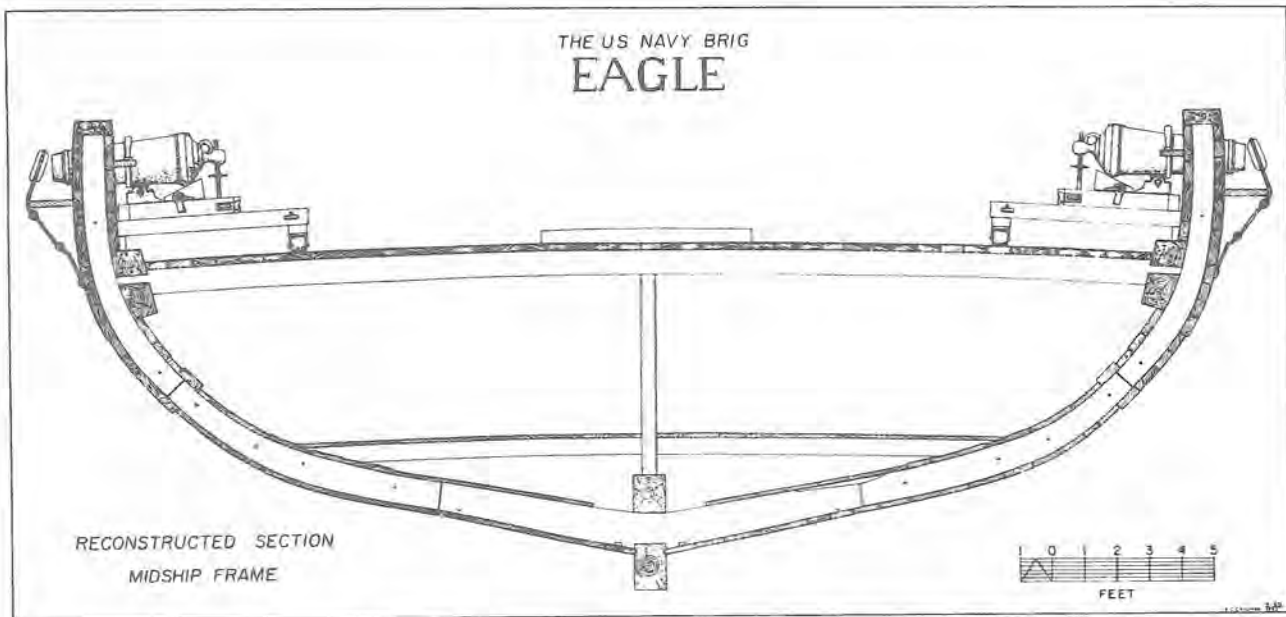


Figure 5. *Reconstructed Midship Section of the U.S. Navy Brig Eagle. This drawing shows the same frame as Figure 4, with the missing starboard side and deck added. Eagle was a large warship for her time, measuring 117 feet, 3 inches in length and 34 feet, 9 inches in moulded beam, but had a shallow-draft hull to safely navigate the shoals of Lake Champlain. Drawing by K. Crisman.*

ket, a cluster of 8-inch mortar bombs, various types of cannon shot, and a collection of entrenching tools (Cohn 1992). A special appropriation by the Vermont State Legislature enabled a team of Lake Champlain Maritime Museum-Institute of Nautical Archaeology divers to return to the site in 1993 to complete the survey, recover and conserve all artifacts, and turn them over to the Vermont Division for Historic Preservation for eventual display to the public. While analysis of the Mount Independence finds is just beginning, evidence suggests that they were probably thrown into the lake during the British withdrawal from the southern lake in 1777.

The War of 1812

The naval race on Champlain in 1814 produced the largest warships to ever sail the lake; it also resulted in one of the hardest-fought and most decisive battles of the War of 1812. The Champlain Valley was essentially ignored by both Britain and the United States during the years 1812 and 1813, but by the summer of 1814 the British had gathered a strong army of veteran troops in Canada and with their newly-enlarged squadron (consisting of a 36-gun frigate, a 16-gun brig, two sloops, and thirteen gunboats) planned a punitive expedition up the New York side of the

lake. In the path of this juggernaut were a small force of U.S. Army troops fortified at Plattsburgh, New York, and the ships of Commodore Thomas Macdonough. Macdonough, aided by the celebrated New York shipwrights Noah and Adam Brown, had spent the previous months building a respectable naval force a Vergennes, Vermont; it consisted of a 26-gun ship, a steamer hull converted to a 17-gun schooner, a 20-gun brig, a sloop, and six gunboats. The opposing navies were about evenly matched.

Macdonough moored his ships in Plattsburgh Bay in early September and there awaited his foes, who sailed into view at dawn on September 11, 1814. The two-and-one-half-hour battle that ensued was fought at anchor, at point-blank range, and the damage to ships and the loss of men was immense. The British frigate, her commander dead and her hold filling with water, eventually lowered her flag, followed by the brig and two sloops; the thirteen British gunboats fled back to Canada. The invading British army then retreated hastily back across the border, and the Americans gained a victory that silenced British demands for territorial concessions and led to an honorable peace. After the battle Macdonough's ships were taken to Whitehall, New York, where within a few years their green-timbered hulls decayed and sank at anchor.

The study of Lake Champlain's War of 1812 fleet began in 1981 with the documentation of the 17-gun schooner *Ticonderoga*; this vessel had been raised in 1959 and placed on display behind the Skenesboro Museum in Whitehall. While somewhat battered and deteriorated, the wreck was nonetheless a storehouse of information on early nineteenth century ship construction techniques (Crisman 1983). Information from Whitehall residents led to a search of the nearby Poultney River, where the remaining ships of the 1814 squadron lay under several feet of extremely murky water. The 1981 diver survey of the Poultney turned up the remains of an American gunboat, part of the British brig *Linnet*, and most of the portside of the U.S. Navy 20-gun brig *Eagle* (Figure 4).

The *Eagle* was a particularly intriguing find, for she had been built and launched by Adam Brown and a crew of 200 shipwrights in the brief span of nineteen days during the months of July and August of 1814. No plans, descriptions, or detailed illustrations of this ship existed, and so a two-year program of underwater recording was begun in 1982 by archaeologists working for the Champlain Maritime Society and the Vermont Division for Historic Preservation. Working in visibility that could only be measured in inches, divers spent a total of five weeks measuring the form and dimensions of each of the *Eagle's* timbers; the diver notes were then used to draft a full set of plans of the brig, both as she existed in 1983 and as she would have appeared on the lake in 1814 (Cohn, ed. 1984:47-72; Fischer, ed. 1985:13-19). Evidence of numerous shipbuilding shortcuts was encountered in the hull, including the use of weaker, rot-prone woods for primary structural timbers and the omission of certain internal reinforcing timbers (Crisman 1987; Cassavoy and Crisman 1988:182-186; Crisman 1991b). Like many of Lake Champlain's warships, *Eagle* was built to fight one battle, and the long-term durability of her hull had to be sacrificed to the exigencies of the moment. Despite these shortcuts *Eagle* was a strong, well-designed vessel, and her completion in time for the Battle of Plattsburgh Bay made Macdonough's victory possible (Figure 5).

THE ERA OF COMMERCE ON LAKE CHAMPLAIN

Lake Champlain's great age of waterborne commerce in the nineteenth century was preceded by thousands of years of Native American trade and nearly two centuries of expanding European commercial activity. Attempts by French and English colonists to establish farms, towns,

and industries in the Champlain Valley were twice thwarted by devastating wars, but the close of the Revolutionary War in 1783 brought permanent settlement and the peaceful expansion of agriculture, industry, and shipping. Until the War of 1812 regional trade centered on Canadian markets, due to the lack of a navigable waterway to the south, but the disruptions of the war and the opening of the Champlain Canal in 1823 would turn the focus of commerce southward to New York City, an orientation that would remain even after the opening of the Chambly Canal on the Richelieu River in 1843.

During the nineteenth century a fantastic array of watercraft plied the lake, their hull forms and propulsion systems each adapted to fit a particular function: transportation of passengers between Canada and New York, ferriage of people and livestock across the lake, conveyance of cargoes between lake ports, and shipment of raw materials and goods through the canals. Archaeological study of the various classes of lake vessels has greatly expanded our knowledge of the ships, people, cargoes, and economic activity of an earlier age.

Lake Sloops and Lake Schooners

The earliest, and most enigmatic type of large merchant craft to navigate Champlain's waters were the "lake sailers," sloops and schooners that spent their entire careers transporting cargoes between lake ports. This category includes all commercial sailing craft existing prior to the opening of the Champlain Canal in 1823, and those vessels built after 1823 that were too large to fit through the canal locks. Most sailing craft on Lake Champlain were fitted with a fore-and-aft rig, either on a single mast (a sloop) or on two masts (a schooner); the fore-and-aft rig is both economical (it requires a relatively small crew) and maneuverable (an advantage in narrow bodies of water). Dozens of lake sailers were built and operated during the nineteenth century, but plans or detailed descriptions of them are rare, and few examples have been found on the bottom of the lake. No examples of early, "pre-canal" lake sloops have ever been found.

Two lake schooners dating to the second quarter of the nineteenth century have been located and examined by archaeologists: the *Water Witch* and the *Sarah Ellen*. The former was originally built as a small steamer in 1832, converted to a schooner in 1836, and lost in a squall with a load of iron ore in 1866; her intact hull has been found in Vermont waters and was studied by a joint Maritime Museum-Institute of Nautical Archaeology team in 1993

(Crisman and Cohn 1993a). The 80-foot-long *Water Witch* contained several distinctive features, including a wooden windlass at the bow, two small cargo hatches on the main deck, and a raised quarterdeck with an open rail around it and a housing for the companionway that led into the stern cabin. Although relatively shallow and broad in hull form the *Water Witch* was an elegant vessel, and her 34-year career is certainly a testament to the quality of her construction.

The *Sarah Ellen* was built in 1849 and went down in a winter storm in 1860 with a load of stone, and her captain and his wife. The schooner sank in the broad lake, in 300 feet

of water, and is currently inaccessible to divers. The wreck was discovered in 1989 during the Maritime Museum-Woods Hole Oceanographic Institute sonar search for Arnold's missing gundelows, and remotely-piloted submarines were used to inspect and video-record the hull in 1989 and again in 1992. The 73-foot-long *Sarah Ellen* proved remarkably similar to the *Water Witch* in her deck layout and general appearance. The bowsprit was buried under the mud, and her foremast fell over when she hit the bottom, but the mainmast was still standing upright (Figure 6). Improved undersea technology should permit detailed recording and analysis of this vessel in the future.

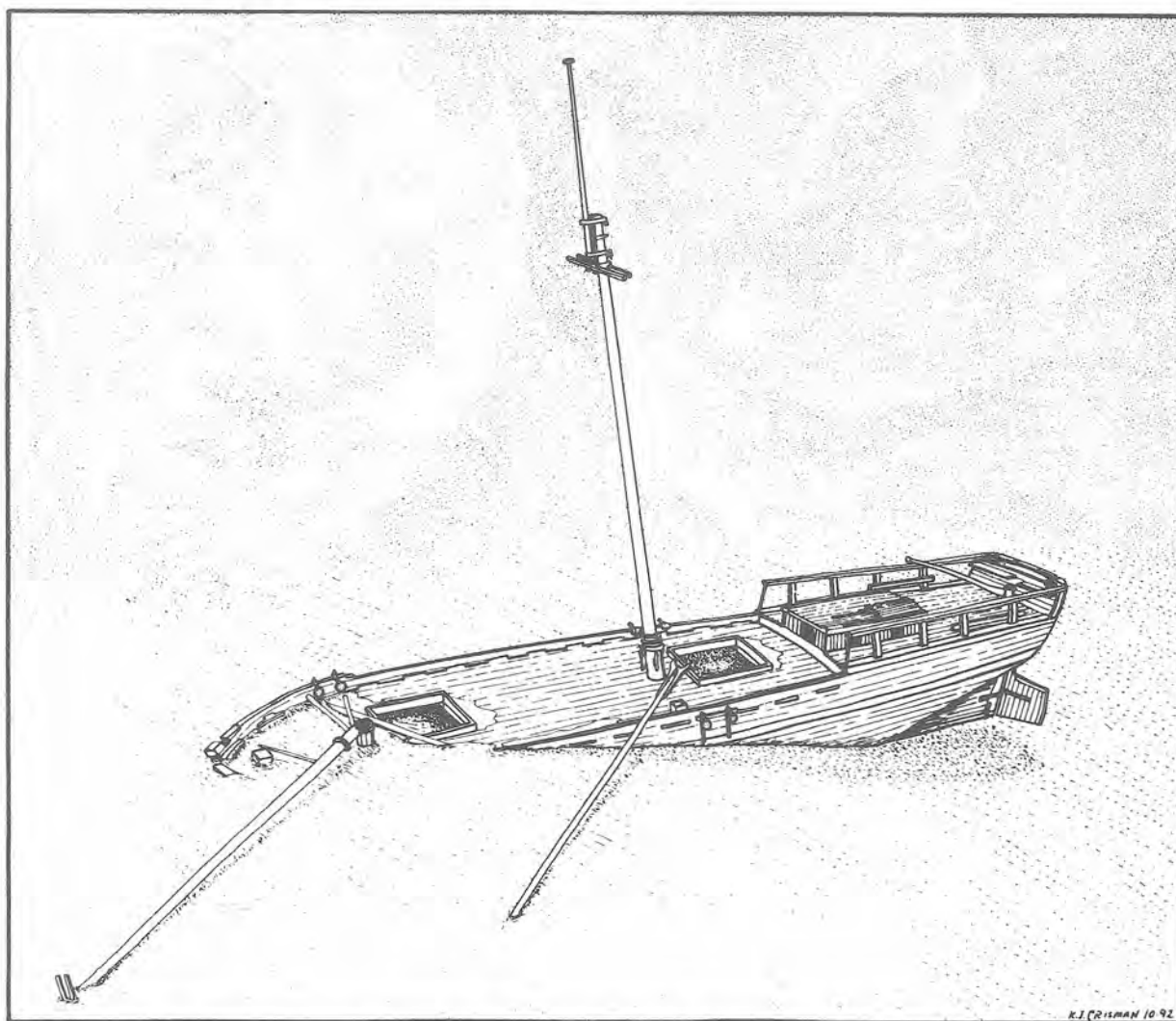


Figure 6. The Lake Schooner *Sarah Ellen* on the Bottom of Lake Champlain. The *Sarah Ellen* sank in 300 feet of water and ploughed bow-first into the bottom. This perspective view is based on the dimensions listed in her enrollment documents and on video footage recorded with a remotely-operated submarine. Drawing by K. Crisman.

Steamboats

Lake Champlain's entry into the age of steam began in 1809 with the launch of the little *Vermont I* at Burlington, Vermont. The second commercially-successful steamer built in the United States (Robert Fulton's 1807 *North River* was the first), *Vermont* was the first of thirty passenger-carrying sidewheel steamers to ply the lake between 1809 and 1953. In an age when boiler explosions and catastrophic collisions routinely took a fearsome toll of steamship passengers on the western rivers and Great Lakes, Lake Champlain's steamers maintained a remarkably safe record over nearly a century and a half of operations. The accident with the greatest loss of life occurred in 1819 when the lake's second steamboat *Phoenix* burned, and six passengers and crew drowned; the loss of the 258-foot-long *Champlain* in 1875 was spectacular — her opium-addicted pilot ran her into a mountainside — but fortunately did not result in any fatalities.

The discovery of the charred hulk of the *Phoenix* off Colchester Shoal in 1978 proved to be the catalyst for the formation of the Champlain Maritime Society, for the strong interest in the wreck on the part of historians, archaeologists, and divers highlighted the need for some type of central organization to study and protect the lake's archaeological resources. The Society's week-long field study of the *Phoenix* in 1980 yielded a plan showing the current appearance of the wreck, a set of conjectural recon-

struction plans that showed the steamer as she probably looked in 1819 (Figure 7), and a published report on the history and archaeology of the vessel (Davison, ed. 1981). The *Phoenix* appears to be the earliest wreck of a steamship to have been archaeologically studied (Simmons 1988:191-192).

The wrecks of other steamboats have been found in the lake, but to date they have seen only limited investigation. The remains of six large sidewheelers dating from the 1820s to the 1870s lie in the "steamboat graveyard" off Shelburne Point, Vermont, and were the subject of a Champlain Maritime Society-sponsored survey in 1983 (Fischer, ed. 1985:55-62). The wreck of the ill-fated steamer *Champlain* lies off Westport, New York, and underwent preliminary mapping as part of a Maritime Museum nautical archaeology field school in 1993.

Towed Canal Boats and Sailing Canal Boats

Canal boats were by far the most numerous type of large wooden vessel to ply the waters of Lake Champlain in the nineteenth and early twentieth centuries, and their role in the transportation network of the Champlain Valley was crucial. Two types were built: towed "standard" canal-boats (which depended on mules to pull them through canals and steamers to pull them over open waters), and sailing canal boats (which also employed mules when in canals, but deployed folding masts and a dropping center-

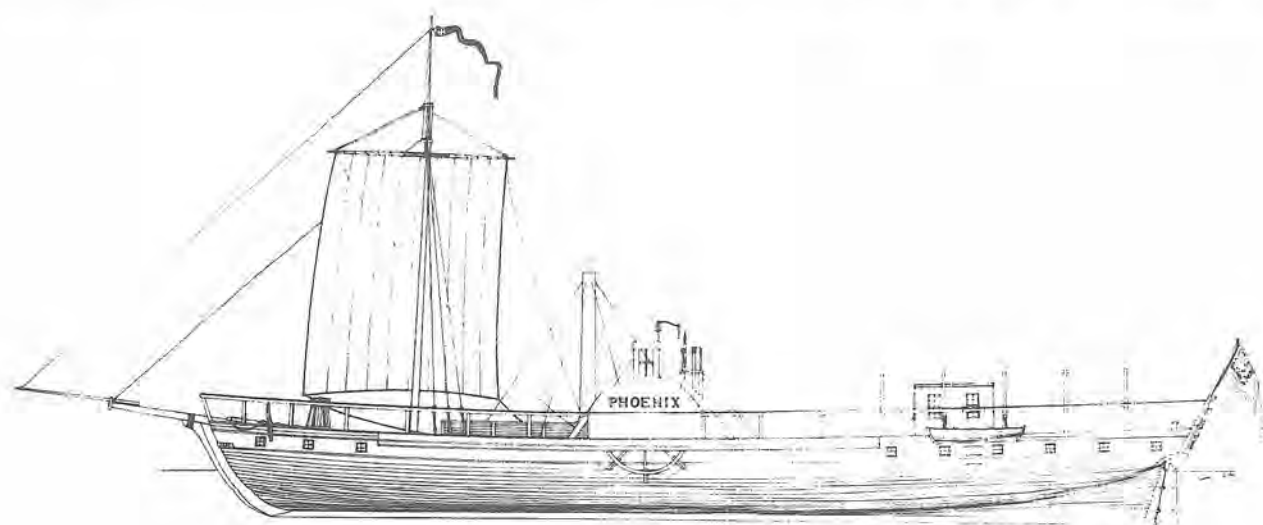


Figure 7. Reconstructed Profile of the Steamboat *Phoenix* (1815-1819). The second steamer on the lake, *Phoenix* burned to the waterline in 1819 with the loss of six lives. Drawing by K. Crisman.

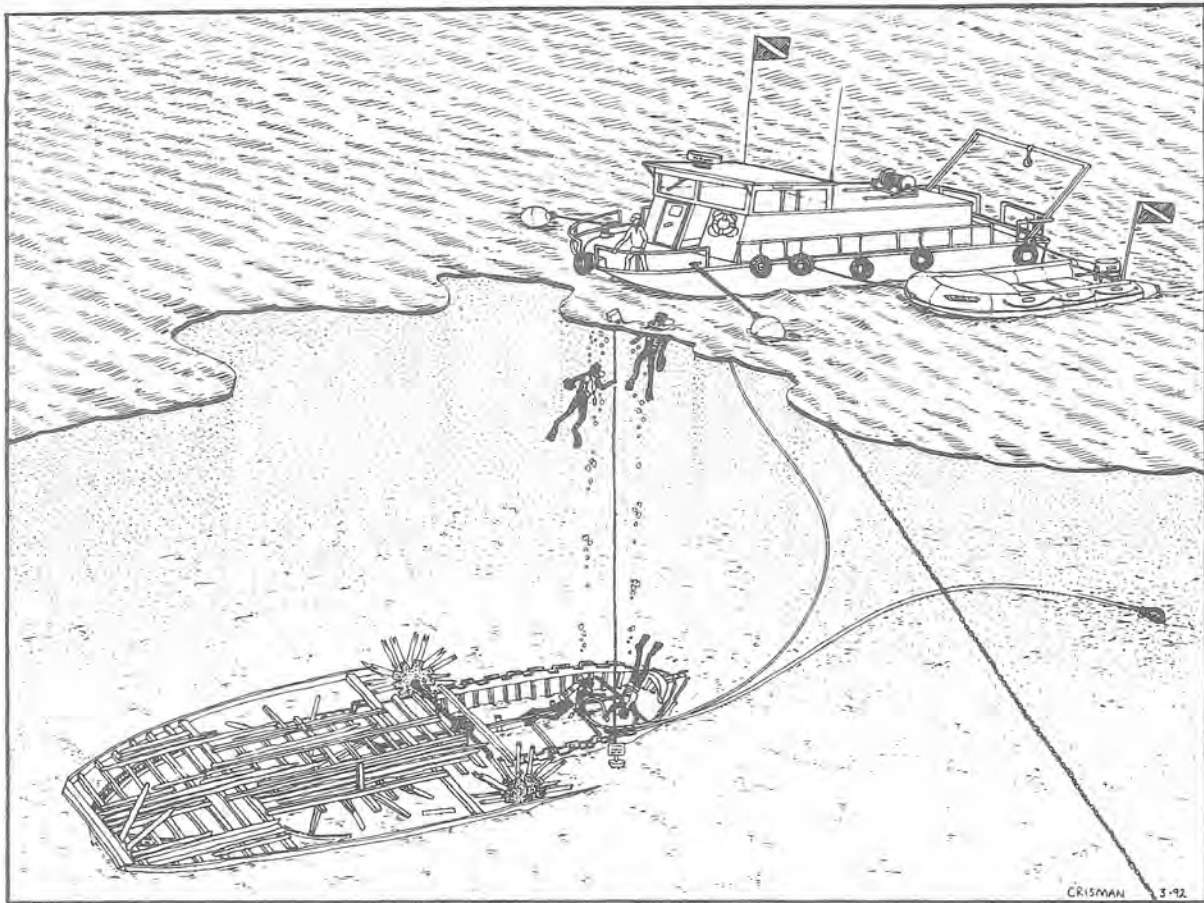


Figure 8. *The Burlington Bay Horse Ferry Wreck. Drawing by K. Crisman.*

board to sail upon the open lake). Many of the wrecks found on the bottom of the lake in recent years have been of standard or sailing canal boats, which is not really surprising considering their great numbers, awkward, relatively unseaworthy hull forms, and light construction. The standard canal boat wrecks thus far examined indicate that these vessels were built in a range of sizes (reflecting changes in lock dimensions over time), and with an astounding diversity of hull forms and construction techniques. Some were assembled with the common, plank-on-frame method of construction, while others were built of thick planks edge-fastened with long iron bolts, using no interior framing at all. Some canal boat wrecks exhibit a moulded bow and transom stern, others are double-ended, and still others have sterns that resemble a square box. One feature common to canal boats is their extreme length-to-breadth ratio, which averages about 6:1. While several standard canal boat wrecks in the lake have undergone preliminary recording, more study of this important class of commercial vessels is needed.

In contrast to the limited studies of standard canal boats, the design and construction of Lake Champlain's sailing canal boats have been documented by intensive studies of several well-preserved shipwrecks. These include unidentified canal sloops sunk off Isle La Motte and North Beach in Burlington Bay, and two canal schooners sunk in the greater Burlington Bay area, the *General Butler* and the *O.J. Walker*. All four vessels had the long, narrow hulls typical of canalboats, a moulded bow and stern, a dropping centerboard contained in a trunk amidships, and "tabernacle" structures for stepping the masts on deck (Cohn, ed. 1984:19-40; Fischer, ed. 1985:21-36; Crisman 1986:27-32). The North Beach Wreck differed from the others by having her central section assembled in the frameless, edge-fastened plank method rather than in the plank-on-frame mode of construction (Cozzi 1992). Historical studies of this heretofore obscure vessel type now indicate that sailing canal boats were common during the second and third quarters of the nineteenth century, and served as a fast, efficient means of shipping goods direct-

ly between northern lake ports and New York City (Cohn and True 1992).

Horse-powered Ferries

One of the most exciting finds in the lake during the 1980s was the well-preserved wreck of a horse-powered sidewheel ferryboat in Burlington Bay (Figure 8). It is the only near-complete example of this type of craft ever to be found and studied by archaeologists. The remains of the ferry were recorded with a photomosaic as part of a Maritime Society-sponsored preliminary survey in 1984 (Shomette 1989), and the hull and machinery underwent excavation and intensive study between 1989 and 1992 (a project co-sponsored by the Vermont Division for Historic Preservation, the Lake Champlain Maritime Museum, and the Institute of Nautical Archaeology).

The horse ferry found in Burlington Bay was one of about ten built and operated on Lake Champlain between the late 1820s and the 1860s. Her machinery was of a type invented and patented in 1819 by Barnabas Langdon of Troy, New York: the horses walked upon a large, horizontal wheel or turntable placed beneath the deck, and through a system of gears and power shafts turned the sidewheels (Figure 9). The ferry measured 63 feet in length, and was powered by two horses standing on opposite sides of the turntable. The condition of the hull and the artifacts found within it together suggested that the ferry saw many, many years of service, and was likely scuttled when she was no longer worthy of repair. The name of this ferry and the period of her service are not known (although she was probably built around 1830). It is certain that she did not operate out of Burlington, for the central portion of the

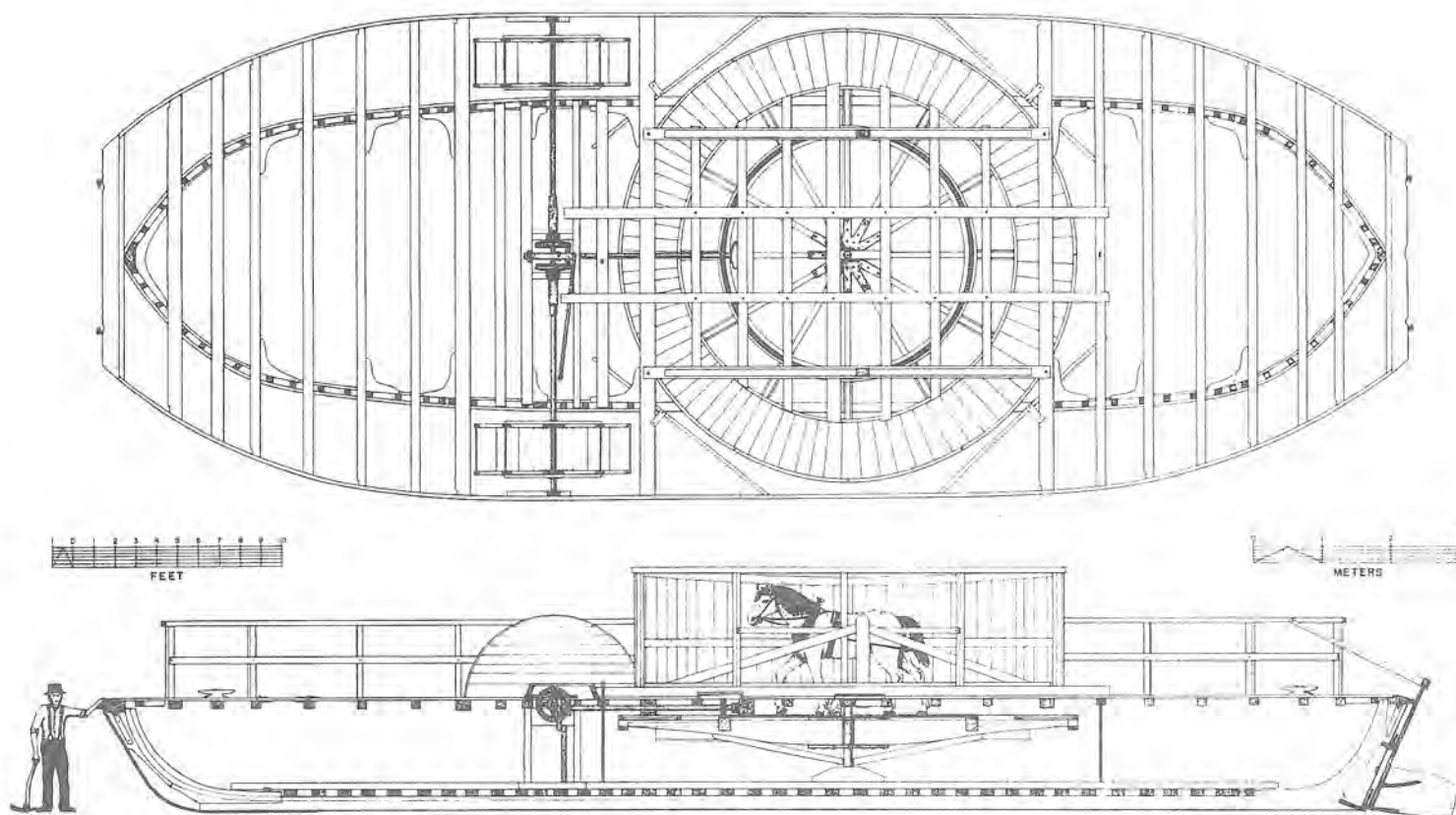


Figure 9. *Reconstructed Plan of the Horse Ferry's Deck and Interior Profile. The ferry's deck was cut through on each side to permit the horses to stand directly upon the turntable. Drawing by K. Crisman.*

lake is too wide and rough to cross with a two-horsepowered ferryboat (Crisman 1990; Crisman 1991a; Crisman 1992; Crisman and Cohn 1993).

Conclusion

Our knowledge of Lake Champlain ships and maritime history has expanded greatly since the first archaeological dive on the *Phoenix* in 1980. Each shipwreck has provided new evidence for changes in design, construction and outfitting over the past 250 years, and each has led us to re-examine the historical record and draw new conclusions about the nature of warfare, commerce, and everyday life on the lake. Through publications, exhibits, lectures, and participation of volunteers in archaeological projects the Champlain Maritime Society, the Lake Champlain Maritime Museum, and other lake research organizations have worked to share this wealth of new knowledge with historians, archaeologists, and the public.

The archaeological resources of Lake Champlain, though bountiful, are nonetheless finite, and protection of shipwrecks from inadvertent damage or intentional vandalism has been one of the prime concerns of the participants in the underwater research. Lake Champlain's sport divers have fortunately taken a strong interest in preserving wrecks in the same condition as they were found, and the Vermont Division for Historic Preservation has created a system of underwater historic preserves that provide easy diver access to a number of spectacular wreck sites, including the *Phoenix*, the General Butler, and the horse ferry. With good management and a measure of luck the ships described here, and those yet to be found, will be around for the enjoyment and education of future generations.

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