Docket No. _____
Exh. TDI-CRS-2

Phase I Archaeological Assessment in Support of the New England Clean Power Link Project- Lake Portion

Grand Isle County, Chittenden County,
Addison County and Rutland County, Vermont

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Lake Champlain
MARITIME MUSEUM

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ABSTRACT

The following is a Phase I Archaeological Resource Assessment carried out by the Lake Champlain Maritime (LCMM) in support of the New England Clean Power Link Project. Champlain VT, LLC, d/b/a TDI-New England (TDI-NE) is proposing the New England Clean Power Link project (NECPL or Project). The NECPL is a high voltage direct current (HVDC) electric transmission line that will provide electricity generated by renewable energy sources in Canada to the New England electric grid. The line will run from the Canadian border at Alburgh, Vermont to Ludlow, Vermont along underwater and underground routes.

The transmission line will be comprised of two approximately 5” diameter cables – one positively charged and the other negatively charged – and will be solid-state dielectric and thus contain no fluids or gases. The nominal operating voltage of the line will be approximately 300 to 320 kV, and the system will be capable of delivering 1,000 megawatts (MW) of electricity.

The proposed underwater portion of the transmission line, approximately 98 miles in length, will be buried to a target depth of 3-4 feet in the bed of Lake Champlain except at water depths of greater than 150 feet where the cables will be placed on the bottom and self-burial of the cables in sediment will occur. In areas where there are obstacles to burial (e.g. existing infrastructure, bedrock), protective coverings will be installed.

In order to assess the potential impact of this project on archaeological resources located on the bottom lands of Lake Champlain the LCMM archaeological staff have reviewed the extant data from previous archeological surveys of the lake. The principal data set examined is that which was generated during the Lake Champlain Underwater Cultural Resources Survey that was carried out from 1996 to 2003. This survey collected side scan sonar data for the majority of the US portion of Lake Champlain in water over 12 feet (3.66m) in depth. In addition to this enormous data set additional archaeological data was reviewed from site specific documentations that have been carried out by LCMM staff and other researchers.

The review of these data sets has revealed three known historical sites that cross the project corridor which will need additional characterization to ensure impact is avoided or minimized. These areas are the Rouses Point Train Trestle, the Revolutionary War Great Bridge between Mount Independence, VT and Fort Ticonderoga, NY and the Larrabees Point Train Trestle. Additionally three unverified sonar targets have been found to lie within 40 meters (131ft) of the project corridor. These sonar targets are anomalies noted in the sonar data that have not been specifically attributed to historic structures but may need additional ground truthing to determine if they are historically significant.

The overarching recommendation for dealing with known, and possible, cultural resources located near the project corridor is avoidance. Where avoidance cannot be achieved based on the current data available, as in the case of the three cross-lake features mentioned above, LCMM recommends that the channel selected for passage through these features be carefully documented before installation begins to record its current state of preservation. Examination of these historic structures should also be carried out once work is complete to ensure that there was no impact. In the case of the Great Bridge crossing between Ticonderoga New York, and Mount Independence, Vermont, LCMM recommends that, in addition to documentation,

subsurface testing should be carried out to identify and remove historic artifacts located within the selected corridor.

In order to have a better understanding of the historic resources (verified and potential) near the project area researchers have also identified 23 additional known historic resources within 500 meters of the project corridor as well as 41 unverified sonar targets within 300m. In its current route the project will have no impact on these sites but they are noted in Appendix 2 in order to have a comprehensive understanding of the area around the project corridor.

	Width	**Objective**
Pre-screening	**500 m for shipwrecks** **300 m for anomaly**	**Initial understanding of resources within reasonable proximity**
APE	**50 feet**	**Area where construction activities may occur**
Buffer	**40 m**	**No in-field studies required for shipwrecks / anomalies that are this distance from route.**

TABLE OF CONTENTS

LIST OF FIGURES

MANAGEMENT SUMMARY AND RECOMMENDATIONS

One design goal of the NECPL is to choose a route for the transmission line that avoids impacting cultural resources located on/in the bottom lands of Lake Champlain. To this end we have the following recommendations to help ensure that the goal minimizing impacts to cultural resources is achieved.

Recommendations:

- Continued consultation with LCMM and/or other CRM professionals.
- The establishment of a 40 meter (131ft) buffer or exclusion zone around known or suspected cultural resources that are found to be near the installation corridor.
- LCMM or other CRM professionals to review any additional remote sensing data that is collected during the course of the project to ensure that any resources that are revealed can be avoided.
- Prepare and adopt a plan for how to avoid or minimize impact on the three historic features that cross Lake Champlain and cannot be completely avoided by corridor selection based on existing data. These sites include:
    - The Rouses Point Train Trestle
    - The Great Bridge between Fort Ticonderoga, NY and Mount Independence, VT. (VT-AD-731).
    - The Larrabees Point-Willow Point Train Trestle (VT-AD-1344) and its associated features
- In the case of the three cross-lake features mentioned above, LCMM recommends that the structures near the channel selected for passage through these features be carefully documented before installation begins to record their current state of preservation and to pinpoint their locations to allow for safe corridor selection. Examination of these historic structures should also be carried out once work is complete to verify that there was no impact of the installation process.
- In the case of the Revolutionary War Great Bridge crossing between Ticonderoga New York, and Mount Independence, Vermont, LCMM recommends that, in addition to documentation, subsurface testing should be carried out to locate, identify and remove historic artifacts located within the selected installation corridor
- If it is found to be unfeasible to adjust the corridor away from the three unverified sonar targets that have been found to lie within 40m of the installation corridor then additional field characterization of these targets should be carried out to determine if they are culturally significant resources.

INTRODUCTION

PROJECT DESCRIPTION

Champlain VT, LLC, d/b/a TDI-New England (TDI-NE) is proposing the New England Clean Power Link project (NECPL or Project). The NECPL is a high voltage direct current (HVDC) electric transmission line that will provide electricity generated by renewable energy sources in Canada to the New England electric grid. The line will run from the Canadian border at Alburgh, Vermont to Ludlow, Vermont along underwater and underground routes.

The transmission line will be comprised of two approximately 5 inch (12.7cm) diameter cables – one positively charged and the other negatively charged – and will be solid-state dielectric and thus contain no fluids or gases. The nominal operating voltage of the line will be approximately 300 to 320 kV, and the system will be capable of delivering 1,000 megawatts (MW) of electricity.

The proposed underwater portion of the transmission line, approximately 98 miles (157.7km) in length, will be buried to a target depth of 3-4 feet (.91-1.2m) in the bed of Lake Champlain except at water depths of greater than 150 feet (45.7m) where the cables will be placed on the bottom and self-burial of the cables in sediment will occur. In areas where there are obstacles to burial (e.g. existing infrastructure, bedrock), protective coverings will be installed.

Area of Potential Effects (APE)

The Area of Potential Effects (APE) of this project within Lake Champlain is 50 feet (15.2 m) wide and 97.1 miles (156.3km) in length. The installation techniques include a trench approximately 6 feet (1.8m) wide and 4 -5 feet (1.2 - 1.5m) deep into which the cables are laid or in depths greater than 150’ the cables will be laid on Lake Champlain’s bottom. It is expected that this trench will fill in naturally as suspended sediment settles back. The total area in the APE is 588.5 acres (238.2 hectares).

Project Sponsors and Agency Involvement

TDI New England
Army Corps of Engineers
Vermont Agency of Natural Resources

METHODOLOGY

The data sets employed in this study were those generated during remote sensing surveys that were carried out on Lake Champlain over the last two decades. The primary data set that was examined to determine known and suspected site locations was the side-scan sonar data generated during the Lake Champlain Cultural Resources Survey (LCCRS). This survey was an effort to capture side scan data for the entire US portion of Lake Champlain. The LCCRS was begun in 1996 and continued through the summer of 2003.

In addition to the LCCRS data numerous surveys of a more localized nature were also studied. The locational information contained within these past surveys has been employed to help guide the project corridor around verified cultural resources and areas were numerous unverified sonar contacts were noted in the survey data.

It should be noted that the LCCRS data and other survey data that was reviewed for this project were not undertaken with the aim to collect engineering level precision in site location. Additionally since these surveys were undertaken the technology of survey and GPS positioning for vessels has advanced considerably. As such the locational information provided by these data sets should not be considered absolutely precise but as a general location within which the resources could be located. Therefore whenever possible the proposed corridor has been shifted as far from known targets as is feasible within the other constraints of corridor selection. LCMM archaeologists are confident that this method of route selection, when combined with the analysis of new remote sensing data generated during the course of this project, will ensure that impacts to cultural resources are avoided or minimized to the extent feasible.

In the following report a number of known shipwreck sites and unverified sonar contacts have been identified as resting near the proposed installation corridor but not within the project APE. In order to ensure that known archaeological sites are not impacted we have identified all known sites that lie within 1640.42 feet (500m) of the project corridor. Unverified sonar targets that lie within 984.252 feet (300m) of the project corridor were also documented and reviewed. The awareness of the these targets around the project area will allow for further decision making that will help to eliminate possible impact to these sites.

LAKE CHAMPLAIN ENVIRONMENTAL BACKGROUND

NATURAL HISTORY

The physical environment of the Champlain Valley has played an important role in the geologic and human history of the region. The Champlain Valley has a distinctive combination of topography, climate, vegetation, and animal life, all of which have maintained a dynamic equilibrium throughout the past. It is important to understand these systems and the history behind them, which has shaped the interactions between humans and Lake Champlain over the past 11,300 years.

Physical Geography

The topography and landforms visible today throughout the Champlain Valley are products of ancient mountain-building processes and the erosional forces of glaciers and rivers that gouged the valley and scoured the surfaces of the surrounding mountains. Lake Champlain is the focal point of the physical or geographical region called the Champlain Lowlands or the Champlain Valley. The complex character of the Champlain Valley is made up of rolling hills, islands, wetlands, river systems, and Lake Champlain. The Champlain Valley is cradled by the Adirondack Mountains to the west and the Green and Taconic Mountains to the east. The surrounding geographical regions are the Green Mountains, the Adirondack Mountains, the Taconic Mountains, and the Vermont Valley. The Green, Taconic, and Adirondack mountain ranges represent the highest elevations surrounding the Champlain Valley and form the headwater areas of tributaries entering Lake Champlain. The Vermont Valley is a small section containing the flood plain of Otter Creek, which eventually flows into Lake Champlain.

After the Great Lakes, Lake Champlain is the sixth largest fresh water lake in the United States. The lake flows north from Whitehall, New York across the U.S.-Canadian border to its outlet at the Richelieu River in Quebec. From the Richelieu River, the water joins the St. Lawrence River and eventually drains into the Atlantic Ocean at the Gulf of St. Lawrence. For much of its length, Lake Champlain defines the state border between Vermont and New York. The lake's watershed is bound to the east by the Connecticut River basin and to the southwest by the Hudson River basin, which is connected to Lake Champlain by the Champlain Canal. The environmental setting of Lake Champlain is unique in part because of its relatively narrow width relative to its great depth and the size of its watershed.

The total area of the Champlain Basin is 8234 miles^2 (21,326 km^2), 56 percent of which is in Vermont, 37 percent in New York, and 7 percent in Quebec.[1] Lake Champlain is a greatly elongated lake that occupies a portion of a long north-south valley that extends from the St. Lawrence River to Long Island Sound. Lake Champlain lies in this valley with the Hudson River to the south and the Richelieu River to the north. With a mean elevation of 95 feet (29m) above sea level, Lake Champlain has a maximum length of 106 miles (171km), a maximum depth of 399 feet (121.7m), and a maximum width of 12.6 miles (20.3 km). The average width of the lake is 4.1 miles (6.6 km), and the average depth is 63.6 feet (19.4m). The lake's surface area is 436 miles^2 (1130 km^2), and it has a volume of 9.12 x 1011 feet^3 (2.58 x1010 m^3). Of the total surface area of Lake Champlain, 270 miles^2 (699km^2) or 62 percent lie in Vermont, 150 miles^2 (389 km^2) or 35 percent lie in New York, and 15 miles^2 (39km^2) lie in Quebec. The shoreline of Lake Champlain is about 587 miles (944km) long, 380 miles (611km) or 65 percent of which lie in

Vermont, 183 miles (294km) or 31 percent lie in New York, and 24 miles (39km) or 4 percent of which lie in Quebec.

In most areas surrounding Lake Champlain, the shoreline profile is quite gentle, although some areas of lakeshore along the New York side of the lake have extremely steep cliffs. Typically, the land topography adjacent to the lake and the basin bathymetry are closely related. Unlike many other lakes, which are bowl-shaped and tend to be more evenly mixed, Lake Champlain is made up of lake segments, each with different physical and chemical characteristics.

Morphologically, the lake is divided into three distinct but connected sections. The largest section is called the Main Lake, which extends from Isle aux Têtes or Ash Island, Quebec, to Crown Point, New York, west of the Champlain Islands. This segment contains about 81 percent of the volume of the entire lake and has the deepest, coldest water. This section reaches a maximum depth of 399 feet (121.7m) near Split Rock Point, New York, and is at its broadest north of Burlington, Vermont, with a width of nearly 12.5 miles (20.1km).

The Restricted Arm of the lake is located to the east of the Main Lake and is composed of three primary basins, including Mallets Bay, the Inland Sea (often referred to as the Northeast Arm or East Bay), and Missisquoi Bay. These primary basins are connected to each other and the Main Lake by shallow narrow passages, all of which are part of the Restricted Arm. Mallets Bay is along the Colchester, Vermont, shoreline southeast of Grand Isle, Vermont. The Inland Sea is east of the Champlain Islands, stretching from the Sand Bar causeway in Colchester north to Missisquoi Bay, and includes the narrow passages between the islands of Grand Isle and North Hero and Alburg Tongue. Missisquoi Bay begins from the southern end of Hog Island, Swanton, Vermont, and extends into Quebec. The third section of Lake Champlain is the South Lake. Resembling a river with an average depth of 20 feet (6.1m) and a width of less than 1 mile (1.6km), the South Lake runs from Crown Point to Whitehall, New York, where Lake Champlain is connected to the Hudson River by the Champlain Canal.

The Champlain Valley can be divided into seven major sub-basins, each drained by one or more of the major tributaries feeding Lake Champlain. These drainages include the Missisquoi Basin, the Lamoille/Grand Isle Basin, the Winooski Basin, the Otter/Lewis Basin, the Poultney-Metawee/South Basin, the Saranac/Chazy Basin, and the Boquet/Ausable Basin. From north to south on the Vermont side of the lake, the major rivers that create these drainage basins are the Pike River, the Missisquoi River, the Lamoille River, the Winooski River, the LaPlatte River, Lewis Creek, Otter Creek, and the Poultney River. The major river drainages on the New York side of Lake Champlain consist of the Great Chazy River, the Little Chazy River, the Saranac River, the Salmon River, the Little Ausable River, the Ausable River, the Boquet River, La Chute, and the Mettawee River.

Surface Geology

The soils and landscape of the Champlain Valley have been strongly influenced by the immense continental glaciers that repeatedly covered much of the northern portion of North America during the Pleistocene Epoch (1.6 million Before Present (BP) to 11,000 BP). Four major glacial stages occurred in North America during this period, each of which is named for the state in which deposits of the stage are particularly well exposed. Three interglacial periods separate the glacial stages. The most recent glacial stage was called the Wisconsin stage and is divided into the Early Wisconsin and Late Wisconsin stages. The glacier of the Late Wisconsin stage covered the Champlain Valley with ice 1.2 miles (2km) thick called the Laurentian ice sheet. The weight of this continental glacier depressed the landmass of northeastern North America, sinking much of the Champlain Valley well below sea level.

As the glacier began to retreat northward and melt, large meltwater lakes were formed in the Hudson and Champlain Valleys. Several lake stages occurred during the last deglaciation. The first was the formation of a pro-glacial lake known as Lake Albany, which extended south of Glens Falls, New York, and drained out through the Hudson River at approximately 13,000 BP. As the glacier continued to melt, it retreated northward, and a larger region of the Champlain Valley known as Lake Coveville was covered by pro-glacial meltwater. During the Coveville stage, the lake drained southward through an outlet channel at Coveville, New York, and filled the southern Champlain Valley to an elevation of 600 feet (183m) above the current sea level. The glacier continued to retreat northward, and the lake level slowly dropped until a more northerly outlet near Fort Anne, New York, formed at 470 feet (143m) in elevation, forming Lake Fort Anne. Lake Coveville and Lake Fort Anne are often collectively known as Lake Vermont.

As the glacier moved steadily northward, the elevation of the Champlain Valley began to rise slowly as the weight of the ice was removed, a process called isostatic rebound. After the final glacial retreat, Lake Vermont was lower in elevation than the contemporary sea level. Marine waters flowed up the Richelieu River into Lake Vermont, turning it into the Champlain Sea by about 12,000 BP. As the glacier retreated, it deposited glacial till throughout the valley in a wide variety of particle sizes, ranging from clay to large boulders. Most of the soils deposited in and immediately adjacent to Lake Champlain consist of well-sorted lake and marine sands and gravel, including beach gravel and deltas. These deposits both commonly occur above bedded silts and clays. The lake bottom and the surrounding area are also strewn with cobbles and boulders that were distributed throughout the valley by ice.

During the Champlain Sea phase, the Champlain Valley began to rebound rapidly to establish a state of equilibrium. Shoreline features of the Lake Vermont and Upper Marine stages of the Champlain Sea can now be seen surrounding the northern part of the valley well above Lake Champlain. These features are parallel to one another, leading researchers to conclude that the valley was rebounding at a constant rate across the area until the end of the Upper Marine stage. During the subsequent periods of the Champlain Sea, however, the northern end of the valley rebounded at a faster rate, possibly because it was depressed farther and over a longer period of time. The Champlain Sea underwent several stages; the lowest was the Port Henry stage, when the surface of the water was 80 to 90 feet (24.4 to 27.5m) below the present lake level.

By 10,200 BP, the Champlain Valley's rebound had surpassed the elevation of the Richelieu Threshold, the fulcrum between the Champlain Valley and the Richelieu River, prohibiting ocean water from flowing into the valley. Shortly thereafter, the Champlain Sea was flushed of its saltwater and once again became a freshwater lake, Lake Champlain.

By about 8000 BP, Lake Champlain reached possibly its lowest level ever. The rate of rebound occurring at that time was about 1 foot over 2 miles (10cm over 1 km) each year. Soil and peat cores taken throughout the Champlain Valley have established the water levels of Lake Champlain for different time periods. Analysis of the core data has revealed that at approximately 8000 BP Lake Champlain was 22 feet (6.7m) below the present lake level; at

6824 BP about 17 feet (5.2m); and at 2778 BP about 5 feet (1.5m). The Champlain Valley is still rebounding today, but at a much slower rate.

Owing to the protection offered by mountains on three sides and the moderating effect of Lake Champlain, the climate in the Champlain Valley is the mildest in Northern New York and Vermont. The temperatures of the region are moderated year-round by the lake. Cool breezes blow inland off the lake in the summer. In the winter, the lake holds more heat than the land and air, so nearby land areas stay warmer as well. Of all the surrounding regions, the Champlain Valley receives the least amount of precipitation. Ample rainfall, moderately warm summers, and fairly cold winters are characteristic of the Champlain Valley. The north-south orientation of the Champlain Valley creates prevailing winds in the same direction. They tend to blow from the south in the summer, although north winds and south winds are about equal in frequency in the winter. The frost-free season is longer, the precipitation less, and the temperatures not so extreme in the Champlain Valley as in the other surrounding regions.

The current climate in the Champlain Valley varies from the surrounding geographic regions because of three main factors: the distance from the valley to the North Atlantic Coast, the shape and orientation of the valley, and the moderating influence of Lake Champlain. When the prevailing winds from the west reach the mountains and rise to move over them, the air is cooled, causing rain in the summer and snow in the winter. For this reason, the higher elevations surrounding the valley receive greater amounts of precipitation. The average annual precipitation in the mountains reaches over 50 inches (127cm), compared with about 30 inches (76cm) in the valley. The growing season also varies in different parts of the valley, lasting only 105 days in the higher, cold pockets of the basin, in comparison to 150 days along Lake Champlain. The longer growing season coupled with fertile soil makes the valley a rich agricultural area

Non-Native Aquatic Nuisance Species

One of the most significant effects of human activity on Lake Champlain has been the relatively recent introduction of several non-native aquatic nuisance species. These plants and animals, most of which were inadvertently carried into the Champlain Valley via the Champlain Canal and the Richelieu River, are causing severe problems for the lake’s cultural resources. Although zebra mussels are demonstrating the most profound impact on the lake’s shipwrecks, other organisms such as water chestnuts and Eurasian watermilfoil, introduced to Lake Champlain in the 1940s and 1962 respectively, have also created problems. These nuisance plants form dense mats on the surface of the water that severely restrict boat traffic and limit access to the lake's underwater cultural resources. Such conditions make it extremely difficult to locate and document submerged resources in the shallow waters where the plants grow.

No methods have yet been found that will successfully eradicate these invaders from the lake system or prevent other non-native nuisance species from entering. The nature of any species introduced to Lake Champlain in the future and their effect on the cultural resources are unknown, but past experience has shown that control of any non-indigenous species is extremely difficult.

Threat of Zebra and Quagga Mussels

The most profoundly disruptive phenomenon to have occurred in Lake Champlain during human history is the introduction of the zebra mussel (*Dreissena polymorpha*), a small freshwater mollusk native to the Eurasian Caspian and Black Seas. The zebra mussel was accidentally introduced to North America in 1987, ejected into Lake St. Clair with the ballast water from a transatlantic vessel in the same manner as many other non-native species now thriving in North America. Zebra mussels were first discovered in the Great Lakes region in 1988. Since then, the mussels have spread across eastern North America by following the flow of water, by attaching themselves to boat hulls, and by the inadvertent transport of zebra mussel juveniles, called veligers.

In 1993, zebra mussels were found in the southern section of Lake Champlain and in the north near Rouses Point, New York. After gaining a foothold in the Champlain Valley, they have rapidly expanded their range within the lake. The microscopic planktonic zebra mussel larvae, which are free-swimming, can be unknowingly transported in bait buckets, bilge water, scuba equipment, and boat engine cooling systems. Once the mussels mature enough to grow a shell, they settle out of the water column and generally attach to a hard surface. The mussels grow rapidly, with adult colonies reaching densities as high as 700,000 mussels per 1.2 yards^2 (1m^2). Zebra mussels encrust boat hulls, engine cooling systems, and intake/outtake pipes, and they can cover the lake bottom within their optimum depth range. These mussels also threaten to encrust any historic object lying on the lake bottom, thus presenting the single largest threat to Lake Champlain's cultural resources. Once the mussels have covered these resources, documentation is nearly impossible, an eventuality which has generated the current urgency to locate, inventory, and document the collection of cultural resources on the bottom of Lake Champlain.

In 1991, the quagga mussel (*Dreissena bugensis*), another non-native mussel, was discovered in the Great Lakes. This species is now present in the Erie Canal System and is migrating eastward. No one knows how long it will take for quagga mussels to reach Lake Champlain, but it is almost inevitable that they will become part of Lake Champlain's growing list of invasive species. The habitat of quagga mussels ranges from 0 to 350 feet (0 to 107m) in water depth, which includes almost the entire bottom surface of Lake Champlain.

Lake Bottom Geomorphology

The hydrodynamics of Lake Champlain are still very much unknown. The water of Lake Champlain is constantly moved by complex processes that change both seasonally and over longer periods of time. In the last two decades scientists have begun to study these flow patterns within the lake, which control the transport of sediment, nutrients, and toxic substances in Lake Champlain. Most of these studies have examined actual movement of the lake water at varying depths. A few of these studies have also looked at bottom sediment features created by currents.

Varying bottom currents affect the lake's sediment erosion, transport, and deposition, but they create predictable geomorphic features. Oceanographers have identified and defined a number of bottom sediment features related to predictable situations. Most of these features can be found in the bottom geomorphology of Lake Champlain. The most efficient and effective way to map these features is with side scan sonar and computer technology that can create a mosaic of the lake bottom. This type of research has been completed in a limited fashion in Lake Champlain only during the last few years.

Previous studies have generated several facts about Lake Champlain. For example, the general flow of water in the Main Lake is from south to north. Water movement is different in the Restricted Arm, however, where the water generally moves south and west to reach the Main Lake through the narrow openings between the Champlain Islands and the modern transportation causeways. The variation of the flow patterns in the Restricted Arm changes with the seasons and the weather. Like other deep lakes, Lake Champlain stratifies in the spring and summer into water layers with distinctly different temperatures. In the spring, the sun warms the surface of the lake. This warmer water is less dense than the colder, deeper water, so it floats on the surface and forms a layer called the epilimnion. This layer is typically about 33 feet (10m) deep in the Main Lake during the summer. Below this layer sharp transitions in temperature define the boundary of the next layer, called the metalimnion, and the much colder waters below, called the hypolimnion.

Wind and temperature primarily drive the water currents in the lake. Once the lake stratifies by temperature in the early summer, changing wind directions and speeds can set up an internal wave called a seiche within the lake. This large wave, which involves water at the surface and at deeper depths, causes the general northward flow of bottom water to reverse direction. A few days of consistent winds from the south gradually pile up warm surface waters at the northern end of the lake, pushing the colder, deep water to the southern end of the lake. When the wind slows or reverses its direction, surface water flows southward and the bottom current flows northward, causing a sloshing motion of the lake water. This very long wave creates currents of up to 1 mph (1.6 kmph) in the Main Lake. The internal seiche causes a mixing of water and also a turbulent resuspension of sediments that creates unique sedimentary features on the lake bottom. As the surface waters cool in late fall, they become more dense than the underlying water, causing them to sink. As the denser, colder water sinks, it mixes with the water below. In the winter the temperature of the entire lake approaches 39ºF (4ºC), while the surface waters are cooled to the freezing point and form ice.

The Restricted Arm is shallower and smaller than the Main Lake, resulting in different thermal stratification and water movement patterns. This area also has an internal seiche and variable currents, but they are not as pronounced as those observed in the Main Lake. Most of the Restricted Arm is readily mixed with strong winds.

Some bottom sediment features are caused by the movement of groundwater rather than water currents. These features can provide significant information about the locations of groundwater sources in Lake Champlain. Bottom sediment features created by groundwater movement also reveal the whereabouts of faults that lie deep within the underlying bedrock.

LAKE CHAMPLAIN HISTORIC CONTEXT

NATIVE AMERICAN HISTORY OF THE CHAMPLAIN VALLEY

The Champlain Valley's cultural history began nearly 11,300 years ago before present (BP), when Paleoindian hunter-gatherer groups moved into the region, which was coincident with the end of the last ice age as the Laurentian ice sheet retreated north. Native Americans have been living in the Champlain Valley continuously from that time to the present. The lake has served as a resource for food, water, tools, spiritual guidance, and transportation. Throughout prehistory, Native Americans lived in small campsites and villages along the lake's shoreline, and employed specific techniques and tools to extract the lake's resources. Vestiges of their occupation sites and lakeside workshops have been discovered throughout the Champlain Valley.

An unknown number of prehistoric sites now lie submerged as a result of changing lake levels and isostatic rebound in the Champlain Valley. These sites have not been documented, and this lack of information has greatly affected modern understanding of Native Americans' utilization of the lake's resources. There is no doubt that Lake Champlain and its preceding water bodies have played a significant role in the lives of all Native Americans living in the Champlain Valley.

Paleoindians were probably the first to use watercraft on Lake Champlain, then part of the Champlain Sea, while hunting and fishing along the lakeshore and presumably built small skin craft to harvest the lake's food resources. Generations of their descendants, the Archaic and subsequently the Woodland peoples, built small craft from tree bark, skins, or hollowed-out logs. Unfortunately, few examples of prehistoric craft have been found, and little is known about their design, appearance, or use. Evidence of bark and skin boats has not been found in the archaeological record, since the organic materials from which they were made are not preserved well in the climate of this area. At least a dozen dugout canoes made of wood, however, have been found in lakes and ponds throughout the Champlain Valley. These simple boats probably date between the Late Woodland period (2900-400 BP) and the nineteenth century. [2].

Contact Period in the Champlain Valley (1609-1664 AD)

By the early sixteenth century, the St. Lawrence Iroquois, the Mohawk Iroquois, the Mahican, and the Western Abenaki occupied the Champlain Valley, while Europeans began to explore the New World looking for resources. In 1534, French explorer Jacques Cartier entered the Gulf of St. Lawrence while looking for the Northwest Passage. During the following two years, Cartier attempted to develop trade relations with the St. Lawrence Iroquois and other tribes living along the banks of the St. Lawrence River. The French attempt to establish a colony in the St. Lawrence Valley during the sixteenth century failed, although sporadic trade for furs in exchange for metal tools did occur between the French and the St. Lawrence tribes.

The influx of Europeans to the Northeast caused great upheaval among the region's Native American populations. Disease, confusing political and economic relations, and continuous warfare split native communities apart and forced them to join outlying groups. The area inhabited by the Western Abenaki at the northern end of Lake Champlain became a haven for Native American refugees displaced by European settlements and wars. The Native Americans of Champlain Valley also relocated numerous times due to military and political conflicts in the region throughout the eighteenth and nineteenth centuries, but they always returned to Lake Champlain and their homeland. [3]

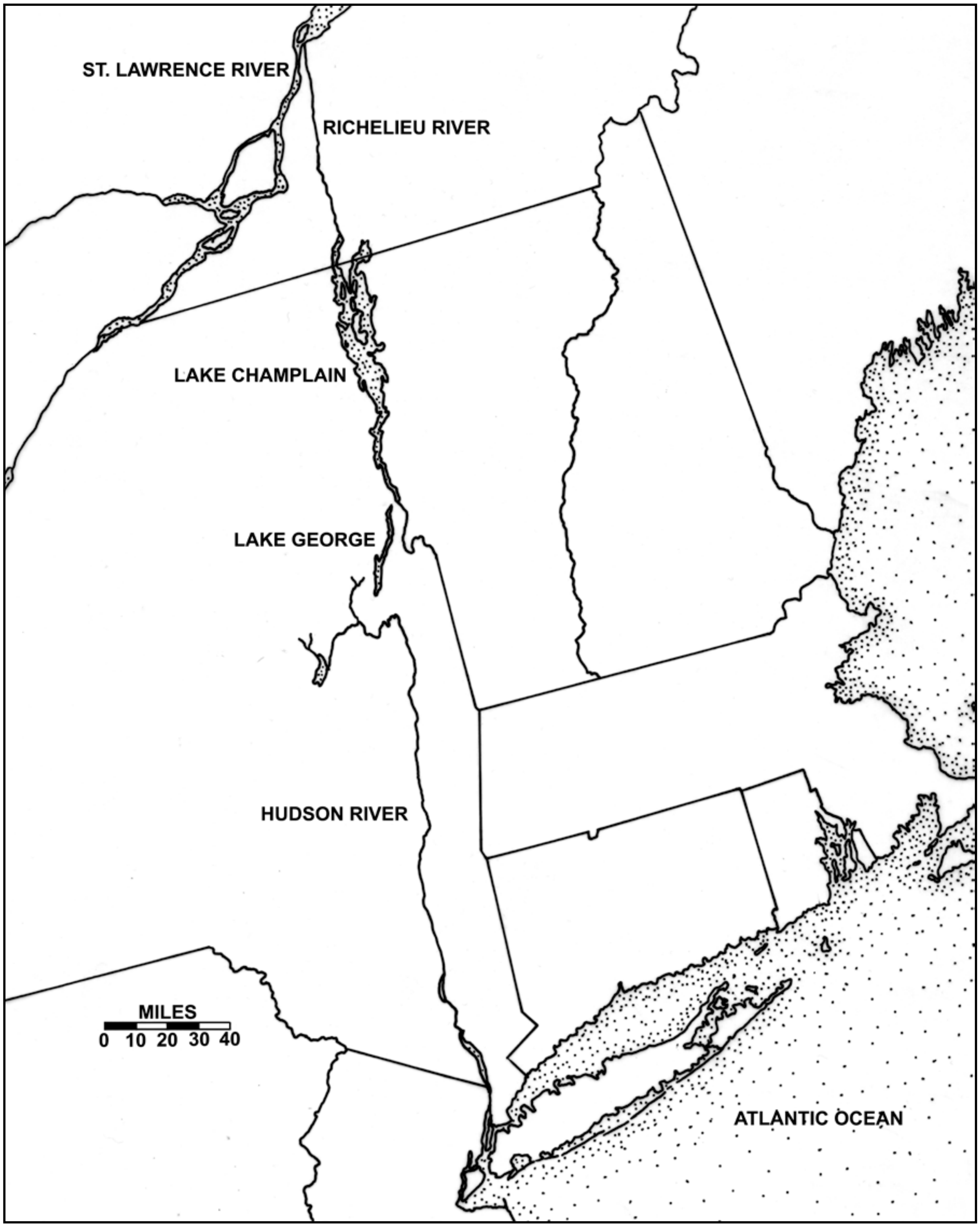

Figure 1: Regional map showing Lake Champlain at the center of a water route between the St. Lawrence and Hudson Rivers (by Adam Kane).

French explorer Samuel de Champlain was the first European to see the lake and valley that now bears his name. In July 1609 Champlain joined a war party of Algonquin, Huron, and Montagnais who paddled up the lake with twenty-four canoes in search of their enemy the Mohawk Iroquois. Champlain and his war party confronted a group of Mohawk warriors at Ticonderoga, where Champlain killed three Mohawk with his arquebus. Thus were established French allies and enemies that endured for nearly two centuries. [4]

For Europeans, one of the important results of Champlain's exploration in the Champlain Valley was the discovery of a nearly complete water route from the St. Lawrence River to the Hudson River. Shortly after Champlain's expedition into the valley, the Dutch explorer Henry Hudson sailed up the river that now bears his name in search of the Northwest Passage. He sailed as far as present-day Albany, New York, and claimed the lands north into the Champlain Valley. Although the French and Dutch did not initially settle the Champlain Valley, they both had a great interest in the area's natural resources. Both colonial powers were heavily involved in the fur trade and depended upon the Native Americans of the Champlain Valley for their fur supply.

Throughout the early seventeenth century, the Iroquois raided Native American and French settlements in the St. Lawrence Valley using Lake Champlain as their invasion route. In the 1640s, French Jesuit missionaries began an effort to develop peaceful relationships with the Western Abenaki and Iroquois and to Christianize them by establishing missions within their villages. Jesuit attempts to make alliances with the Iroquois in northeastern New York largely failed, however, because the Iroquois felt threatened by the Jesuits and believed that they brought bad luck. By 1655 relentless Iroquois raids had spread fear throughout the farms and villages of the St. Lawrence Valley. Numerous fortified outposts had been constructed throughout the Richelieu and St. Lawrence Valleys, but they failed to stop the Iroquois war parties. [5]

French and British Military Conflict (1664-1763)

By 1664, the Iroquois grew bolder, attacking isolated French farms and towns and spreading fear throughout New France. The increased threat led to the rebuilding of Fort Richelieu and the construction of several new fortifications along the St. Lawrence and Richelieu Rivers. A regiment of veteran French regulars was sent from France in 1665 to establish the military power of New France and to crush the Iroquois in the Mohawk Valley, even though the Iroquois were attempting to make peace with the French at that time. In January 1666, the French made a daring mid-winter raid on the Iroquois villages of the Mohawk Valley. Nearly 600 troops wearing snowshoes trekked over a frozen Lake Champlain, then overland to the Hudson Valley. By February, however, the troops had become lost following their Indian guides and found themselves near the Dutch village of Schenectady instead of the Iroquois settlements on the Mohawk River.

The troops eventually had a minor skirmish with the Mohawk, then retreated northward with the Iroquois in pursuit. Sixty soldiers died of starvation and exposure or were taken prisoner by the Iroquois before the French returned to Canada in March 1666. New France did not, however, abandon its plan to crush the Iroquois villages. Some of the French regulars were sent to Isle La Motte to build a fort that was later named Fort St. Anne, the southernmost French outpost of that time. This fort was intended to defend the colonists in the Richelieu and St. Lawrence Valleys from Iroquois war parties.

In September 1666, the French organized 1300 troops and 300 bark canoes and bateaux for an expedition to the Mohawk Valley. The army moved south on Lake Champlain, left some troops with provisions to build a stockade fort at Ticonderoga, portaged to Lake George, and proceeded to its southern end, where they hid their boats for the return trip. The French army then marched to the Mohawk River and burned four Iroquois villages. This drastic action led to a peace treaty between the French and the Mohawk in the spring of 1667.

Questions over the control of Lake Champlain arose as tensions escalated in Europe. Over the coming decades, the colonists became involved in a series of wars, a brutal struggle to decide whether Lake Champlain should be English or French.[6] These included King William's War (1689-1697); the European War of Spanish Succession, or in North America Queen Anne's War (1702-1713); and the War of Austrian Succession, or in North America King George's War (1744-1748).

The final conflict in this era began in 1754 as the French renewed their raids with an assault on British Fort Number 4, located in New Hampshire along the Connecticut River. This event marked the beginning of the conflict known as the French and Indian War (1754-1763) in North America, or the Seven Years War in Europe.

In 1755, the English colonies assembled nearly 4,000 troops at Albany, in addition to hundreds of bateaux and canoes, and constructed a road from the Hudson River to Lake George to transport them to the Champlain Valley. Meanwhile, the French assembled an expeditionary force of 2,500 troops to build a fortification at Ticonderoga, later called Fort Carillon. From this base the French rowed to South Bay and marched overland to the southern end of Lake George, where they attacked the British. Vastly outnumbered, the French were defeated at the Battle of Lake George. [7]

In March 1757 the French launched an assault by an expedition of 1,600 men on Fort William Henry, constructed by the British in 1755 on Lake George. The French attacked the lightly garrisoned fort and burned its outbuildings and all of the British vessels, eventually taking the fort. The aftermath of the victory turned into a massacre when hundreds of unarmed British troops, women, and children were killed at the hands of New France's Native American allies.

The remains of the British force retreated into the Hudson Valley, leaving the French in control of Lake Champlain and Lake George. In early July 1758, a force of 6,367 British regulars and 9,024 provincial troops gathered at the ruins of Fort William Henry. Their plan was to attack Fort Carillon and Fort St. Frederic, then to advance to Montreal. In a splendid show of military power, the English army crossed Lake George in approximately 900 bateaux and 135 whaleboats with their artillery on a number of pontoon rafts. The massive British army slowly approached Fort Carillon, which was only occupied by approximately 3,500 troops. The British commander James Abercromby made a tragic blunder, however, by insisting that the well-fortified stronghold be taken by a frontal assault in broad daylight after learning that a large French reinforcement would be arriving shortly. Nearly 2,000 British troops were killed or wounded in this ill-fated attack. The British army, discouraged and confused, abandoned its provisions and wounded during their retreat to the southern end of Lake George. [8]

The spring of 1759 saw the gathering of another British and provincial army on Lake George with the objective of driving the French from Lake Champlain. This British expedition was led by a more cautious commander-in-chief, Major General Jeffery Amherst. The British left their new fortification of Fort George, located at the southern end of Lake George, with over 11,000 troops in another impressive flotilla. [9]

Although the French troops at Carillon were nearly equal in number to the previous year, their rations were short and disease had ravaged the men inside the fort. The calm, precise, and methodical management of the British troops and artillery forced the small 400-man French army to retreat to Crown Point by bateaux and three sloops. The British army moved most of their fleet overland to Lake Champlain and recovered the vessels intentionally sunk by the French during their retreat. The fighting was now concentrated in the Champlain Valley. [10]

A small French naval fleet on Lake Champlain hampered the British advance. The larger vessels of the French fleet included the 10-gun schooner *La Vigilante* (*Vigilant*) and three sloops or xebecs named *La Musquelongy* (*Muskellunge*), *La Brochette* (*Pike*), and *L'Esturgeon* (*Sturgeon*). All of the vessels were constructed at St. Jean at the northern end of the lake between 1757 and 1759. The sloops carried eight guns each and a crew of 40 to 50 men. After the British moved most of their fleet into Lake Champlain, they quickly began the construction of two radeaux. Expecting a fight, the British then advanced to Crown Point, but to their surprise they found that Fort St. Frederic had been destroyed and abandoned. The British immediately set out to build a larger fortification in its place called Fort Crown Point. After gaining intelligence about the size and strength of the French fleet, the British constructed the 6-gun radeau *Ligonier* at Crown Point, the 20-gun brig *Duke of Cumberland*, and sloop *Boscawen*. The British fleet now consisted of Ligonier, Duke of Cumberland, Boscawen, two small radeaux, three row galleys, and a large number of bateaux and canoes. [11]

In October 1759 the British naval fleet trapped the three French sloops and two long boats in Cumberland Bay. The French decided to scuttle two of their sloops and disable the third before walking back to Isle-aux-Noix. Only the two long boats escaped the British trap. *Boscawen*'s crew recovered some of the sunken war materials and the two French sloops, which gave the British control of Lake Champlain. In November the British fleet was sent to Fort Ticonderoga to be laid up for the winter at the King's Dock.

The 1760 campaign brought about the final collapse of the French Empire in North America. The British strategy involved a three-pronged attack on the French forces in Canada. One force moved west on the St. Lawrence River from the North Atlantic. The second force moved eastward from Lake Ontario toward Montreal, and the third force followed the easiest route, through Lake Champlain. [12]

On the morning of August 11, 1760, the assembled British fleet at Crown Point departed to begin the assault on Canada. This diverse fleet included one brig, four sloops, three radeaux, three row galleys, two long boats, 263 bateaux, twelve canoes, and 41 whaleboats. The British army consisted of 3,300 troops. On their trip north, the fleet lost one whaleboat and seven bateaux due to bad weather conditions. After reaching Isle-aux-Noix, the radeau *Ligonier* and the row galleys maintained a constant fire on the French fort and vessels to protect the British troops during the landing. Once on shore, the British constructed a breastwork nearly 1.6 km (1 mi) long on the eastern shoreline of the mainland and erected four gun batteries. The British captured the remaining vessels of the French fleet and the fort, but most of the French troops escaped and retreated to Montreal. On their way, the French burned everything behind them, including the town of St. Jean. The British plan was successful, and, on September 8, 1760, the French signed the articles of surrender. [13]

At the end of 1760, most of the British fleet and the captured French vessels were taken to Ticonderoga for winter storage. The forts on Lake Champlain were not abandoned, but their garrisons were dramatically reduced. Supplies for the forts largely came from the Hudson Valley and were transported on Lake Champlain. In October of 1761, while delivering provisions to Crown Point, the radeau transport vessel *Grand Diable* sank during a storm and was not recovered despite several attempts to do so. After the Treaty of Paris between England and France was signed in 1763, the lake became a highway for the transport of communication, supplies, troops, travelers, and early settlers. [14]

Revolutionary War in the Champlain Valley (1775-1783)

After the signing of the Treaty of Paris in 1763 the yoke of British rule seemed increasingly heavy to the self-reliant and restive British colonists in North America. From the outset, rebel leaders knew that they must expel the besieged British garrison in Boston, but such an undertaking was impossible without heavy artillery. Such weaponry was at that time completely unavailable to colonial militias. However, cannon were known to be in ample supply at the weakly-manned British forts at both Ticonderoga and Crown Point on Lake Champlain. The Americans immediately devised plans to seize the guns and bring them to Boston.

Once again Lake Champlain became a critical strategic arena. If the Americans could capture the lake's forts, they would gain not only cannons but also control of the lake. They would then command the most direct invasion route to British Canada. On the other hand, if the British maintained their presence on Lake Champlain, then geography would favor their endeavors, allowing them to divide New England and the remaining colonies and conquer them piecemeal.

Early in May 1775, Connecticut authorized Ethan Allen and two hundred Green Mountain Boys to attack Fort Ticonderoga and capture its cannon for the siege of Boston. On the eve of the planned attack, Benedict Arnold arrived with a colonel's commission and orders from the Massachusetts Committee of Safety, bent on the same mission. After a heated dispute between the two leaders to determine who was in charge of the attacking party, Arnold and Allen finally agreed to share the command. In the early-morning hours of May 10, they entered the fort "side by side" with a force of 81 and took the sleeping garrison by surprise.

Along with Fort Ticonderoga, Allen and Arnold quickly captured the fort at Crown Point in May 1775. At the southern end of the lake, the Loyalist settlement of Skenesborough (present-day Whitehall), New York, fell to the Americans as well. At Skenesborough, the Americans seized Philip Skene's schooner *Katherine*, the first vessel to be captured in the war and the first designated warship of the rebellious colonies. In his journal, Lieutenant Eleazar Oswald noted the event: "We set sail from Skenesborough in a schooner belonging to Major Philip Skene, which we christened *Liberty*." [15]

Arnold immediately assumed command of *Liberty* when the schooner arrived at Ticonderoga and embarked for St. Johns, Canada, at the northern end of the lake. There he surprised and captured the "King's sloop" *Betsy*. Arnold renamed the sloop *Enterprise* and confidently reported, "At present, we are Masters of the Lake." Thus, just over a year before the signing of the Declaration of Independence, American forces on Lake Champlain were in complete control of a water highway that led directly into the heart of Quebec. To capitalize on their strategic advantage, the Americans made immediate plans to invade Canada. [16]

The colonial leaders decided on a two-pronged assault on Canada, mistakenly expecting Canadians to gladly join the Americans in their cause. One army would move north through the wilderness of Maine and Quebec and the second through the Champlain Valley, once again assigning Lake Champlain a key role as a highway for invasion.

The Americans maintained a siege of Quebec City throughout the winter of 1775-1776, but hastily retreated when British reinforcements arrived in the spring. They stopped at Ile-aux-Noix in the Richelieu River to regroup, but it was a desperate scene. Three thousand ailing soldiers camped on the island, and at least 15 to 20 perished every day for want of medical supplies. The remaining colonial troops evacuated Ile-aux-Noix and retreated to Crown Point.

The Americans had captured and armed four vessels in 1775: *Liberty*, *Enterprise*, *Royal Savage*, and *Revenge*. This small fleet prevented the British army from advancing south, despite the deplorable condition of the American forces. Throughout the summer of 1776, American and British forces at opposite ends of the lake worked furiously to assemble naval squadrons.

The southern lake town of Skenesborough was chosen for the construction of the American vessels, and, an ironworks to supply the shipyard. In just over two months, the American shipbuilding effort produced one small galley constructed from timbers captured at St. Johns, eight new 54 feet (16.5m) gondolas (or gunboats), and four 72 feet (22m) row galleys. Each completed hull was rowed to Fort Ticonderoga where it was out fitted with masts, rigging, guns, and supplies.

By early October 1776, the American fleet numbered 16 vessels, under the command of General Benedict Arnold, and manned by volunteers and troops drafted from the Northern Army. Arnold, who had sought troops with some maritime experience, was not very pleased with his recruits. He wrote to General Horatio Gates, Commander of the Northern Department, "We have a wretched motley crew in the fleet, the marines the refuse of every regiment, and the seamen, few of them ever wet with salt water."

Meanwhile, the British were also constructing a fleet on Lake Champlain with two objectives: to overcome the American fleet then patrolling the lake, and to escort and protect the army that was preparing to invade the colonies. The larger vessels were manned by Royal Navy officers and seamen from the St. Lawrence naval and transport ships, and the gunboats were manned by British and Hessian artillerymen. These professional forces were far superior to the untrained novices aboard the American fleet.

The two fleets met on the western side of Valcour Island near Plattsburgh, NY, on October 11, 1776. Arnold's vessels sheltered to the west of the island, and the British ships sailed from the north, past the southern end of Valcour Island, then turned north against the wind. Fortunately for the outmatched Americans, most of the large British vessels were unable to work far enough against the wind to engage them. Instead, the bulk of the fighting that day was undertaken by British gunboats that rowed within musket range of the American line. Both sides sustained significant casualties, and the American schooner *Royal Savage*, one of Arnold's largest vessels, ran aground on the southwestern corner of Valcour Island.

The battle halted at nightfall, and at the Americans attempted an escape by rowing past the British line, rowing south to safety along the New York shoreline. The weary American crews, struggling against a southerly wind, rowed for their lives. On the morning of October 13, near Split Rock Mountain, the fresh British fleet caught up with the vessels that were straggling at the end of the American line. The British pressed on in a running gun battle. Arnold, ordered his men to run the remaining five vessels aground in Ferris Bay, near Panton, Vermont. He and his marines ascended the bank, blew up the ships to deny them to the British, and narrowly escaped overland to Fort Ticonderoga and Mount Independence.

Figure 2: "Battle of Valcour Island", by Henry Gilder, circa 1776 (courtesy of Queen Elizabeth II).

The British were now in firm control of the waterway. Now relying on land fortifications at Fort Ticonderoga and Mount Independence, the Americans anticipated an imminent attack. The British, however, realized that a long siege would be necessary and with cold weather approaching, decided to return to Canada for the winter.

During the winter of 1776-1777, the Americans reduced their garrisons on Lake Champlain from nearly 13,000 to 2,500 men. Lieutenant Colonel Jeduthan Baldwin, a Massachusetts engineer, was entrusted with further strengthening the fortifications before the spring offensive. On the

Vermont shore the Americans had carved a large-scale fortification out of a 300-acre (121.5 hectares) peninsula jutting northwards into the lake. Named Mount Independence, it featured a water battery, protective batteries, and a picket fort atop its highest height. Baldwin's troops lacked sufficient food and supplies for winter, but they used the ice as a platform to construct a massive "Great Bridge" across the lake, linking Fort Ticonderoga and Mount Independence.

In the spring of 1777, 8,000 British troops under the command of General John Burgoyne began the invasion of the Champlain Valley. They reached Ticonderoga and Mount Independence in late June, and at once began to haul cannon to the top of nearby, undefended, Mount Defiance, which overlooked the American fortifications. Burgoyne had discovered the Achilles Heel of the two forts. The Americans under General Arthur St. Clair had no choice but to evacuate their positions in the middle of the night on July 5 and 6.

After the campaign of 1777, the British controlled Lake Champlain for the duration of the Revolutionary War. The British naval fleet provided transportation and support for raids into the Champlain and Mohawk valleys from 1778 to1780, and served as supply vessels for the British posts at the northern end of the lake. When the Revolution ended in 1783, the British fleet was laid up at St. John's, except for the schooner Maria, which continued to patrol the northern end of the lake. The Americans were eager to take advantage of the water highway as a trade route; in 1790, merchants from Burlington, Vermont, were said to have purchased for commercial use two of the British schooners laid up at St. John's.

Settlement and Commercialization (1783-1812)

From 1775 to 1791, Vermont operated as an independent republic on the eastern side of Lake Champlain, while the western side of the lake was under the jurisdiction of New York. The population of the Champlain Valley, only a few hundred in the years following the American Revolution, exploded to approximately 143,000 people by 1810. Business entrepreneurs, land speculators, and individuals yearning for a new start quickly began to move into the valley. The large stands of virgin timber were the easiest and most profitable way to make money, and the dozens of streams and rivers in the valley attracted the development of sawmills. The trees were cut into logs, milled into building materials, burned to make potash, pearl ash, and charcoal, or processed to make tar, pitch, and mineral spirits. Towns with manufacturing centers also began to develop along the lakeshore. As the population increased, the commodities heading for Canada diversified to include furs, hides, beef, pork, fish, wheat, cheese, horses, grain, pig iron, tobacco, wool, and paper. [17] Rafts and small vessels including canoes, barges, scows, sloops, bateaux, whaleboats, and longboats moved much of the material due to the lack of good roads. Champlain Valley products were exchanged for cash, salt, and manufactured goods at the markets in Quebec. [18]

After the Revolutionary War, the United States government made a determined effort to stand clear of European conflict while expanding its economic base through peaceful and honest trade without alliances. This approach worked effectively until the renewal of the Napoleonic Wars in 1803, when the fledgling nation became trapped between the two unfriendly superpowers of France and England. For two years, American commerce actually benefited from the conflict, including the Champlain Valley, which continued its exports to Canada. As a neutral party to the Napoleonic Wars, America experienced enormous growth in international trade, becoming the world's largest neutral carrier and the chief supplier of food to Europe. Both Britain and France resented America's neutral trading, however, and a series of confrontations with both belligerent countries soon began. Provoked by the harassment, President Thomas Jefferson called for an embargo in 1807 that essentially forbade all foreign trade. The disastrous effects of the embargo for the U.S. led to the passage of the Non-Intercourse Act of 1809, which permitted trade with all nations except Britain and France.

Champlain Valley residents depended heavily upon the trade with Canada, so most of the valley residents ignored the embargo acts and traded openly with Canada until the United States government began to rigorously enforce the laws by posting customs agents on the lake. Wharves were purposely built astride the boundary, so that Americans could unload their goods in the United States, and Canadians, out of reach of U.S. Customs, could reload the material on boats docked in Canada. Throughout the embargo and prior to the War of 1812, the Champlain Valley's Canadian trade continued and increased dramatically despite the government's prohibition.[19] When the Non-Intercourse Act expired in 1810, trade was reopened with Britain and France as long as each country withdrew its restrictions on American shipping. France lifted its maritime restrictions, but Britain stalled long enough that America declared war in July of 1812.

War of 1812 (1812 – 1815)

American plans for the War of 1812 included gaining control of Lake Champlain and the Great Lakes. To that end, Lieutenant Thomas Macdonough was charged with the organization of the U.S. naval fleet on Lake Champlain. This fleet already had two vessels; the navy had built two 40-ton row galleys in 1808 to stop smuggling with Canada. As the army and navy began to assemble their forces in the Champlain Valley, the War Department acquired six sloops. The navy acted primarily as a transport for troops and supplies between the army bases in Plattsburgh and Burlington. The American fleet was then stationed in Shelburne Bay for the winter, where they made repairs and modifications to the vessels.

The first actual engagement between the two opposing navies took place in the channel of the Richelieu River on July 3, 1813. The American sloops *Growler* and *Eagle*, each with 11 guns, mistakenly sailed too far into the river channel and became trapped by three British gunboats and troops along the shore. The American vessels were captured, repaired, and renamed *Broke* and *Shannon*. [20]

In June 1813 Macdonough received permission to purchase the necessary vessels, men, material, and munitions to keep control of the lake. He purchased the *Montgomery* and the 50-ton merchant sloop *Rising Sun*, which was renamed *Preble*. He also rented the sloops *Francis* and *Wasp*. On July 24 Macdonough was promoted to master commandant of the small but growing lake fleet. On July 29, the British departed from Isle-aux-Noix for Plattsburgh with 1,000 men, *Broke*, *Shannon*, three gunboats, and more than 40 bateaux. The British raided Plattsburgh, Point au Roche, Swanton, Chazy, and Champlain and burned an arsenal, blockhouses, warehouses, barracks, and a hospital. They also looted a number of private homes and captured or burned a number of privately owned vessels. [21]

On December 21, 1813, Macdonough brought his fleet 7 miles (11.3km) up Otter Creek to Vergennes, Vermont, for winter quarters. Vergennes was chosen in anticipation of a major shipbuilding program scheduled to begin in early 1814. The navy's instructions for Macdonough were to increase the size of the fleet dramatically. Vergennes was not only surrounded by stands of oak and pine, but it also had a waterfall that powered a host of industries including eight forges, two furnaces, a wire factory, a rolling mill, gristmills, and sawmills. A shipyard was also already in operation below the falls. Vergennes also had one of the most developed iron industries in the region, which processed bog iron ore from Monkton, Vermont. Vergennes not only had secure access to the lake but was also located on a major road through the Champlain Valley. [22]

At Vergennes, shipwrights built six 70-ton row galleys, each armed with one 24-pounder cannon, and one 18-pounder cannon named *Allen*, *Borer*, *Burrows*, *Centipede*, *Nettle*, and *Viper*. During the late spring, the 26-gun ship *Saratoga*, which had a length of 143 feet (43.6m) and width of 36 feet (11.0m) was built in an amazing 40 days. They also converted a steamboat hull partly constructed at Vergennes into the schooner *Ticonderoga*. The 120 feet (36.6m) vessel with a beam of approximately 26 feet (7.9m) mounted with 17 guns taken from the two small sloops *Francis* and *Wasp*. The British were also enlarging their fleet during the spring of 1814, busily constructing the 16-gun, 82 feet (25.0m) brig *Linnet* at their shipyard at St. Jean. [23]

On May 14, 1814, the British fleet arrived at the mouth of Otter Creek in hopes of blockading or destroying the American fleet on the river. The British were unable to approach the mouth of Otter Creek due to the presence of Fort Cassin, an earthen fort located at the mouth of the river. The fort and the British fleet engaged in a 1½-hour battery with few causalities to either side. The American fleet quickly moved down to the mouth of the creek, but the British fleet retreated northward before they arrived. Nevertheless, British naval commander Captain Daniel Pring obtained detailed information from a spy about the American fleet, which led him to begin construction of *Confiance*, a 37-gun frigate and the largest sailing warship that would ever be constructed on Lake Champlain. [24]

The American fleet spent most of the summer patrolling and escorting bateaux between Plattsburgh and Burlington with troops and supplies. On August 11, 1814, the last American vessel, the 120 feet (36.6m) brig *Eagle*, was launched in 19 days. On August 25, the frigate *Confiance* was launched. The 831-ton square-rigged, three-masted ship was 146 feet (44.5m) long on the gun deck and had a beam of 36 feet (11.0m).[25]

The two fleets finally met in Cumberland Bay on September 11, 1814. Macdonough positioned the American vessels inside the bay to permit the American fleet to use its short-range guns more effectively in the inevitable battle. Macdonough's strategy for engaging the British was very similar to that used at Valcour Bay by Benedict Arnold in 1776. Macdonough positioned his fleet in a north-south line inside the bay with an intricate anchoring system rigged with spring lines. This system allowed the American vessels to be turned end-to-end to bring fresh guns on the opposite side of the ship to bear on the enemy should the guns on the original side become disabled.

The two fleets were nearly matched in size and firepower, although the British had greater weight in long-range guns. Command of the British fleet was given to Captain George Downie only days before the battle, leaving him to take command of his new crew in unfamiliar waters. Both fleets had crews consisting of trained seaman and inexperienced land troops; none of the crews, however, were prepared for the devastating battle that was about to begin. The battle raged for two hours and twenty minutes with deafening cannon and musket fire and resulted in a high number of causalities. Thanks in part to their spring lines the American fleet ultimately defeated the Royal Navy, and the British army withdrew its artillery from the New York shore and returned to Canada. [26]

After the Treaty of Ghent was signed on Christmas Eve of 1814, there was little need for the naval fleet on Lake Champlain. Most were brought to Whitehall at the southern end of the lake and laid up in ordinary. The vessels were then stripped of their masts, guns, sails, and naval stores in early March 1815. Some of the vessels were sold for commercial trade on the lake, while the remaining vessels were destroyed or moved up the Poultney River and abandoned. [27]

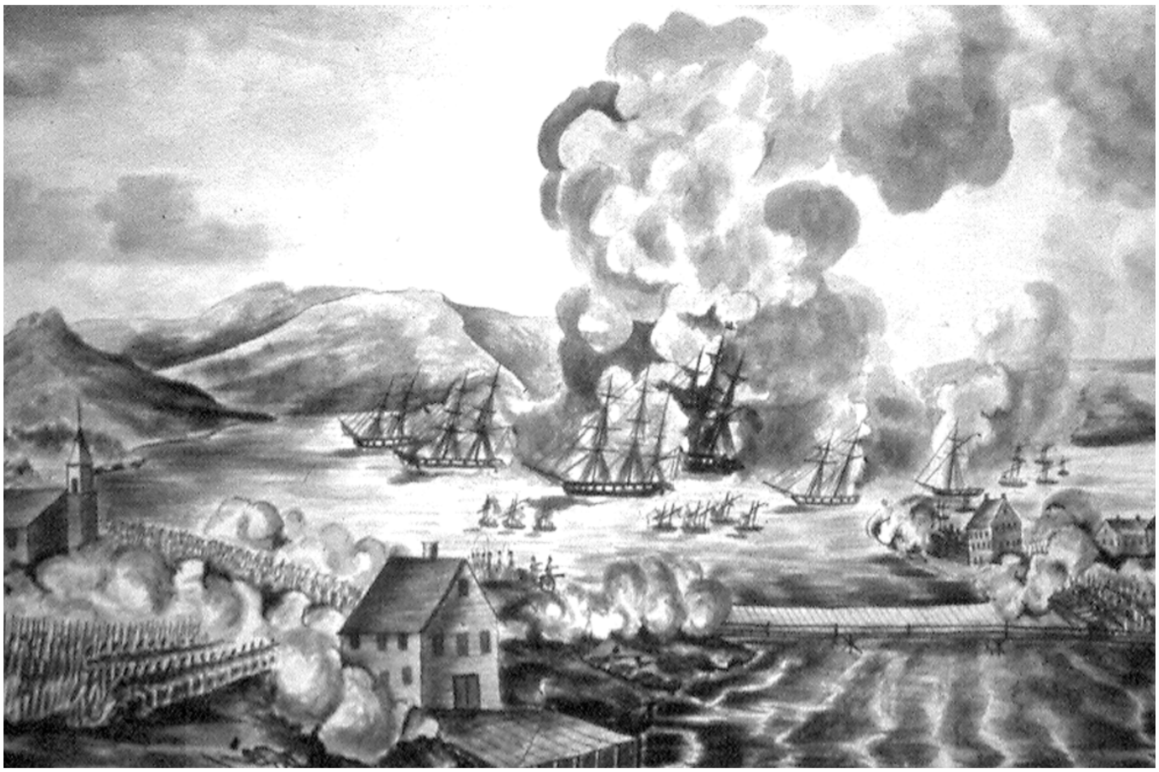

Figure 3: Contemporary painting of the Battle of Plattsburgh Bay (LCMM Collection).

Era of Waterborne Commerce (1823-1945)

The War of 1812 had expanded commercial ties with businessmen in the Hudson Valley, and post-war British tariffs on imports to Canada prevented Canadian markets from once again monopolizing the Champlain Valley's trade. The lack of a navigable waterway to the Hudson River continued to impede trade to the south. Stagecoaches and wagon trains connecting the valleys could accommodate people and small amounts of goods, but bulky, heavy cargoes such as timber, potash, iron, and other raw materials were still without an economical means of transportation. Because of this effective commercial barrier, the population of the Champlain Valley increased only a small amount following the War of 1812. [28]

The Champlain Valley desperately needed canals to connect directly to Canadian or New York markets so that bulk cargoes could be easily and cheaply transported to market. With renewed interest in expanding the Champlain Valley's markets and exports, enthusiasm for building these canals gained momentum. Both canals had been suggested and researched during the Revolutionary War, but at that time such an effort was an insurmountable project for any single, independent company. This transportation barrier was resolved in 1817, when the legislature of

New York resolved to build two commercial waterways, the Champlain and Erie Canals, through the interior of upper New York. The Champlain or Northern Canal would extend for 64mi (103.0km) between Whitehall and Waterford, New York, which meant that an artificial channel 46.5 mi (74.8km) long had to be excavated. With tremendous fanfare the Champlain Canal opened in 1823, and its impact on the Champlain Valley's development and history was profound. The trade that had previously occurred predominately with Canada changed directions almost overnight. [29]

The opening of the Champlain Canal fundamentally affected the economic development of the Champlain Valley. Extractive industries, particularly timber cutting, stone quarrying, and iron mining, experienced a surge of activity as entrepreneurs hastened to take advantage of the new unrestricted domestic market for their products. Agricultural surpluses of apples, potatoes, grain, butter, cheese, and other semi-perishables could be shipped quickly and inexpensively to urban centers along the Eastern Seaboard. The Champlain Canal also provided residents of Vermont and northeastern New York with manufactured goods and raw materials that had previously cost a great deal to ship overland or import from Canada. The year 1823 marked the end of the Champlain Valley's relative isolation from the outside world and its entry into the national economy. [30]

The number and types of vessels that passed over Lake Champlain’s waters greatly increased after 1823. The canal's shallow channels, low bridges, and narrow locks were too restrictive for nearly all of the existing lake merchant craft, so large numbers of long, narrow, shallow-draft boats were constructed for canal service. Three types of canal vessels were employed during the early years of the canal: standard canal boats, sailing canal boats, and packets. All of these craft were towed through the canal by teams of mules or horses. Shipyards that specialized in the building of standard canal boats and packets appeared in the southern portion of Lake Champlain and at towns along the Champlain Canal. Shipbuilders at the northern end of the lake occasionally constructed sloop- or schooner-rigged canal boats that could sail up to Whitehall, unstep their masts, raise a centerboard or leeboards, and pass through the canal. [31]

The use of the sailing canal boat increased after 1841, when Burlington businessmen Timothy Follett and John Bradley formed the Merchants Lake Boat Line. The practice of transferring cargoes from lake craft to standard canal boats had long been recognized as inefficient due to delay, expense and damage to freight. Follett and Bradley thus chose to use sailing canal boats in their fleet to avoid unnecessary handling. Their vessels were sloop-rigged with centerboards, and the profitability of their line soon forced other shippers to switch to similar boats. [32]

The effect of the sailing canal boat on other types of merchant craft was considerable. The construction of sloops and schooners declined very rapidly after 1842, and those that remained in service were relegated to secondary roles such as carrying stone, lumber, and other bulky cargoes between lake ports. In order to compete with the sailing canal boats, owners of standard canal boat lines also dispensed with the unnecessary freight handling by building steam tugboats for canal service and a different style of tugboat for lake service. The elimination of trans-shipment at each end of the Champlain Canal lowered freight rates and increased the profitability of bulk cargoes. [33]

The opening of the canal also proved beneficial to steam navigation on Lake Champlain. The steamer *Vermont*, completed in 1809, was the world's second commercial steamer and the first steamer on Lake Champlain. Other steamers that followed operated successful and lucrative services on Lake Champlain, most under the operation of the Champlain Transportation Company (CTC), which by 1835 had acquired a monopoly on Lake Champlain steamboat ferry service. [34]

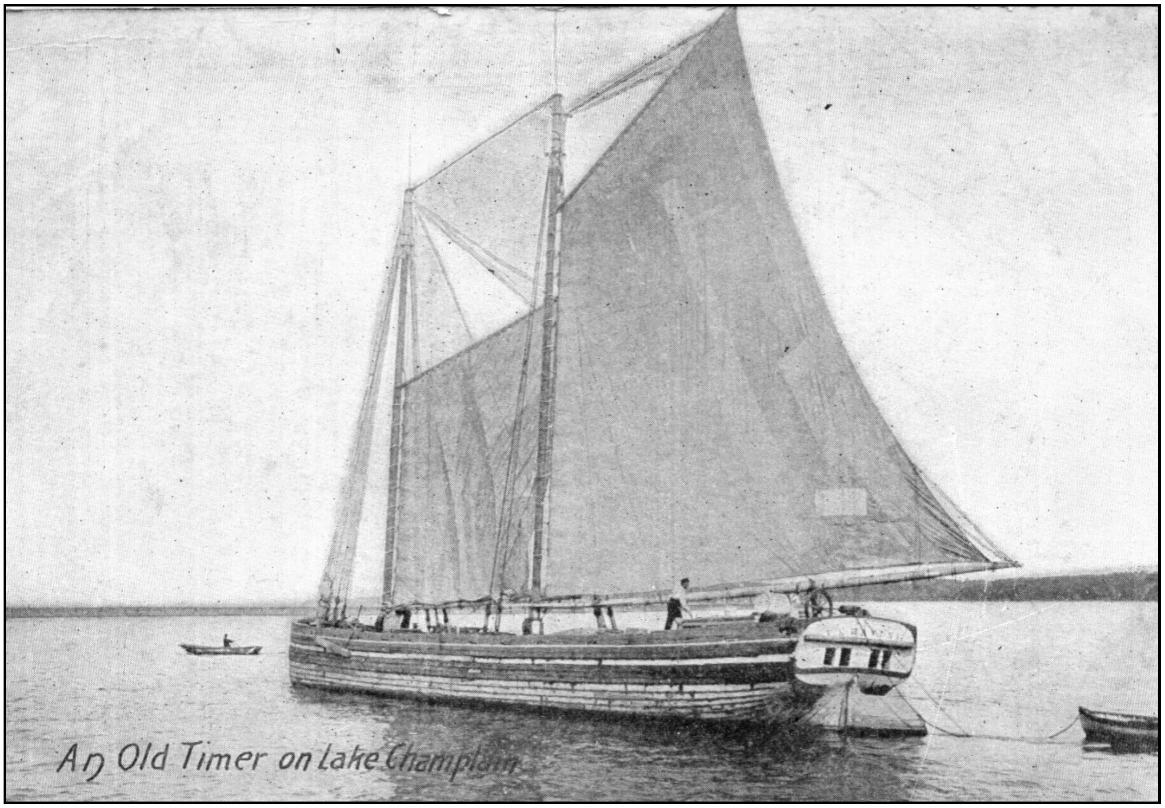

Figure 4: An "1858-class" sailing canal boat, photographed circa 1900 (LCMM Collection).

Small cross-lake ferryboats were also an important part of Lake Champlain's commercial traffic throughout the nineteenth century. From 1825 onward, steam ferries dominated long-distance crossings, but most of the short-distance crossings continued to be served by sail or sweep-propelled scows. In the late 1820s, a trend of horse-powered ferries swept the lake, and a number of these innovative craft were put into service at medium-distance crossings. By 1848, however, all of these vessels had been replaced with other watercraft types. [35]

The opening of the Chambly Canal around the rapids of the Richelieu River in 1843 also boosted the economy of the Champlain Valley. The new waterway opened a direct passage to interior trade markets and allowed merchants to ship goods between the Great Lakes, the Eastern Seaboard, and the St. Lawrence Valley without trans-shipment. [36]

Decline of Lake Commerce (1874-1945)

One of the most negative effects on Lake Champlain commerce resulted from the construction of a rail line on the western shore of Lake Champlain. Many vessels operating on the lake had depended upon the transport of bulky cargoes of iron ore mined in the Adirondack Mountains. Once railroad tracks ran along the western shoreline, they were able to capture almost all of the iron ore traffic, simply as a matter of economics. The new rail line eventually rendered the need for passenger steamers on Lake Champlain unnecessary. The 1870s marked a rapid decline in all types of commercial sailing craft on Lake Champlain. With a few exceptions, the production of commercial sailing craft ceased in the 1870s, and a substantial number of the existing canal sloops and schooners were dismasted and converted into standard towed canal boats. An increasing number of steam tugs made towing a faster and more effective means of moving cargo around the lake. The expanding rail system also served a greater number of the northern lake towns, drawing away the freight that had previously supported the sailing craft.

Lake Champlain commerce survived into the middle of the twentieth century by carrying bulky cargoes within the Champlain Valley and bringing fuel oil, kerosene, and gasoline to the largest lake towns and cities. In an effort to stimulate lake commerce and activity on the Champlain Canal, the State of New York decided to enlarge the lock size to accommodate larger vessels by 1916. The state wrongly assumed that enlarging the size of the vessels would reduce the cost of shipment, thus providing an incentive to use water transportation instead of railroads. The new lock dimensions, however, exceeded the practical size for a shallow-draft wooden vessel. Commercial wooden ships had largely become obsolete by the 1920s, when wooden shipbuilding yielded to the construction of iron or steel vessels.

The use of ferries also eventually declined, primarily as a result of bridge construction. In 1929 the Champlain Bridge, the first permanent highway bridge to span Lake Champlain, was constructed between Crown Point, New York, and Chimney Point, Vermont. The second highway to cross the lake, from Rouses Point, New York, to Swanton, Vermont, was completed in 1938. By 1945, bridges connected almost all of the Champlain Islands, and the roads around Lake Champlain had been vastly improved. The automobile, introduced to the region at the turn of the century, eventually became the most popular way to transport goods and passengers throughout the Champlain Valley. Even tourists abandoned the lake's excursion vessels and embraced the automobile as the easiest way to explore and move about the area.

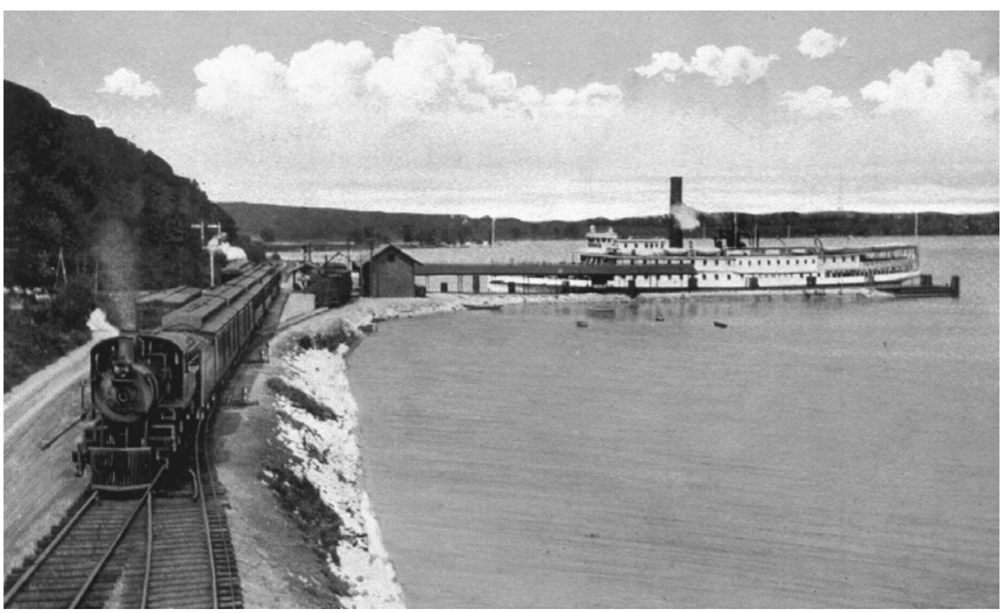

Figure 5: Early twentieth century postcard showing the steamer *Vermont III* docked next to a railroad line at Montcalm Landing in Ticonderoga, New York (LCMM Collection)

Recreational Period (1945-present)

Lake Champlain had become a tourist attraction even after the Revolutionary War, but the primary use of the lake did not become recreational until after World War II (1941-1945). At that time the only commercial vessels that remained on the lake were car ferries and a small number of steel barges and diesel tugs. The solid economic footing of many Champlain Valley residents allowed them to purchase small pleasure boats following World War II. The development of reliable outboard motors for these small craft allowed almost anyone to purchase a small runabout for recreational use on Lake Champlain. The number of public beaches also increased, as well as the number of beachgoers.

As more lakeshore property was purchased and developed for recreational use, concern for Lake Champlain's water quality and health increased. A number of federal, state, and local ecological organizations were created to monitor and study the lake's environment. Towns and cities conducted studies on how they should develop their waterfronts in an effort to revitalize local economies. Many of these projects never progressed beyond the drawing board, but others have succeeded in recent years.

Appreciation for Lake Champlain's environmental and historical value has dramatically increased over the past two decades. Public school programs are beginning to emphasize the Champlain Valley's historic role in regional, national, and international affairs. Citizens are more concerned about the health and preservation of the lake's natural and cultural resources. A number of museums and historic sites dedicated to interpreting Lake Champlain's natural and cultural history have opened in recent years to fulfill the public's desire to learn more about the area’s past. Dozens of studies concerning the lake's resources have been undertaken with public support to preserve Lake Champlain.

RESULTS

The review of remote sensing data by LCMM staff has revealed three known archaeological sites that stretch across Lake Champlain that the proposed corridor must pass through. All three of these sites are the remains of historic structures that once connected the two sides of the lake. The three sites are: the Rouses Point Train Trestle, the Larrabees Point-Willow Point train trestle, and the Revolutionary War Great Bridge that connected Mount Independence, VT with Fort Ticonderoga, NY.

In addition to the known archaeological resources this review also identified three sonar targets that lie within 40m of the installation corridor. These sonar targets have not been verified as cultural in origin. Due to the fact that they have not been fully characterized their presence and location have been indicated so that they can be avoided wherever possible and impact can be reduced or eliminated.

In order to obtain a comprehensive understanding of the cultural resources that are near the project APE, LCMM archaeologist have also identified 23 additional known sites that lay within 500m of the project corridor and 41 unverified sonar targets that are located within 300m of the APE. These additional targets are well outside the project APE and will therefore not be impacted by the installation of the cable. Information about these targets is presented in Appendix 2.

KNOWN SITES IN PROJECT AREA

The three known archaeological sites that overlap with APE of this project include the remains of three historic structures, and their associated artifact scatter. A description of each of these sites is presented in the following pages.

<u>Site Name</u>: Rouses Point Train Trestle

<u>Site Number</u>: N/A

<u>Description</u>:

The Rouses Point Train Trestle is the remains of the important railroad link across Lake Champlain that was constructed in 1850. This new railroad bridge connected Rouses Point with the town of Ogdensburg, New York. In 1851 when the Rouses Point Bridge went into operation it allowed trains to cross over Lake Champlain traveling over a mile-long wooden trestle and floating drawbridge to connect with the Vermont and Canada (later a part of the Vermont Central) Railroad in Alburgh, Vermont. The floating drawbridge, which was in use for seventeen years, was replaced by a center pivot drawbridge in 1868 that operated until the 1950s when the railway crossing was abandoned.

The railroad was much used during the 1870s for both passengers and freight. By 1883 there were five railroads at Rouses Point, and the town had become a transportation hub for the North Country. Yet, the town never became the city that citizens forecast in the mid-nineteenth century.

Currently the trestle is in a state of extreme disrepair with areas of it collapsed into the lake. The only clear navigable path through the trestle remains are the opening that once housed the floating drawboat and later the center pivot bridge.

Though it has not yet been nominated, the Rouses Point Train Trestle is eligible for inclusion in the NRHP, VSRHP, or NYSRHP under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential.

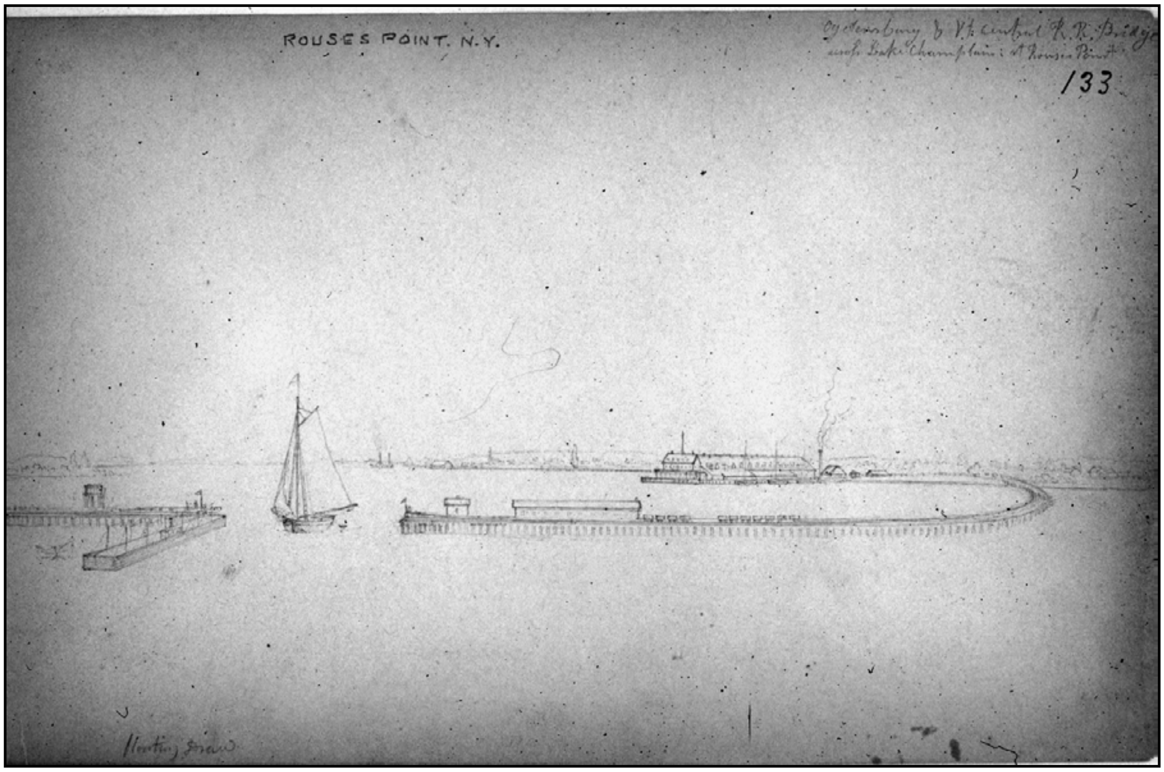

Figure 6: 1857 sketch of the Rouses Point drawboat by R.P. Mallory (Courtesy William L. Clements Library at the University of Michigan).

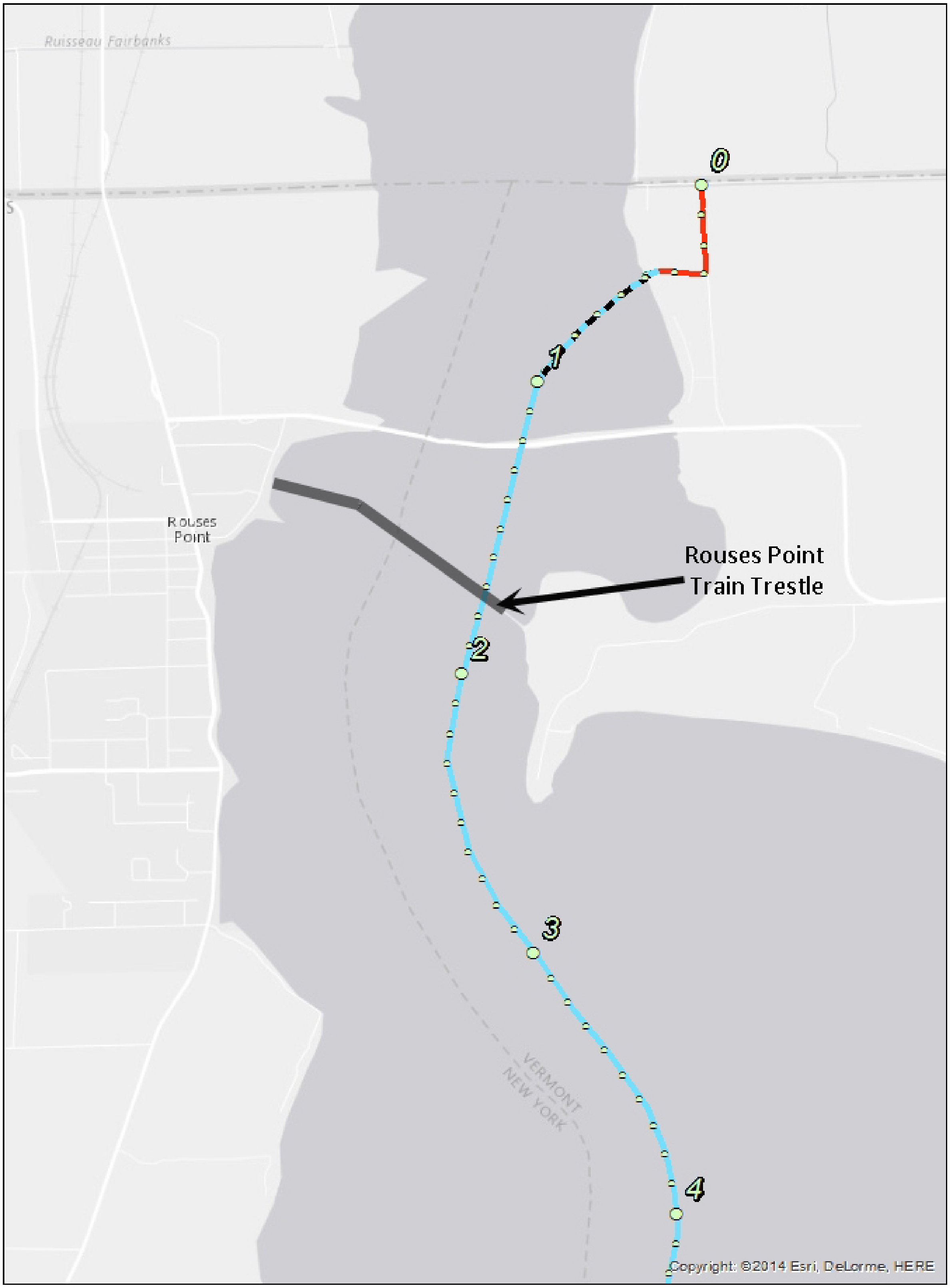

Figure 7: Map showing location of the Rouses Point Train Trestle

<u>Site Name</u>: Larrabees Point-Willow Point Trestle
<u>Site Number</u>: VT-AD-1344
<u>Description</u>:

The waters adjacent to Larrabees Point in Shoreham, Vermont and Willow Point in Ticonderoga, New York contain a significant concentration of submerged cultural resources. These include the remains of the Addison County Railroad's crossing of Lake Champlain between Larrabees Point and Willow Point and two of the railroad drawboats that were used in its operation. With the completion of the 2003 Lake Survey the waters adjacent to Larrabees Point have been examined with side scan sonar on three occasions. The first survey was undertaken by the Champlain Maritime Society in 1984 on behalf of the Vermont Division for Historic Preservation. In 1992 the LCMM surveyed the waters in this portion of Lake Champlain again. Much of the following research is excerpted from the technical report produced from the 1992 survey by Peter Barranco entitled *Ticonderoga's Floating Drawbridge, 1871-1920.*[37] The detailed information from this report is updated with data from the LCMM's 2003 Lake Survey.

In November 1870, ground was broken for construction of the Addison County Railroad that was to link the Rutland Railroad at Leicester Junction with Larrabees Point in Shoreham, Vermont and then by bridge across Lake Champlain to Ticonderoga, to connect with the Whitehall & Plattsburgh (later the Delaware & Hudson Canal Company) Railroad.[38] For fifty years (1871-1920) it linked the economies of Ticonderoga with the towns of Shoreham, Orwell, Whiting and Leicester across the lake. It remained in use for another forty years (1921-1961) providing a diminishing commerce among the Vermont towns.

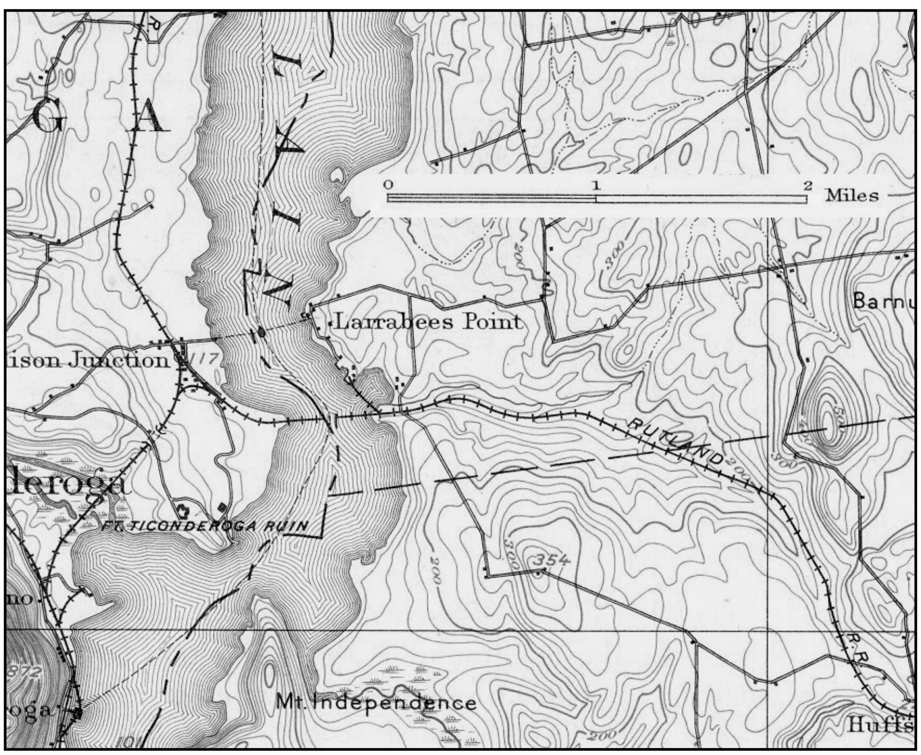

Figure 8: 1903 USGS Quadrangle showing Larrabees Point.

Construction of the pile trestle bridge was underway in January 1871.

> "The contract for building the bridge has been awarded to the firm of Hawkins, Herthel & Burrell of Springfield, Mass. The Manufacturer and Builder says it is to be a pile bridge one-third of a mile long, with timber cribs, filled with stone, and sunk at 100 feet [sic] intervals; it is to be provided with a swing-boat 300 feet long, in the channel, for a draw, and it is to cost $80,000."[39]

The timber cribs, except one, were apparently not built.

As with the Rouses Point crossing, it was decided to use a floating bridge or "ferry" as it was sometimes called, to allow for the passage of lake traveling vessels. "The lake will be piled from its shores to the edges of the navigable channel. Upon these piles a railroad track will be laid. In the gap and across the channel a huge float, operated by steam, is to be placed, which is to be 300ft (99m) long. This float will have a railroad track, and will swing like a gate on a hinge."[40]

At Ticonderoga there were actually three different drawboats used in the bridge over the course of this route life span. The first boat (1871) succumbed to old age and was replaced by a new boat in 1888. This boat lasted until 1902 when it burned and was in turn replaced by the third and last drawboat which remained in service through the end of 1920. The remains of the 1871 (VT-AD-1018) and 1888 drawboats (NYSM11628) have been located, while the 1902 drawboat has not been found.

Although the last drawboat had probably been sunk around 1923, the wood pile trestle at this crossing apparently lasted until 1928 or 1929, when the site for the vehicular bridge was assured and the bridge was actually under construction between Crown Point and Chimney Point making the Larrabees Point-Willow Point Trestle superfluous and it was allowed to fall into disrepair.[41]

Cushman Baker recalled that the pilings had been removed with dynamite by lowering a steel collar filled with the explosive down over the pilings and detonating it at the lake bottom to cut them off. The pilings were then taken out and stacked behind the old ice house on the south point of Beadles Cove near the turntable until sold to a sawmill. Cushman Baker's father, Julius W. Baker, a farmer from East Shoreham, had the contract to draw the piling to the sawmill. This work was done during the winter with horse drawn sleds.[42] The sawmill may have been in Ticonderoga.[43] The trestle was entirely removed to eliminate an obstruction to navigation.

Despite efforts to remove the pilings, there still exist several features related to the trestle located during the 1992 and 2003 surveys. In addition to the 1871 and 1888 drawboats, these remains include pile remnants, a wooden crib structure, two circular mounds, and a chain scar. Sonar records from the area clearly show the path of the former trestle, indicating that the bottoms of some of the piling are visible above the lake bottom.

The timber cribs that were originally to be located at 100ft (30.5m) intervals across the lake were, except for probably one, apparently not constructed. One 30ft by 30ft (9.1m by 9.1m) crib was located along the south side of the trestle on the Vermont side during the 1992 and 2003 underwater surveys. This may have been the "pier" that was reported to have sunk 12ft (3.66m) below the water on the Vermont side during construction of the trestle in May 1871.

The sonar surveys of the area also showed a scar on the lakebed from the chain used to pull the drawboat into the gap between the ends of the trestle. The scar extends in an arc from the west side of the draw to a location due south of the east end of the draw. It is located on the bottom about where the chain from the drawboat would lay as the boat was swung open and closed.

Two interesting features that appeared on the 1992 and 2003 sonar records were mounds about 40ft (12.2m) in diameter on the bottom near the west end of the draw. What the mounds consist of is unknown. It is possible that they are made up of ashes from the firebox for the steam boiler, however, its location, i.e. directly under the bottom of the drawboat, would seem to make this unlikely since the ashes probably would have been dumped over the side of the boat.

In 1992 there were a number of magnetometer ‘hits’ in the project area; however, there were none that would seem to indicate large iron or steel objects such as a railroad car or locomotive. Rumors that there was a locomotive on the lake bottom in the area appear to have been dispelled. Undoubtedly the contacts that were recorded were smaller objects such as rails, tools or other railroad related ‘iron’.

The sites contained in the waters around Larrabees Point, Vermont and Willow Point, New York exhibit an extraordinary collection of nineteenth century submerged cultural resources including the remains of the train trestle and at least two of the drawboats that were used in its operation.. Most of these sites are eligible for inclusion in the State Register of Historic Places and the NRHP when evaluated individually; however, it is more appropriate to consider them as an historical archaeological district. The Larrabees Point Historic District is eligible for inclusion in the NRHP under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential. For Criterion A the archaeological sites in the district reflect on the development of the region’s railroads and lake commerce, and the unique interaction between the two. Criterion B is met by the distinctive engineering adaptation represented by the district’s railroad drawboats. Three railroad drawboats are known to exist; all three in Lake Champlain and two of the three in the Larrabees Point Historic District. Criterion D is met through the information potential which could be derived through the study of any and all of the district’s components.

Site Name: Great Bridge Caissons and Artifact Scatter

Site Number: VT-AD-731 and VT-AD-711

Description:

The 1777 Great Bridge is a National Register of Historic Places archaeological site in Lake Champlain. The site consists of 21 log-cabin style bridge footings (caissons) which span the entire width of Lake Champlain between Vermont’s Mount Independence and New York’s Fort Ticonderoga.

The Great Bridge was built in the winter of 1776-1777 to act as a connection between the two American forts and as an obstacle to British navigation on the lake. However, when British forces appeared in the spring of 1777 the bridge was quickly breached and both forts were captured without a fight. After the end of the American War of Independence the bridge fell into disrepair and eventually the tops of the cassions were dismantled either by human activity or damage caused by winter ice.

The Great Bridge site was the subject of an archaeological study in 1993. An archaeological team from the LCMM documented all the remaining cassions and in the process discovered a sizable collection of Revolutionary War artifacts.

Historic Background

When hostilities between the British and their American colonists broke out in 1775, the Constitutional Congress immediately saw the need to take possession of the forts lining Lake Champlain, noting the location was an ideal invasion route for the British coming south from their Canadian holdings. Located on the Ticonderoga Peninsula, Fort Ticonderoga guards the narrow passage through which water from Lake George enters Lake Champlain, making it one of the most important strategic holdings of Lake Champlain.

In early July 1776, the hill directly across Lake Champlain from Fort Ticonderoga, known as "Rattlesnake Hill", was fortified to consolidate American control over the southern entrance (or exit) of the lake. The rebels dubbed the hill Mount Independence, and established barracks, storehouses, magazines, and a hospital on the hilltop. The mountain was armed with earthworks bristling with cannon, mortars, and muskets. From July 1776 through the first half of 1777, the Americans added breastworks and new batteries to fortify their position.

In October 1776 the American fleet under Benedict Arnold was defeated at the Battle of Valcour Bay, leaving the path clear for the British to advance down the lake into the colonies. However, winter was rapidly approaching and a strong force of 12,000 Americans awaited them at Fort Ticonderoga, so the British decided to wait until the following spring to press their advantage and proceed down the lake. The Americans withdrew their troops from Crown Point to Fort Ticonderoga and Mount Independence, and spent the winter feverishly fortifying their positions in anticipation of the coming British attack in the spring.

An enormous floating bridge was built across the lake from Fort Ticonderoga to Mount Independence by Engineer Jeduthan Baldwin to improve communications and prohibit the passage of British ships. Twenty-two huge caissons were constructed over the winter to anchor the bridge. Work crews cut squares out of the ice, through which bases for these caissons could be dropped. Platforms were added to the square tower-like structures, and filled with stones for stability.

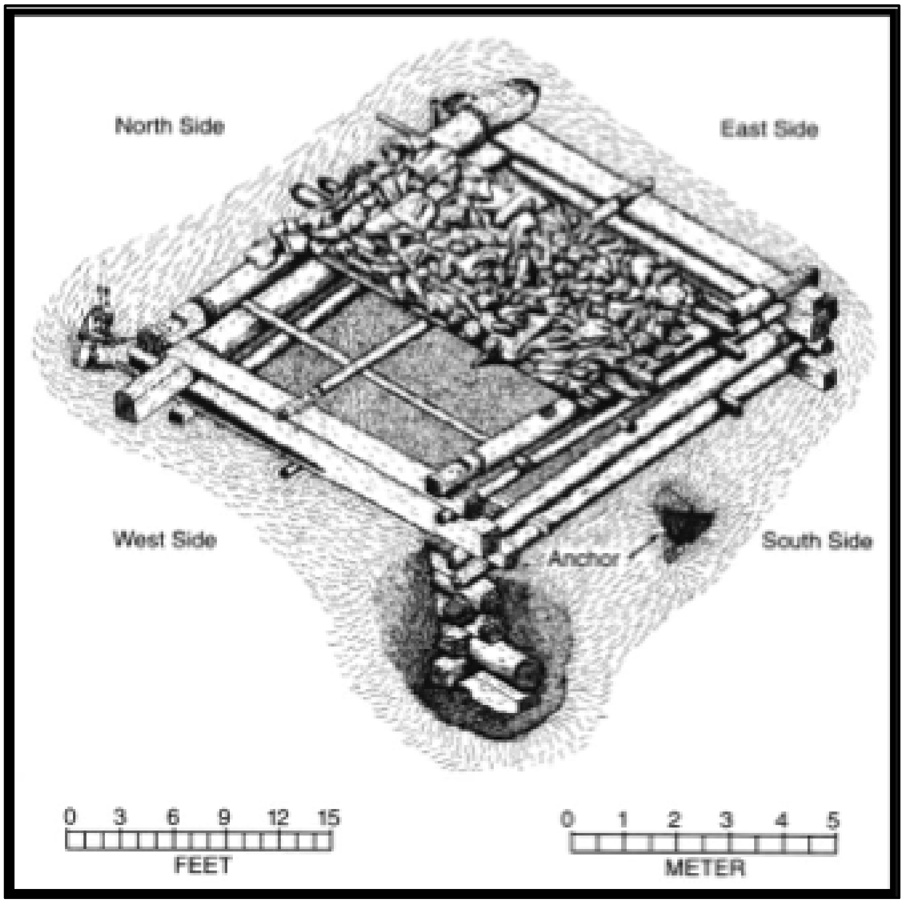

Figure 9: Remains of the Great Bridge Cassion 2 (by Kevin Crisman)

As more logs were added, building up the sides of the caissons, the weight of the structure began to force it slowly to the bottom. When completed, the caissons rested in the soft sediment on the lake's bottom and extended above the surface for 10 feet (3.5m) at the lake's low water level. When the ice broke up in March, the caissons were built on shore and floated into position. The floating bridge was attached to the caissons with chains.

Alas, as strongly fortified as the two positions were physically, by the summer of 1777 they were severely undermanned. The British Commander in Chief, Lieutenant-General John Burgoyne, planned to send Lieutenant-General Howe north up the Hudson Valley and Lieutenant Colonel St. Leger through Lake Ontario and the Mohawk Valley while Burgoyne himself would proceed through Lake Champlain, with all three armies meeting at Albany, New York. Standing between Burgoyne's army and Albany were the American troops at Fort Ticonderoga and Mount Independence. The American Major General Arthur St. Clair was appointed commander of Fort Ticonderoga and Mount Independence, and after his requests for support went unheeded by General George Washington, he planned for the worst.

Determining that the Americans could hold either Fort Ticonderoga or Mount Independence, St. Clair decided that Mount Independence stood a better chance of holding off the British invasion. Fort Ticonderoga and the two promontories south and west of the Fort, Mount Hope and Mount Defiance, were all but abandoned as the Americans attempted to shore up Mount Independence. Unfortunately for the Americans, Burgoyne's troops managed to take Mount

Defiance, which the Americans believed was unscalable with artillery. With an unimpeded line of fire from Mount Defiance, the 8,000 British troops, complete with artillery, was an overwhelming threat to the 3,000 Americans at Mount Independence. Despite the importance of holding Mount Independence, in the face of British General Burgoyne's superior army, the Americans had little choice but to abandon Mount Independence.

St. Clair hoped to abandon their fortification in the dark with such stealth that the British would not know they were gone until at least the next day. The troops would cross the Great Bridge to Fort Ticonderoga, and from there they would head south to Saratoga. The plan of retreat was kept secret from the men until the last possible moment so that Burgoyne would not see them making preparations to leave. The men were issued orders to move out at 10pm, and the retreat was going according to plan until Brigadier General Fermoy, the commander of Mount Independence, flagrantly disobeyed orders and set fire to his cabin at 2am lighting up a large portion of the camp. The British then saw every move made by the Americans and proceeded to give chase to the retreating army.

The need for secrecy forced the Americans to leave behind a good amount of supplies, provisions, and ordnance. One four-man detachment was left behind to fire a cannon steadily at the British pursuers, and the fire did manage to confuse the British. The Americans also attempted to burn the Great Bridge in their wake, but due to the fact that the Bridge floated upon water this was not a successful method of destruction. They did manage to damage the Bridge, though.

The British managed to salvage and use a large amount of the abandoned supplies and provisions; damaged goods were ordered destroyed by being burned, buried, or dumped in the lake. However by October 1777, the tide of war had turned to favor the Americans and a superior American force was preparing to lay siege to Fort Ticonderoga and Mount Independence after the defeat of Burgoyne's army at Saratoga. By then British Brigadier General Henry Watson Powell was commander of Mount Independence, and when given the option by his commanding officer to determine whether his position was defendable or should be abandoned while his retreat was secure, he decided to abandon Mount Independence and Fort Ticonderoga.

Unlike the Americans, the British had time to plan a retreat, and they destroyed everything that they could not transport. They destroyed the captured forts beyond repair, blowing up buildings, spiking cannon and knocking off trunions, burning everything made of wood. All the iron ammunition that could not be carried was thrown into the lake. The Americans still managed to scavenge and use some of the equipment left behind, but not much.

Previous Archaeology

In 1983, the Champlain Maritime Society and the Vermont Division for Historic Preservation began surveying the lake bottom in the area of Fort Ticonderoga. In 1992 LCMM conducted the Fort Ticonderoga-Mount Independence Project under a contract with the Lake Champlain Basin Program in 1992 and the Vermont Division for Historic Preserve in 1993. The survey work begun in 1983 was continued off the northern shore of Mount Independence in May 1992 with a Phase I side scan sonar and magnetometer survey to locate, identify, and plot the underwater cultural resources in the area. Two weeks in July 1992 were allotted to conducting a Phase II diver survey to determine the nature and extent of all archaeological features and materials discovered off the northern end of Mount Independence.

This Phase II component verified cultural targets found during the Phase I survey and mapped finds such as shipwrecks, artifact scatters and the Great Bridge caissons. Each of the 21 caissons between Fort Ticonderoga and Mount Independence was identified and examined; Caisson 2 was found in a good state of preservation and thus chosen as the example caisson for full documentation. The project yielded a drafted reconstruction of the caissons that once anchored the 1700 feet (518.5m) floating bridge. The Phase III portion of the project took place in 1993, and was designed to educate archaeologists, historians, students, and the public about the historic significance of Fort Ticonderoga and Mount Independence's underwater archaeological resources.[44]

These field efforts revealed a large number of artifacts dating to the American revolution that are evidence of the construction work on the bridge itself or items that were cast into the lake by the retreating American army in 1777. In addition to the artifacts the remains of at least nine of the bridge caissons rest in Vermont waters.

The Great Bridge is eligible for the National Register of Historic Places under Criterion A: Event(s) and Broad Patterns of Events, Criterion B: Associated with the lives of significant persons, Criterion C: Design, Construction and Criterion D: Information Potential.

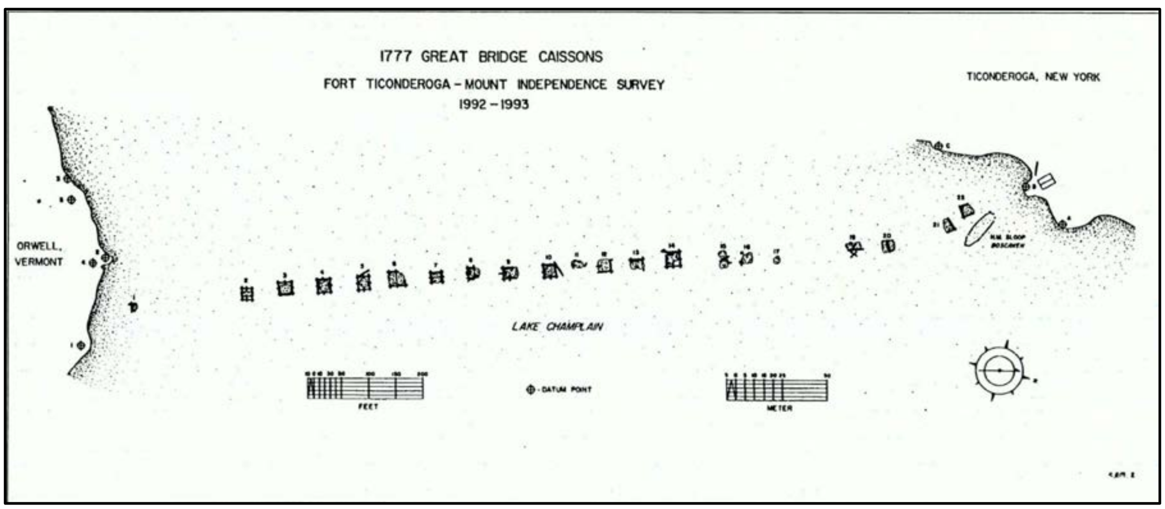

Figure 10: Map showing location of the remaining Great Bridge Caissons (LCMM Collection)

SONAR TARGETS NEAR PROJECT CORRIDOR

In addition to the known archaeological resources this review also identified three sonar targets that lie within 40m of the installation corridor. These sonar targets have not been verified as cultural in origin. Due to the fact that they have not been fully characterized their presence and location have been indicated so that they can be avoided wherever possible and impact can be reduced or eliminated. The general recommendation for these sites is avoidance. Where this proves unfeasible and the target lies within 40m of the proposed corridor, LCMM recommends that additional field characterization be carried out to determine if the target represents a significant historical resource. The three anomalies that fit these criteria are sonar targets 34, 290 and 319.

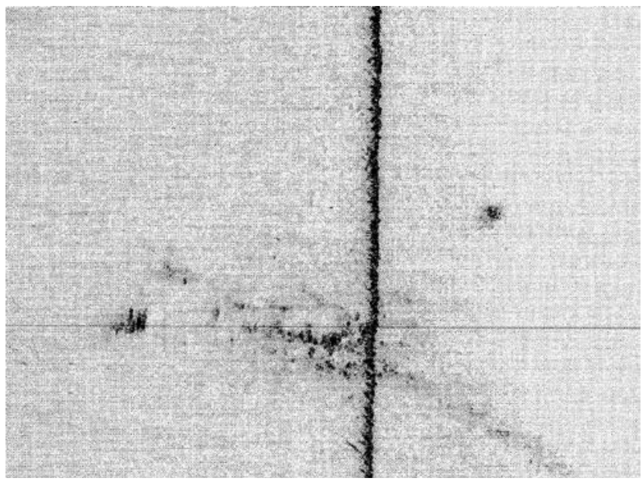

Figure 11: Sonar image of Target 34 (LCMM Collection)

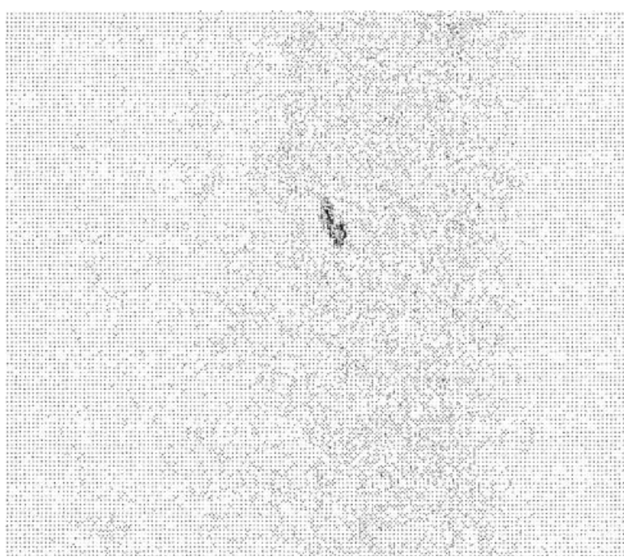

Figure 12: Sonar Image of Target 290 (LCMM Collection)

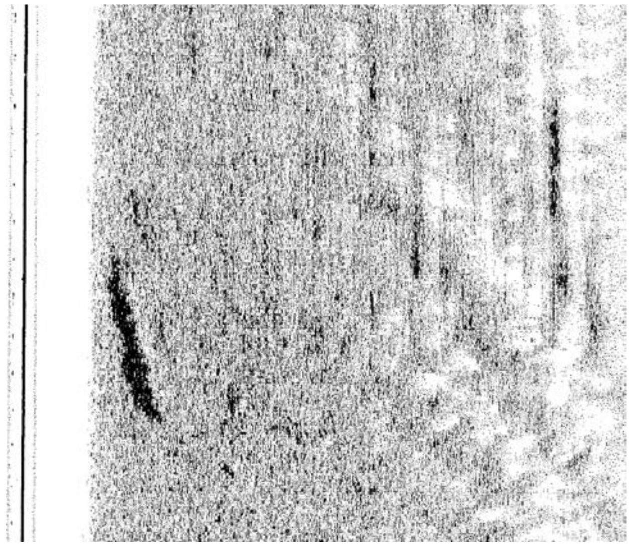

Figure 13: Sonar image of Target 319 (LCMM Collection)

CONCLUSIONS AND RECOMMENDATIONS

One design goal of the NECPL is to choose a route for the transmission line that avoids impacting cultural resources located on/in the bottom lands of Lake Champlain. To this end we have the following recommendations to help ensure that the goal minimizing impacts to cultural resources is achieved.

Recommendations:

- Continued consultation with LCMM and/or other CRM professionals.
- The establishment of a 40 meter (131ft) buffer or exclusion zone around known or suspected cultural resources that are found to be near the installation corridor.
- LCMM or other CRM professionals to review any additional remote sensing data that is collected during the course of the project to ensure that any resources that are revealed can be avoided.
- Prepare and adopt a plan for how to avoid or minimize impact on the three historic features that cross Lake Champlain and cannot be completely avoided by corridor selection based on existing data. These sites include:
    - The Rouses Point Train Trestle
    - The Great Bridge between Fort Ticonderoga, NY and Mount Independence, VT. (VT-AD-731).
    - The Larrabees Point-Willow Point Train Trestle (VT-AD-1344) and its associated features
- In the case of the three cross-lake features mentioned above, LCMM recommends that the structures near the channel selected for passage through these features be carefully documented before installation begins to record their current state of preservation and to pinpoint their locations to allow for safe corridor selection. Examination of these historic structures should also be carried out once work is complete to verify that there was no impact of the installation process.
- In the case of the Revolutionary War Great Bridge crossing between Ticonderoga New York, and Mount Independence, Vermont, LCMM recommends that, in addition to documentation, subsurface testing should be carried out to locate, identify and remove historic artifacts located within the selected installation corridor
- If it is found to be unfeasible to adjust the corridor away from the three unverified sonar targets that have been found to lie within 40m of the installation corridor then additional field characterization of these targets should be carried out to determine if they are culturally significant resources.

BIBLIOGRAPHY

Barranco, Jr. Peter A. *Ticonderoga's Floating Drawbridge, 1871-1920, Demonstration Report.* Grand Isle, VT: Lake Champlain Basin Program, 1995.

Bellico, Russell. *Sails and Steam in the Mountains: A Maritime and Military History of Lake George and Lake Champlain.* Fleischmanns, NY: Purple Mountain Press, 1992.

Calloway, C.G. *Western Abenakis of Vermont, 1600-1800: War, Migration, and the Survival of an Indian People*. Norman, OK: University of Oklahoma Press, 1990.

Clark, ed., W.B. *Naval Documents of the American Revolution*. *Vol. 1*. Washington D. C.: Department of the Navy, 1964.

Coolidge, G.O. *French Occupation of the Champlain Valley from 1609 to 1759*. Mamaroneck, NY: Hargor Hill Books, 1989.

Crisman, Kevin J. *Of Sailing Ships and Sidewheelers: The History and Nautical Archaeology of Lake Champlain*. Montpelier, Vermont: Vermont Division for Historic Preservation, 1986.

Crisman, Kevin J. *Lake Champlain Commercial Navigation: Statement of Historical Context -- Draft*. (Montpelier, VT: Vermont Division for Historic Preservation, 1990.

Fischer, Richard M. *Lake Champlain Planning Guide for Water and Related Resources, June 1976.* Boston: New England River Basin Commission, 1976.

Hill, Ralph Nading. *Lake Champlain: Key to Liberty.* Woodstock, VT: Countryman Press, 1995.

Kane, Adam and Christopher Sabick. *Lake Champlain Underwater Cultural Resources Survey – Volume IV: 1999 Results and Volume V: 2000 Results*. Lake Champlain Maritime Museum: Vergennes, 2002.

Kane, Adam, A. Peter Barranco, Joanne M. DellaSalla, Sarah E. Lyman, and Christopher R. Sabick. *Lake Champlain Underwater Cultural Resources Survey Volume VIII: 2003 Results and Volume IX: 2004 Results.* Lake Champlain Maritime Museum: Vergennes, VT, 2007.

APPENDIX 1: GLOSSARY

Aft Near or at the stern of a vessel.

Amidships The middle of a vessel.

Archaeological Site Locations where signs of human activity are found.

Archaeology A sub-discipline of anthropology involving the study of the human past through its material remains.

Artifact Any object used or manufactured by humans.

Athwartships From one side of a ship to the other.

Barge A large, unpowered, generally flat-bottomed boat towed by other craft and used as a freight-hauler or work platform.

Bateau (plural **bateaux**) A lightly built, flat-bottomed, double-ended boat.

Bathymetry The measurement of the depth of bodies of water.

Beam A dimension measured from side to side of a vessel.

Bedrock A mining term for the unweathered rock below the soil.

Bilge The lowest point of a vessel's interior hull.

Bilge Stringer A fore and aft timber located in the bottom of the hull that lends longitudinal strength to the hull and keeps the frames in line.

Bitts Strong wooden or metal uprights used for securing heavy ropes such as anchor cables.

Boat An open vessel, usually small and without decks, intended for use in sheltered water.

Bollard Short thick post of wood or iron (often mounted in pairs) used for securing mooring ropes, springs, or hawsers.

Bolt A fastener consisting of a threaded rod with a head at one end, designed to be inserted through a hole in assembled parts and secured by a mated nut that is tightened by a wrench.

Boom Spar used to stretch out the foot of a sail.

Bottom Planking In an edge-fastened vessel the planking that covers the flat bottom of the vessel, normally oriented transversely.

Bow The forward end of a vessel.

Bowsprit A spar projecting forward from the bow.

Breadth The measurement of a ship's width.

Breakwater A structure, usually made of stone or concrete, built to create a harbor or improve an existing one.

Breast Hook A large, horizontal knee fixed to the sides and stem to reinforce and hold them together.

Bulwark The side of a vessel above the its upper deck.

Bulkhead Vertical partition between two decks of a ship, running either lengthwise or across, forming and separating different compartments.

Cabin The living quarters of a vessel.

Canal A manmade waterway or artificially improved river used for navigation.

Canal Boat A boxy vessel designed to travel in a canal system. The vessel has no means of propulsion and must be towed or pushed by another vessel or animal.

Caprail A timber attached to the top of a vessel's frame.

Cargo hatch A deck opening providing access to stow cargo below.

Causeway A raised roadway across water or marshland.

Ceiling The internal planks of a vessel.

Chine log A longitudinal timber at the angular junction of the side and bottom of a flat-bottomed vessel.

Chock Wooden wedge used to prevent other structural members from moving.

Clamp A thick ceiling strake used to provide longitudinal support.

Cleat A T-shaped rigging fitting to which a vessel's lines are attached.

Coaming The raised lip with which openings in the deck such as hatchways are framed to prevent water on deck from running into the hold.

Cocked Hat Triangular wooden block used to brace the floors and futtocks where the bottom of the hull meets the sides.

Cultural Resource A nonrenewable prehistoric or historical resource such as archaeological sites, artifacts, and standing structures.

Deck A platform extending horizontally from one side of a ship to the other.

Decking The individual timbers that form the floor of the deck.

Deck beam A timber mounted across a vessel from side to side to support the vessel's deck and provide lateral strength.

Derrick Form of crane used to hoist cargo or their weights. It consists of a swinging boom supported by a topping lift and controlled sideways by guys.

Diagonal Bracing Angled bracing in the hull of a vessel used to resist fore-and-aft or athwarships distortion.

Draft The depth of a vessel's keel below the waterline when the vessel is loaded.

Drift bolt A cylindrical iron rod used to fasten ship timbers together; usually headed on one end and slightly larger in diameter than the hole into which it is driven.

Edge-fastened A shipbuilding technique used to attach the hull planks of a vessel together. The planks are set edge to edge and a hole drilled through them. Large iron bolts are driven through the planks to hold them together.

Fairlead A deck fixture used to lead a rope in a required direction.

Fender Timber designed to absorb the force from impacts with vessels or wharfs.

Floor Timber A frame timber that crosses the keel and spans the bottom of a vessel.

Fore Located at the front of a vessel.

Fore-and-Aft From stem to stern, from front to back, oriented parallel to the keel.

Frame A transverse timber or group of timbers that creates the skeleton of a vessel and to which the hull planking and ceiling are fastened.

Futtock A frame timber that continues where the floor timber leaves off and continues up the side of a vessel.

Gudgeon Device used to attach the rudder to the boat so that it can swing freely

Gunwale The timber above the sheer strake.

Hanging knee A vertical L-shaped timber attached to the underside of a beam and the side of a vessel; used to connect and reinforce the junction of a deck beam with the side of the vessel.

Harbor A safe anchorage, protected from most storms; may be natural or manmade; a place for docking and loading.

Hatch A deck opening in a vessel providing access to the space below.

Historic The period after the appearance of written records for a given region.

Hold The lower interior part of a ship in which cargo is stored.

Hull The structural body of a vessel, not including the superstructure, masts or rigging.

Hull Plank A thick board used to create the outer shell of a hull.

Inboard Toward the center of the vessel.

Keel The main longitudinal timber upon which the framework or skeleton of a hull is mounted; the backbone of a hull.

Keelson An internal longitudinal timber, fastened on top of the frames above the keel for additional strength.

Knee An L-shaped timber used to strengthen the junction of two surfaces on different planes.

Lighter A type of barge used to carry goods and equipment.

Longitudinal timber A long timber that runs parallel with the length of a vessel.

Magnetometer A scientific instrument used to measure the strength and/or direction of the magnetic field in the vicinity of the instrument. In archaeology this is used to identify metal objects.

Mast A large wooden pole that supports the sails of a vessel.

Mooring A permanent placement of an anchor, anchor chain, shackles and buoy necessary to anchor a vessel.

Mortise A cavity cut into a timber to receive a tenon.

Moulded Dimension The measurement of depth of a timber as seen in a cross-section view of a vessel.

Mud line The intersection of a shipwreck’s hull with the bottom’s surface.

Naphtha Launch: A small vessel that ran on the naphtha engine which did not use steam, but instead forms of gasoline and vapor.

Outboard Outside or away from the center of a vessel's hull.

Plank A thick board used as sheathing on a vessel.

Plank-on-Frame A shipbuilding technique, also commonly known as carvel built. Vessels of this type have planking running fore and aft with the planking laid edge to edge.

Port The left side of a vessel when facing forward.

Primary Source An artifact, document, or individual that provides information based on personal observations. A firsthand account.

Provenience The original location of an object, in reference to artifacts it is the exact location in which they were found.

Rabbet A concavity in the keel or chine log into which the planking is fit.

Rake The projection of a ship, at stem or stern, beyond the ends of the keel.

Rake timber Timber that acts as framing for the raked end of a scow.

Rider Interior frame mounted inside a ship's hold and bolted to other structural elements to strengthen the ship's structure.

Rigging The hardware and equipment that support and control the spars and sails of a vessel.

Rigging block A wooden pulley used to operate a vessel's spars and sails.

Room and Space The distance between the moulding edges of two adjoining frames.

Rub Plate A metal band placed on the forward end of the stem and bottom of the keelson to protect the underlying wood.

Rubwale See Rub Strake

Rub Strake: A rail on the outside of the hull of a boat to protect the hull from rubbing against piles, docks and other objects

Rudderpost A vertical timber in the stern of the vessel to which the rudder is attached

Scarf An overlapping joint to connect two timbers or planks without increasing their dimensions.

Schooner A fore-and-aft-rigged sailing vessel with two or more masts.

Scow Flat bottomed watercraft, normally rectangular in cross-section with outward sloping ends.

Secondary source An individual's description and interpretation of a historical event recorded at a different time and place. A secondhand account.

Sheer strake The top strake, or plank, of a wooden vessel next below the gunwale.

Sided dimension The measurement of width of a timber as seen in a plan view of a vessel.

Sloop A single-masted, fore-and-aft-rigged sail boat.

Spar A pole used to help support the sail of a vessel.

Spike A large nail.

Spud: Posts found on some barges which are lowered from the barge and pushed into the waterway floor to anchor the vessel in place.

Stanchion An upright supporting post.

Standing Knee A vertical L-shaped timber attached to the top of a deck beam, or decking; used to connect and reinforce the junction of a deck beam with the side of the vessel.

Starboard The right side of a vessel when facing forward.

Steamboat A vessel propelled by a steam engine.

Steamer A vessel propelled by a steam engine.

Stern The after end of a vessel.

Strake A continuous line of planks, running bow to stern.

Stringer A longitudinal timber fixed to the inside surface of the frames of a vessel to provide it with greater strength fore-and-aft.

Tenon a projection on a timber which fits into a mortise.

Tiller A handle attached to the rudderpost to steer a vessel.

Timber In a general context, all wooden hull members; specially those that form the framework or skeleton of the hull.

Top Log Longitudinally oriented timber which runs on top of the futtocks.

Towfish The torpedo-shaped unit that houses the transmitter and receiver of a side scan sonar and is usually towed behind a vessel.

Transverse Describes a component of a ship that runs side to side, not fore and aft.

Underwater archaeology The archaeological study of underwater cultural resources.

Underwater cultural resource A nonrenewable resource that partially or entirely lies below water, such as submerged prehistoric archaeological sites, artifacts, bridges, piers, wharfs and shipwrecks.

Vessel A watercraft, larger than a rowboat, designed to navigate on open water.

Wale A thick strake of planking located along the side of a vessel for the purpose of stiffening the outer hull.

Waterline The intersection of the vessel's hull and the water's surface.

Wharf A structure, parallel to the shore, for docking vessels.

APPENDIX 2: KNOWN SITES NEAR PROJECT CORRIDOR

Site Name: Isle La Motte Wreck (Wreck UU)
Site Number: VT-GI-24
Description:
The Isle La Motte Canal Sloop (VT-GI-24) is a wooden-hulled vessel possessing an overall length of 79 feet 8inches (24.3m), a maximum beam of roughly 13 feet 6inches (4.1m), and an approximate depth of hold of 4 feet (1.2m. She lies down at the bow, with a starboard list, in soft sediment. Significant components of the hull, her rigging and associated artifacts are described below. The site was first dived and preliminarily documented in 1982 by the Champlain Maritime Society, precursor of the Lake Champlain Maritime Museum (Cohn 1984). Its location was verified during the 2000 LCCRS field efforts.

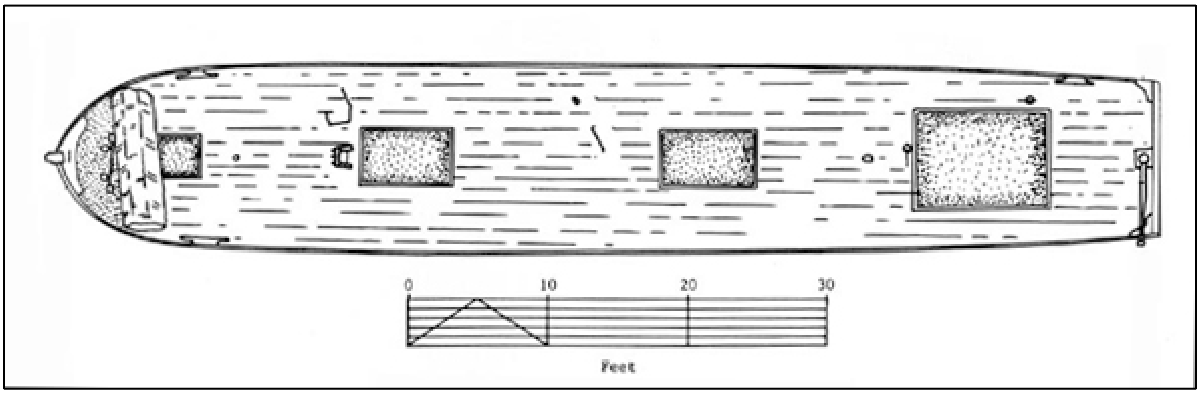

Figure 14: Plan View of the Isle La Motte Wreck/Wreck UU (drawing by Kevin Crisman)

The wreck retains extensive portions of the bow, stern, main deck, and exterior planking extant. In addition to its well preserved exterior many of the interior structures of the vessel are also assumed to be well preserved though they are somewhat inaccessible do to the presence of extensive cargo remaining in the canal boats hull.

On deck there are extensive remains of the vessels hatchways, its centerboard trunk, the mast tabernacle, remains of the stern cabin and other working equipment including a windlass and folding stock anchor.

In 2000, research conducted by Peter Barranco seems to have uncovered the circumstances of the Isle La Motte canal boat's loss, although the vessel's name still remains a mystery. The September 2, 1846 edition of the Plattsburgh Republican reported that:

> Accident. – Mr. Daniel Hall, an industrious citizen of this town, who was employed in carrying stone on a small sloop from Gilman's quary (sic) to the new Fort at Rouse's Point, was drowned on the night of the 2d. inst. When within a few miles of Rouses's Point a sudden squall struck his vessel, which was heavily laden, and in endeavoring to throw the anchor over he was caught by the cable, the vessel partly capsized, filled and sunk – taking him down with it. His son and another man who were on board, saved themselves with much difficulty (*Plattsburgh Republican*2 September 1846).

Wreck UU is currently under consideration for inclusion in the Lake Champlain Underwater Historic Preserve Program. Although the intact nature of the vessel would appeal to recreational divers, there are numerous preserve issues to be addressed prior to its inclusion. The vessel lies in the navigation channel, and therefore the area is subject to considerable boat traffic. The vessel is also archaeologically sensitive. Prior investigations did not include the excavation of the stern cabin, an area which certainly contains many portable artifacts.[45]

Wreck UU is considered to the eligible for the NRHP or VSRHP under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction and Criterion D: Information Potential.

<u>Site Name:</u> Tug *LaVallee* (Wreck I)
<u>Site Number:</u> VT-CH-814
<u>Description</u>:
Wreck I is a wooden tugboat located in Vermont waters with its steam machinery still on board. The vessel is estimated to be 45.3 feet (13.8m) long and 17.4 feet (5.3 m) wide, and it stands 7.5 feet (2.3 m) off the lake bottom. Based on its location and description, the vessel has been identified as *U.S. La Vallee*, which was scuttled in the 1930s after a working life of over fifty years. This remarkably well-preserved vessel is the only known intact steam tugboat in Lake Champlain. Its towing bits, propeller, ship's wheel, steam stack, and machinery were clearly visible and in excellent condition due to the lake's cold water. The wheelhouse with its curved windows was found lying in pieces, almost as if it had been blown outward. Trapped air may have torn apart the vessel's wheelhouse in a violent explosion during the vessel's sinking.

LaVallee is considered to the eligible for the NRHP or VSRHP under Criterion C: Design, Construction and Criterion D: Information Potential.

Figure 15: Historic image of the steam tug LaVallee (LCMM Collection)

<u>Site Name</u>: *Phoenix*
<u>Site Number</u>: VT-CH-711
<u>Description</u>:
During the summer of 1978, a group of divers headed by Don Mayland encountered the remains of a large vessel off Cholchester Shoals. When Mayland reported his find to the Vermont Division for Historic Preservation (VDHP), he learned that diver and archaeologist Arthur Cohn

was initiating a search for the wreck of the steamboat *Phoenix,* which had sunk in that very area in 1819. The two divers examined the wreck together and verified that the remains were those of the lost steamer. This discovery led to the first detailed archaeological examination of a shipwreck in Lake Champlain.

Phoenix was built immediately after the end of the War of 1812, the first vessel constructed for the Lake Champlain Steamboat Company. It was launched in the spring of 1815 at the Vergennes, Vermont shipyard of a man named Mr. Roberts. It was a large vessel 44.84 m (147 ft) in length with a 8.24-m (27-ft) maximum beam, and it was propelled by a 45-horsepower steam engine. The vessel cost the Lake Champlain Steamboat Company $45,000 to build.

The vessel carried passengers and cargo across the lake for four years, even carrying President James Monroe from Burlington, Vermont to Plattsburgh, New York in 1817. *Phoenix*'s career came to a tragic end on the night of September 4, 1819, as it was northbound from Burlington to Canada with 46 persons on board. The vessel was in the command of 21-year-old Richard W. Sherman, son of the steamer's regular captain Jahaziel Sherman, who was ill at the time.

The voyage progressed routinely until around midnight, when passenger J. Howard noticed that the vessel was on fire below decks. Howard quickly woke all the passengers, who assembled on deck. *Phoenix* was equipped with only two lifeboats, which would have been sufficient to carry the passengers and crew if they had been fully filled. Tragically, in their panic to leave the doomed vessel, the passengers of the second lifeboat pushed away from *Phoenix* before the boat was full, leaving eleven persons on the now flame-engulfed steamer. The two lifeboats rowed to Providence Island to unload then returned to search for survivors who might have abandoned the steamer. They were able to rescue five people found clinging to pieces of wreckage, including Captain Sherman, but the last six passengers and crew were lost.

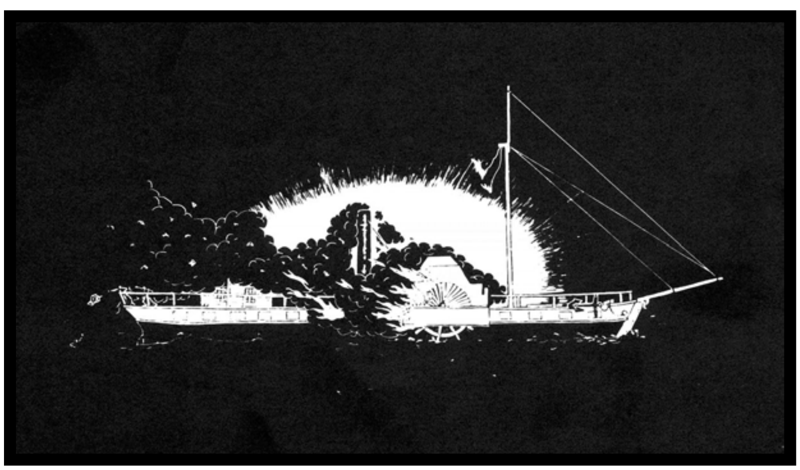

Figure 16: *Phoenix* Burning (LCMM Collection)

The charred remains of the vessel drifted onto the shallows of Colchester Shoal, where they remained exposed for some time. The Lake Champlain Steamboat Company recovered the steam engine from the wreck before the lake froze. Ice shifted the hull timbers off the shallows during the winter and spring of 1820, and the hulk eventually came to rest on the lakebed in water ranging from 18.3 to 33.55 m (60 to 110 ft) in depth.

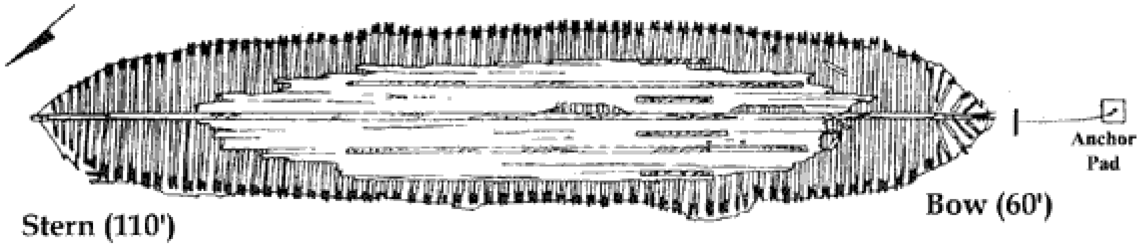

Figure 17: *Phoenix* Site Plan (LCMM Collection)

The hull lay forgotten in the cold, dark water off Cholchester Shoal for more than 150 years, until Don Mayland and Art Cohn rediscovered the site in the late 1970s. The relocation of the hull initiated a thorough historical and archaeological investigation of the steamboat. Extensive historical research eventually brought the entire history of the vessel to light. With a grant from the VDHP, an eight-person team documented the wreck site in a week-long project in 1982. This examination generated a complete wreck plan and contributed significant information to modern understanding of the construction techniques of early steam vessels.

Additional Fieldwork and recording were carried out on the remains of the Phoenix during the summers of 2009 and 2010. A joint team of divers from LCMM and Texas A&M University's Nautical Archaeology Program recorded the vessels structural remains and were able to use this newly acquired information to produce a detailed 3-Dimensional model of the hull remains and of the vessel as it may have appeared during its use life.

The wreck site of Phoenix is now included as a part of the State of Vermont's Underwater Dive Preserve system and has been listed on the NRHP.

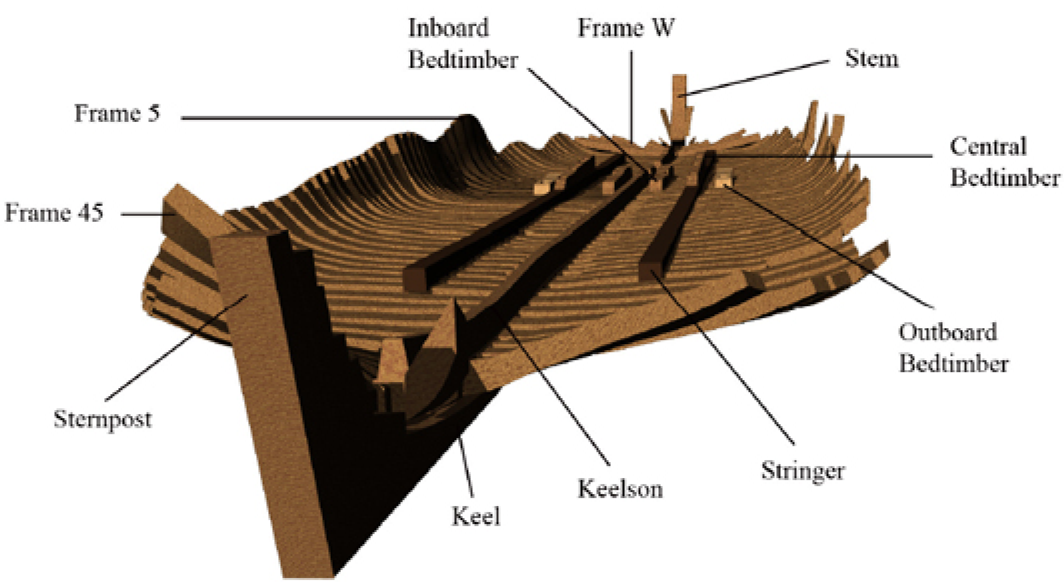

Figure 18: Three dimensional view of the hull remains of *Phoenix* (George Schwarz)

<u>Site Name</u>: Wreck GG

<u>Site Number</u>: VT-AD-1134

<u>Description</u>:

Wreck GG (VT-AD-1134) was located with side scan sonar in the deep water of the lake's main channel. The vessel is a standard canal boat that exhibits several uncommon features. ROV footage revealed that the canal boat rests on an even keel in very thick silt which has drifted over and into large portions of the wreck, filling much of the hold up to deck level. The silt in the hold has made it impossible to determine if the vessel's cargo remains below the mud.

Figure 19: Sonar Image of Wreck GG (LCMM Collection)

The outside hull of the canal boat is relatively intact and demonstrates a remarkable state of preservation. In several places portions of the white paint that once covered the vessel can still be found. There is obvious damage to the wreck in the stern quarter of the starboard side. There is also no deck planking in this stern area. From slightly aft of amidships to the rear of the stern cabin the starboard side of the vessel has peeled open, carrying away the deckhouse. All that remains of the main living quarters on Wreck GG is a jumble of disarticulated timbers that have collapsed into the hold. The exposed timbers of the starboard side reveal that the vessel was frame built and not edged fastened.

Several deck planks along the starboard side are missing, revealing the knees that supported the deck. The bow is devoid of decking, though two large bits and the composite iron and wood windlass are still present. The bits are in the extreme bow and rest against the after edge of the breasthook that joins the sides of the surprisingly finely shaped bow.

While the relatively fine entrance in the bow was surprising, the rounded shape of the stern was quite unexpected. Canal boats with rounded sterns are rare in Lake Champlain with only one other found to date, Wreck JJ. The planks along the side of the vessel are bent around in a tight corner to join the sternpost. There is an overhang in the stern through which the rudderpost passes. Six large knees give an additional measure of support to this overhang. Though the extreme depth of the site precludes visitation by divers using recreational diving technology, this site may be examined further with ROVs in the future.

Wreck GG is considered to the eligible for the NRHP or VSRHP under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction and Criterion D: Information Potential.

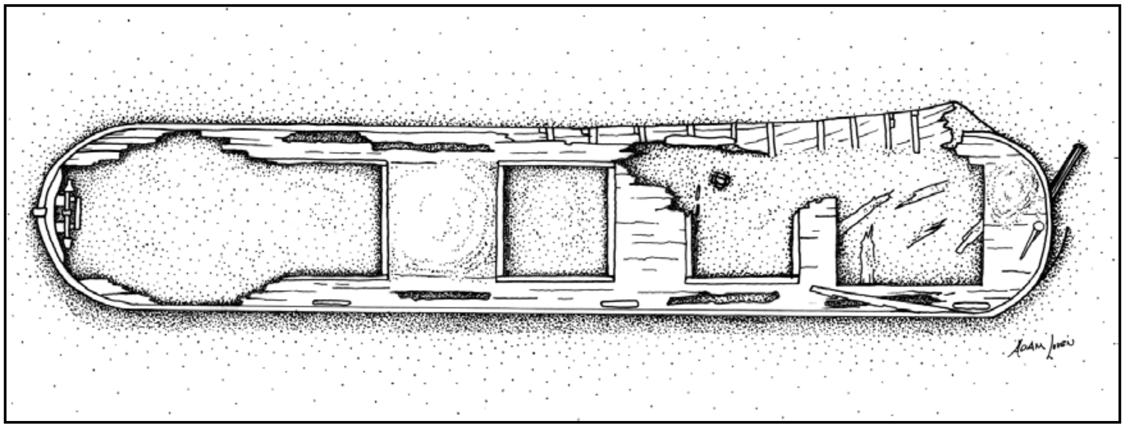

Figure 20: Plan view of Wreck GG, based on video footage. Not to scale (drawn by Chris Sabick, inked by Adam Loven).

<u>Site Name</u>: *L.A. Hall* (Wreck II)

<u>Site Number</u>: VT-AD-716

<u>Description</u>:

L. A. Hall, a standard canal boat, had been built in Whitehall New York in 1867. The vessel measured 85 feet 6 inches (26.1m) in length, 14 feet 8 inches (4.5m) in beam, and 5 feet 9 inches (1.75) depth of hold, giving her a tonnage of 62.85 tons. On October 30, 1878 *L.A. Hall*, under the command of Captain Kane, was in tow behind the steam tug *John F. Winslow*. The canal boat was carrying 100 tons (90.9 metric tons) of pig iron loaded onto her decks. Around midnight Captain Kane and his son were jolted awake by a horrible crashing sound. They ran out of the stern cabin to find that a portion of the pig iron had collapsed the deck of the canal boat, and gone through the vessel's bottom. Kane and his son escaped only moments before the vessel sank to the bottom.

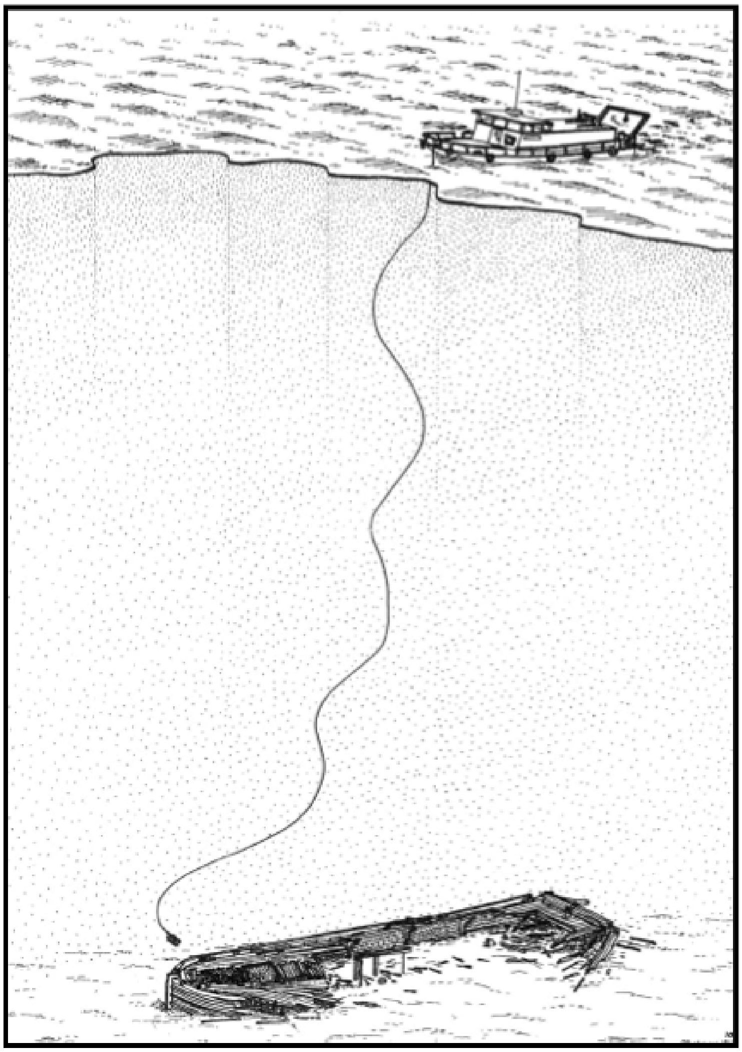

Figure 21: Perspective drawing of the L.A. Hall (drawing by Kevin Cristman)

The remains of the vessel were relocated in deep water on June 22, 1994 during the LCMM's sonar survey. While the location, depth, and sonar image of the site suggested that the vessel found was *L. A. Hall* it was not until an ROV videotaped stacked piles of pig iron on the wreck's deck that the tentative identification was confirmed. The ROV also substantiated the catastrophic event that sent the canal boat to the bottom. It appears that the iron stacked amidships collapsed through the decking carrying a large portion of the port side of the vessel with it. The roof of the stern cabin is also missing; it most likely floated away as the canal boat settled to the bottom. Due to the vessel's rapid demise it is hypothesized that it contains an extensive collection of artifacts and therefore may be revisited in the future for further archaeological analysis.[46]

L.A. Hall is considered to the eligible for the NRHP or VSRHP under Criterion D: Information Potential.

Site Name: Wreck ZZZ

Site Number: NYSM 11626

Description:

Wreck ZZZ is a standard canal boat originally located in 1984 by the Champlain Maritime Society during a side scan sonar survey; its 1984 designation was LC84-15. An archaeological diver verified the shipwreck after its initial discovery; however, dive conditions were poor and did not allow for document the site. The wreck was relocated during the 2003 Lake Survey and verified in October 2003. Subsequent to its 1984 discovery the site was assigned a Vermont Archaeological Inventory number (VT-AD- 725); however, precise positioning data from the 2003 Lake Survey indicates that the vessel lies on the New York bottomlands of Lake Champlain, and thus has subsequently been given a NYSM site number.

The extent of the remains is difficult to determine because very little of Wreck ZZZ is exposed above the lake bottom. The canal boat's deck, cabin trunk and cabin roof are missing, with most of the rest of the hull is likely present below the sediments. The extant remains are 81 feet 8 inches (24.9m) long, measuring from the stem to a vertical member at the stern, which may be the rudderpost or sternpost. The beam could not be determined due to the buried nature of the remains. The boat's length indicates that Wreck ZZZ is an early Lake Champlain canal boat (1823-1858) built before the completion of the first expansion of the Champlain Canal in 1858.

The wreck's most exposed feature is the stem, which stands 6 feet (1.8m) above of the bottom. The starboard side of the bow has peeled away from the stem; however the port side is intact up to the tops of the futtocks. The bow shape is sharper than the rounded bow seen on later class vessels. The exterior of the bow has two rubrails, both with iron bands on their forward faces. The plank-on-frame hull becomes further buried toward the stern, making documentation impossible in this stage of fieldwork. The aftermost remains consisted only of a single beam protruding from the sediments along the presumed centerline. No remains were noted past this post. The canal boat's last cargo, a load of iron ore, is still preserved in the hull.

The location of Wreck ZZZ and its cargo corresponds with an August 1870 newspaper account of a canal boat sinking. Several regional newspapers reproduced the following story:

> "CANAL BOAT SUNK – Thursday night [August 18] as the steamer Winslow was passing Chimney Point, going south with a tow of boats, one of the boats, the Ella R. Bailey, loaded with iron ore, filled and sank almost immediately. The captain and his wife had barely time to save themselves."

The discovery of iron ore cargo during the target verification phase of the fieldwork initially seemed to determine conclusively that the wreck was the *Ella R. Bailey*. Further historic research, however, has cast doubt on that conclusion. No vessels by the names of *Ella R. Bailey* are found in any edition of the List of Merchant Vessels of the United States (MVUS) or in the New York State Canal Boat Registers (NYSCBR). However, a vessel with a similar name is listed in the MVUS 1870. The canal boat *Ella E. Bayles* (O/N 36365, 40.05 tons), homeported in Frankfort, New York, appears in 1870 and again in the MVUS 1871- 1876 as *Ella E. Bagley*. The MVUS 1877-1878 lists her homeport as Oswego, New York. She is not listed in the MVUS 1879 and is not listed in the initial MVUS 1868 list. The boat is also listed in the NYSCBR for 1870 and 1878 as *Ellie E. Bagley*.

If Wreck ZZZ is *Ella (Ellie) E. Bagley,* it is still listed after its 1870 sinking in the MVUS and NYSCBR from 1870-1878. This is not unusual because many vessels were carried in the lists years after they were lost or abandoned because the paper work was not submitted. Periodically the government agencies that maintained these records purged the entries if the boat did not report after a certain number of years. However, the homeport was changed from Frankfort to Oswego in 1877 suggesting that the boat was still in service after 1870. If it was the *Ella (Ellie) E. Bagley* that sank in 1870 in Lake Champlain it could have been salvaged as it was apparently a fairly new boat (NYS Certificate of Registry dated May 20, 1867) and was in shallow water. If that was the case, then Wreck ZZZ is another boat, perhaps an older Lake Champlain boat, even though the location and cargo suggest that it was the boat that sank in 1870.

Wreck ZZZ is eligible for the NYSRHP and the NRHP under Criterion D: Information Potential. The vessel's hull lies buried and is likely intact making it a valuable source of information regarding the earliest class of canal boats to operate on Lake Champlain. Additionally, the contents of the boat's cabin, which are likely significant given that the boat sank in distress, will reflect the lifeways of the vessel's occupants.[47]

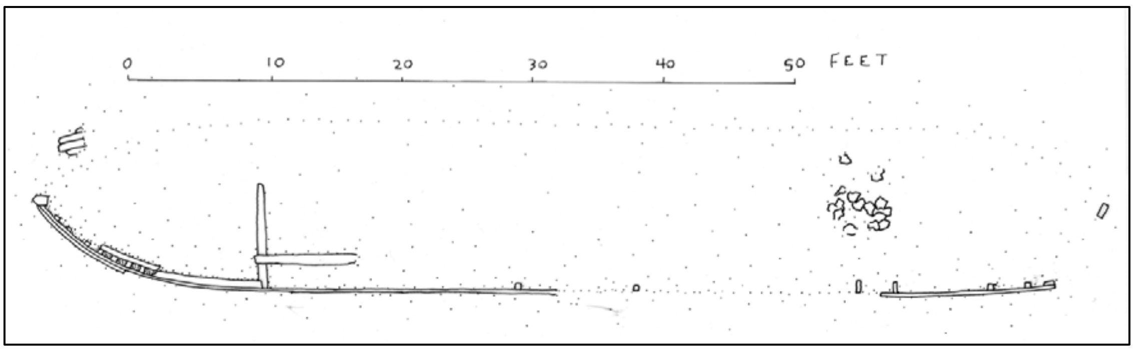

Figure 22: Preliminary archaeological plan view of Wreck ZZZ (by Adam Kane, LCMM Collection)

<u>Site Name</u>: Wreck Q4

<u>Site Number</u>: VT-AD-1023

<u>Description</u>:

Wreck Q4 is a poorly preserved canal boat first located in 1984 by the Champlain Maritime Society during a side scan sonar survey; its 1984 designation was LC84-20. The site, which lies in Vermont waters, was relocated during the 2003 Lake Survey and dive verified in July 2004.

The wreck is broken-up and largely buried. Some bow and stern frames protrude 2 to 3 feet (0.6 to 0.9m) from the bottom, but otherwise very little of the vessel is visible. One section of edge-fastened side was noted amidships. The exposed remains were 90 feet (27.5m) long and 15 feet in (4.6m) beam. Neither of these measurements can be considered conclusive as so much of the wreck was buried. Finding the true length and beam was not possible in a single verification dive. The condition of the wreck may indicate that it was dynamited in order to make the wreck less of a navigational hazard, a likely scenario given its location in the middle of the navigable channel.

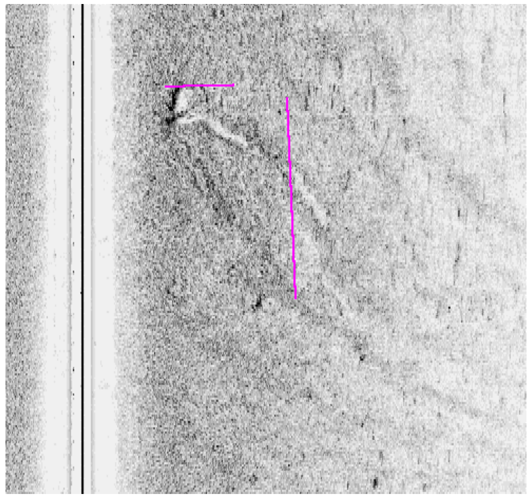

Figure 23: Sonar image showing Wreck Q4 (LCMM Collection).

Determining Wreck Q4's eligibility for the VSRHP and the NRHP is difficult given the lack of visible vessel remains. If Wreck Q4 was dynamited as researchers presume, it is unlikely to retain enough site integrity to be eligible for nomination to the VSRHP or the NRHP.[48]

Site Name: YYY

Site Number: VT-AD-726

Description:

Wreck YYY is a well-preserved canal boat initially located by the Champlain Maritime Society during a side scan sonar survey in 1984; its 1984 designation was LC84-19. The site, which lies in Vermont waters, was relocated during the 2003 Lake Survey and verified by archaeological divers in July 2004.

This wreck is a largely buried, but intact mid-nineteenth century canal boat. The stern projects 3 to 4 feet (.9-1.2km) above the bottom, descending from there forward until all remains are buried at 72 feet (21.9m) forward of the rudderpost. Subsequent to the verification dive examination of the sonar image indicated that a small portion of the bow may also be exposed above the sediments. This observation has yet to be confirmed. The vessel has a beam of 14 feet 1 inch (4.3m), which, based on the known expansions of the Champlain Canal locks, indicates that the vessel was constructed between 1858 and 1872.

A canal boat of this class should have an overall length of approximately 88 feet (26.8m). With the exception of the stern, the exposed remains consist largely of the gunwales and hatch coamings. The wreck is preserved up to deck level. Wreck YYY's only major absent structural components are the cabin trunk and roof, as well as the decking in the stern.

The wreck is constructed in a plank-on-frame fashion. The stern has an overhanging guard for supporting the rudderpost, similar in construction to that found on Wreck JJ.110 The rudder is turned to starboard; the tiller is missing. The interior of the stern is buttressed by a composite sternhook constructed of three timbers. The opening for the cabin is marked by two sets of half beams, which once supported the walkway above, and allowed unobstructed headroom in the cabin.

The deck of the boat has two cargo hatches, both 20 feet (6.1m) long and separated by an 8 foot (2.4m) span of deck. Each corner of each hatch has a stanchion that projects approximately 1 feet (30.5cm) above the hatch coaming. This is likely related to a hatch cover system that is no longer present. Two wooden cleats were noted along the port walkway. The after cargo hatch was hand probed for any evidence of remnant cargo; none was encountered at an arm's depth into the hold.

Wreck YYY is eligible for the VSRHP and the NRHP under Criterion D: Information Potential. The vessel is almost completely intact; study of this wreck would significantly contribute to our understanding of mid-nineteenth century canal boat construction. If the vessel sank in distress, which could not be determined during the verification dive, the contents of its cabin would still be present. These contents would reflect the lifeways of the family and crewmembers that lived aboard the boat.[49]

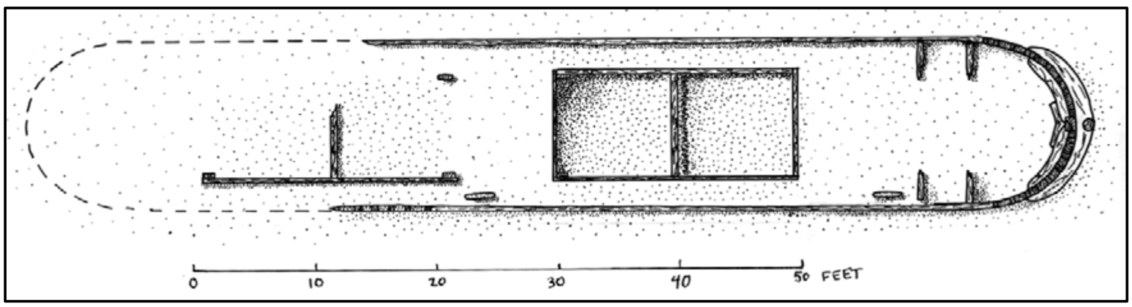

Figure 24: Preliminary archaeological drawing of Wreck YYY (drawing by Adam Kane)

<u>Site Name</u>: Shoreham Sloop (Wreck H4)

<u>Site Number</u>: VT-AD-1369

<u>Description</u>:

Wreck H4, also known as the Shoreham Sloop, was discovered during the 2003 Lake Survey and verified by archaeological divers in July 2004. Additional archaeological study of wreck H4 took place in 2005. The site, which lies in Vermont waters within the town of Shoreham, Addison County is a circa 1825 Lake Champlain canal sloop.

The additional archaeological study was conducted during the week of July 25, 2005. Although not ideal, underwater conditions proved conducive to the vessel's archaeological study. The site lies in approximately 20 feet (6.1m) of water. The site's shallow depth allowed for long bottom times, often exceeding one hour. The archaeological study required 14 dives for a total bottom time of 13.4 hours. Underwater visibility was typically between 3 and 4 feet (.91 to 1.2m). The archaeological study was non- destructive and no artifacts were recovered.

The Shoreham Sloop is in fair condition. The hull is preserved up to the tops of the top timbers, however, the deck, deckbeams, bowsprit, mainmast, cabin roof and cabin trunk are no longer extant. The vessel is mostly buried with approximately 2 feet (.61m) of hull rising above the bottom in most areas. Approximately 3⁄4 of the structure is present, although only a small portion of it is exposed above the bottom sediments.

The plank-on-frame hull is 64 feet 10 inches (19.8m) long measuring from the after face of the transom to the forward face of the stem. The vessel's overall length including the bowsprit knee is 67 feet 1 inch (20.4m). The original length accounting for the no longer present bowsprit was approximately 75 feet (22.9m). The hull has a maximum beam of 14 feet 7 inches (4.4m), tapering to 12 feet 6 inches (3.8m) at the stern. The depth of hull measuring from the top of the keelson to the underside of the deck beams was approximately 4 feet (1.2m).

Much of the exposed planking on the Shoreham Sloop was eroded and in poor condition. The planking was typically 11.5 inches (3.8cm) thick, however, the original thickness was likely 2in (5.1cm). Planking was fastened to the frames with wrought iron nails. The interior of the hull was sheeted with a 11.5 inch (3.8cm) thick ceiling.

Evidence of the vessel's deck structure is minimal, and consists of lodging knees and the partial remnants of deck beams. Knees are typically constructed of compass timber, or naturally curving portions of a tree from which the pattern of a timber is cut. This is true for the knees on the Shoreham Sloop, however, the distinct details of the tree's trunk and limb from which the knee is cut are visible.

Evidence of the vessel's rig was found both alongside and inside the hull. Remains of standing rigging were preserved approximately 25 feet (7.6m) aft of the stem. These remains consisted of two chainplates with deadeyes attached on each side of the hull. The chainplates and deadeyes were used to secure the no longer extant shrouds. The chainplates are 2 inches (5.1cm) wide and 0.5 inch (1.3cm) thick iron plates bolted into the hull. Because the chainplates are no longer secured to the shrouds they have spun downward and are now largely buried. The chainplates are located just aft of the mast step. No other chainplates were found on the hull leading researchers to believe that the wreck is a sloop. Evidence of the mainmast was found inside the hull in the form of a mortice in the keelson 21 feet (6.4m) aft of the stem.

Only the upper portions of the bow of the vessel are exposed above the mud line. As with the rest of the hull, the interior of the bow is also filled with silt. The major features in the bow are the stem assembly, breast hook, frames, bowsprit knee and band, hull planking, and line chock.

Based on the archaeological data recorded in 2005, the Shoreham Sloop is believed to be a sloop-rigged sailing canal boat built between 1823 and 1830. The most important data leading to this conclusion were the vessel's dimensions. The maximum beam is between 14 feet 7 inches (4.4m). This beam measurement is consistent with canal boats built to fit inside the Champlain Canal locks between 1858 and 1873. However, 1858-class canal boats all have lengths of approximately 88 feet (26.8m), which is considerably larger than Wreck H4's 65 feet 10 inches (20.1m), and even with a bowsprit the vessel would have been approximately 75 feet (22.9m) in length. Moreover, there is no historical or archaeological information that indicates 1858-class sailing canal boats had bowsprits. This beam discrepancy can be explained by the reasonable assumption that the hull has splayed roughly 1 foot (30.5cm) since it sank. This is highly likely based on the absence of deck beams tying the sides of the hull together.

The Shoreham Sloop's length to beam ratio is 4.45 when not accounting for its splayed sides; when the beam measurement is reduced to 13 feet 6 inches (4.1m), in accordance with the early Champlain Canal locks, the length to beam ratio is 4.80. Both the corrected and uncorrected measurements are consistent with the range of 3.38 to 5.98 of the canal sloops listed in Barnum's 1826 list. Whereas, the traditional lake sloops of Barnum's list had length to beam ratios between 2.71 and 3.05.

The overall hull shape is also an important consideration in determining that the Shoreham Sloop is an early sailing canal boat. The canal locks limit vessel size, thus canal boats were typically flat bottomed with parallel sides so that they filled the maximum volume of the canal locks. Traditional sailing vessels like lake sloops, however, were shapelier. In plan view their hulls had an oblong form with a fine entrance and a tapered stern. The Shoreham Sloop has elements of both vessel types with its parallel sides suggesting it is a canal boat, and the rounded hull setting it apart from later, more standardized flat-bottomed sailing canal boats. The rounded hull form is similar to the hull of another early sailing canal boat, the schooner *Troy*, which sank in 1825. All of the other, later archaeological examples of sailing canal boats are flat bottomed.

The former presence of a bowsprit also suggests an early date for the Shoreham Sloop. Bowsprits were used by some of the earliest sailing canal boats. It is not known how many sailing canal boats had bowsprits, but it is believed to be only a handful and only in the first ten years after the 1823 opening of the Champlain Canal. Bowsprits were not employed by later sailing canal boats because the length of the canal locks were fixed, thus the length of the hull was reducing by the length of the bowsprit necessarily reduced the canal boat's cargo capacity, and corresponding profitability.

The mast step on the keelson is an interesting feature given that the Shoreham Sloop appears to be a sailing canal boat. All other sailing canal boats found in Lake Champlain have had their masts stepped on the deck so that the mast could be removed for transit on the canal and under its low bridges. The masts are held in place by a three-sided box, known as a mast tabernacle by researchers. The sides of the tabernacle are made of thick planks that extend down to the bottom of the hull. The sides of the tabernacle transfer the weight of the mast to the bottom of the hull. The 1825 sailing canal boat *Troy* has a mast tabernacle, suggesting that the Shoreham Sloop could pre-date that vessel.

There are several bits of archaeological data that provide insight into the use-life of the Shoreham Sloop. The likelihood that the vessel had a long working life is show in the removal of the centerboard and centerboard trunk, and the wear on the line chocks in the bow. Centerboard trunks commonly leak, and it is plausible to propose that the vessel's centerboard trunk became so problematic that its owner(s) decided to remove it. It seems likely that this type of stress on the trunk would take several years to manifest itself. Similarly, the wear on the line chocks would have taken several years to develop.

The removal of the centerboard could also suggest that the vessel had been unrigged and was being used as a towed canal boat. However, the presence of chainplates and deadeyes for the shrouds demonstrates that the vessel was likely still powered by sail when it sank.

Wreck H4 is eligible for inclusion in the VSRHP and the NRHP under Criterion D: Information Potential. The study of this site will add significantly to our understanding of nineteenth century boat construction on Lake Champlain. If the vessel sank in distress, the contents of its cabin would still be present. These contents would reflect the lifeways of the family that lived aboard the boat.[50]

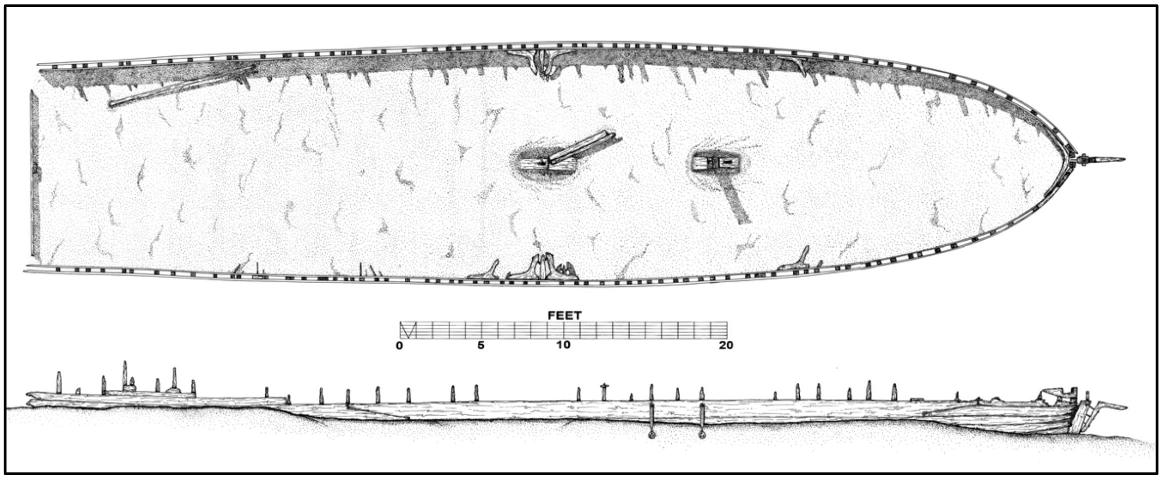

Figure 25: Archaeological drawing of Wreck H4 (drawing by Adam Kane and Christopher Sabick)

Site Name: Wreck B4

Site Number: VT-AD-727

Description:

Wreck B4 is a standard canal boat lying next canal boat Wreck A4 (VT-AD-728). Wreck B4 is eligible for the VSRHP and the NRHP as part of the Larrabees Point Historic District under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential.

Site Name: Wreck A4

Site Number: VT-AD-728

Description:

Wreck A4 is a standard canal boat lying next to canal boat Wreck B4 (VT-AD-727). Wreck A4 is eligible for the VSRHP and the NRHP as part of the Larrabees Point Historic District under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential.

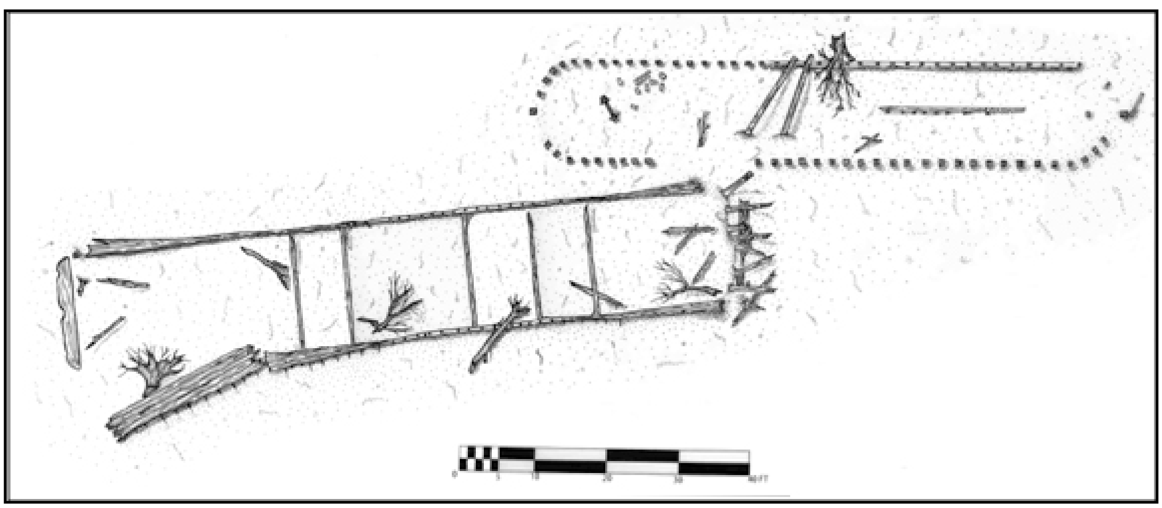

Figure 26: Site Drawing of VT-AD-727 and VT-AD-728 (Drawing by Chris Sabick)

Site Name: Beadles Cove Drawboat (Wreck C4)

Site Number: VT-AD-1018

Description:

Wreck C4 is a railroad drawboat built in 1871 for a railroad trestle which ran between Larrabees Point, Vermont and Willow Point, New York. The vessel was replaced by a new drawboat in 1888. Wreck C4 is eligible for the VSRHP and the NRHP as part of the Larrabees Point Historic District under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential.

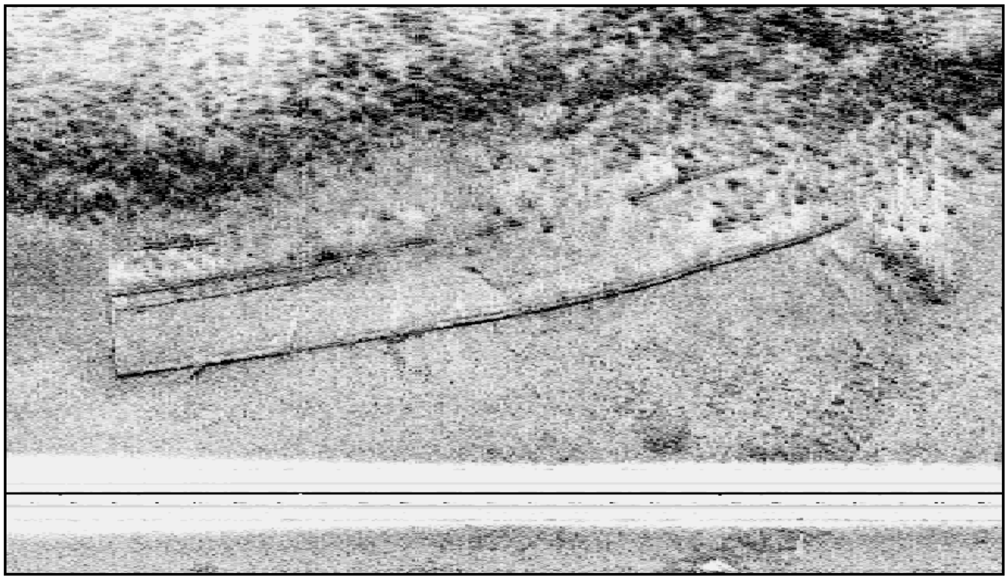

Figure 27: Sonar image showing Wreck C4VT-AD-1018 (LCMM Collection).

Site Name: Wreck G4

Site Number: NYSM 11628

Description:

Wreck G4 is a railroad drawboat built in 1888 for a railroad trestle between Larrabees Point, Vermont and Willow Point, New York. The vessel burned to the waterline in 1902. Wreck G4 is eligible for the NYSRHP and the NRHP as part of the Larrabees Point Historic District under Criterion A: Event(s) and Broad Patterns of Events, Criterion C: Design, Construction, and Work of a Master, and Criterion D: Information Potential.

Figure 28: Sonar image of the part of Wreck G4 lying in the draw opening (LCMM Collection).

Figure 29: Sonar image of the wreckage of Wreck G4 lying near the draw opening (LCMM Collection).

Site Name: Wreck K7

Site Number: VT-AD-1020

Description:

Wreck K7 has not been fully characterized by divers due to poor visibility conditions. It is not possible with the current data to accurately assess this site's eligibility for the VSRHP or the NRHP.

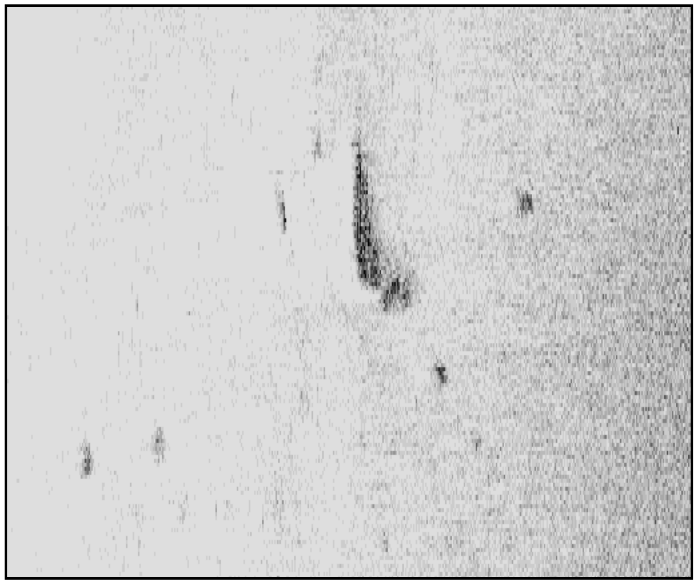

Figure 30: Sonar image of Wreck K7 (LCMM Collection).

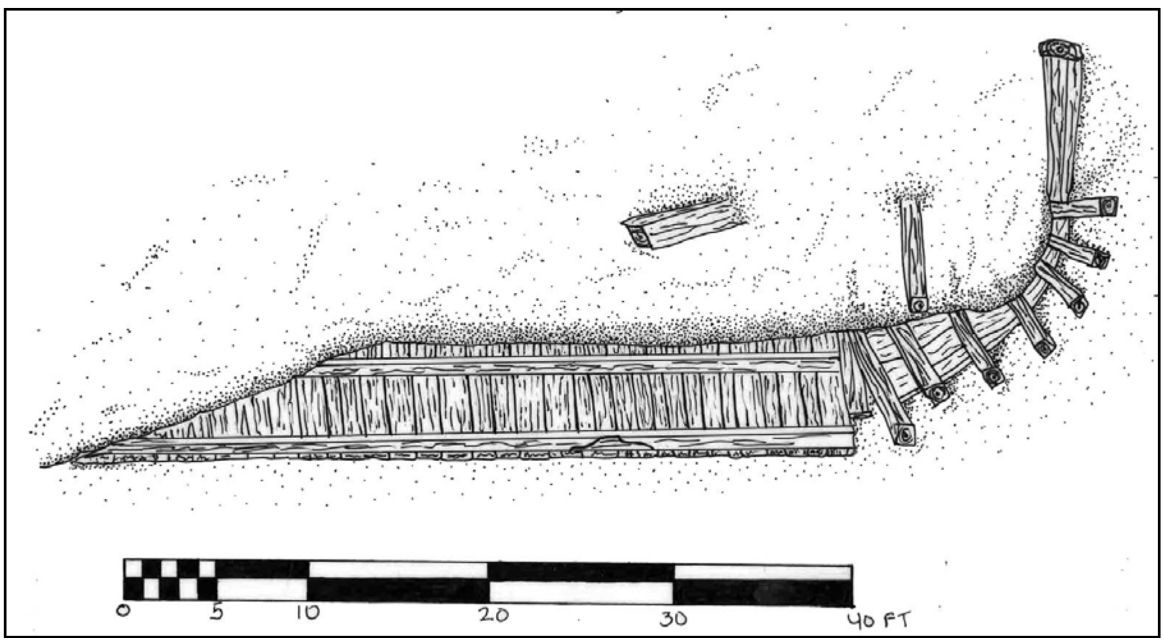

Figure 31: Preliminary archaeological drawing of Wreck K7 (by Adam Kane and Pierre LaRocque, inked by Joanne DellaSalla, LCMM Collection).

Site Name: Wreck F4

Site Number: NYSM 11627

Description:

Wreck F4 is a well-preserved standard canal boat. The vessel is 88 feet (26.8m) long and a 14 feet (4.3m) in beam, indicating that it was built between 1858 and 1872. Wreck F4 is eligible for the NYSRHP and the NRHP under Criterion D: Information Potential.

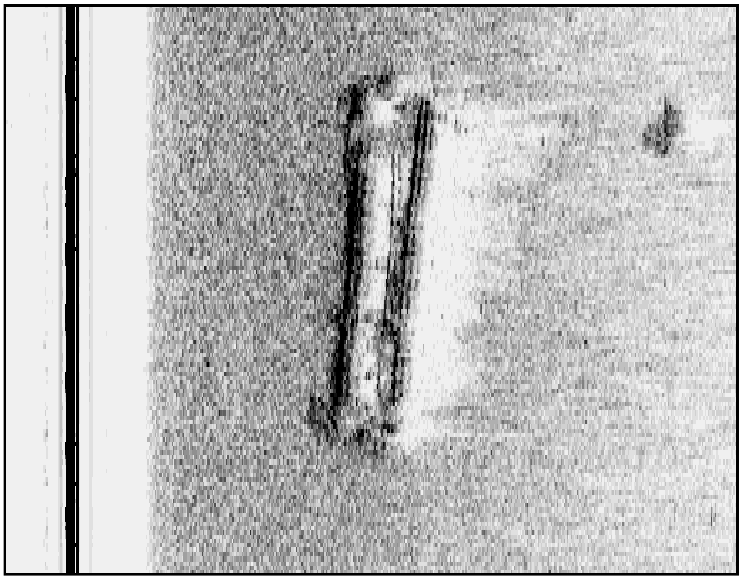

Figure 32: Sonar image of Wreck F4 (LCMM Collection).

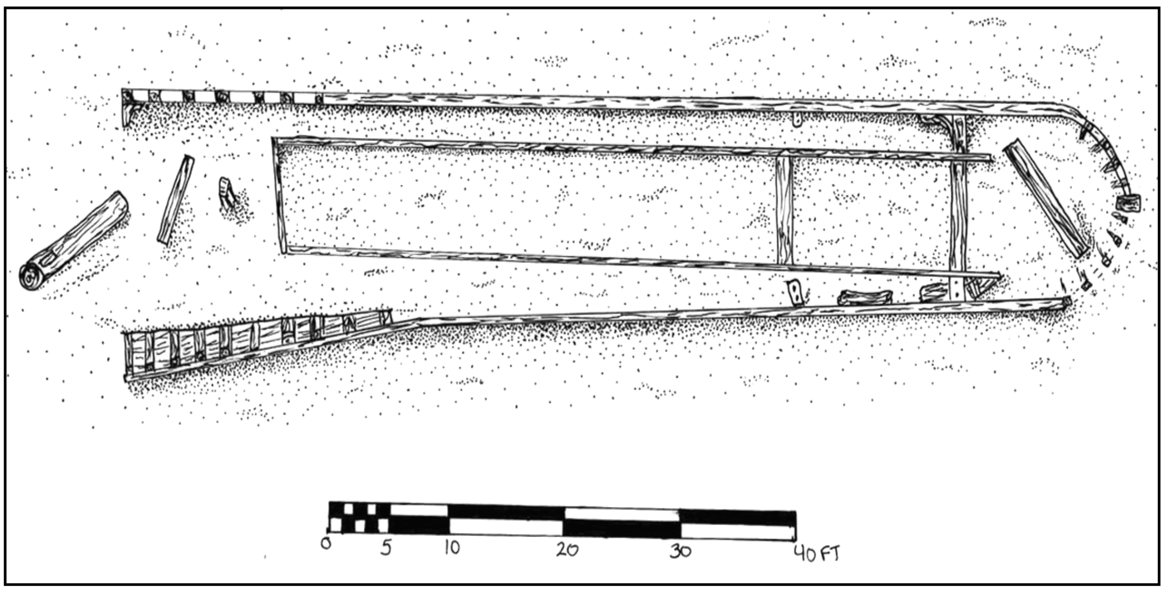

Figure 33 Preliminary archaeological plan view of Wreck F4 (by Pierre LaRocque, inked by Joanne DellaSalla, LCMM Collection).

Site Name: Wreck O7

Site Number: VT-AD-1151

Description:

Wreck O7 is a 52 feet (15.86m) long by 23 feet (7m) wide wooden scow. Based on its intact nature Wreck O7 is likely eligible for the VSRHP and the NRHP under Criterion D: Information Potential.

Site Name: *Montcalm* (Wreck E4)

Site Number: VT-AD-730

Description:

Wreck E4 is shown on "NOAA Chart No. 14784, Lake Champlain, Barber Point, NY to Whitehall, NY, 1992." The vessel is reported to be that of gasoline screw (propeller) ferry *Montcalm*. This boat crossed Lake Champlain between what is now the Buoy 39 Marina and the New York shore at Montcalm Landing (Port Marshall) just south of Fort Ticonderoga in the 1920s. However, there is also reason to believe that the wreck could be one of two other ferries, *Ti-Orwell (*I) of 1912 or the *Ti-Orwell* (II) of 1925, both gasoline sidewheel vessels, used on this crossing. The shallow water site was not visible on the 2003 Lake Survey sonar records because of aquatic vegetation obscuring the site.

The Montcalm ferry, as the crossing was called, was at one time known as the Red House ferry, and had provided a cross-lake conveyance for passengers, teams, and later, automobiles, since at least 1828 when Lemuel H. Wicker operated the ferry. Subsequent operators included a man by the name of Simmons, Clark P. Ives (1874-1886), and various members of the Blood family starting with Ephraim Blood in 1886. The Montcalm ferry was in operation until 1938.

The last three ferries used on the Montcalm Landing crossing are described below, although it is not clear when each was actually withdrawn from service:

- *Ti-Orwell*, Official Number 210567, wood, gasoline side wheel, 49x14.5x1.4 feet (14.9 x 4.42x.42m), 15 GT 9 NT, scow head, scow stern, built at Ticonderoga in 1912, home port: Plattsburgh, hailing port: Ticonderoga. George W. Stewart, owner and master. Enrollment and license surrendered at Rouses Point, March 10, 1927, vessel abandoned.114
- *Montcalm*, Official Number 223747, wood, gasoline screw, 64.3x16x3 feet (19.6x4.88x.915m), 26GT 17NT, scow head, scow stern, built at Whitehall by William J. Ryan in 1922, home port: Rouses Point, hailing port: Ticonderoga, George W. Stewart, owner and master. Enrollment and license surrendered at Rouses Point, April 4, 1929 as unfit for service.115
- *Ti-Orwell*, Official Number 226371, wood, gasoline side wheel, 51x14.7x2.3 feet (15.5x4.48x.7m), 17 GT, 11 NT, scow head, scow stern, built at Ticonderoga by Charles H. Ferguson in 1925, home port: Rouses Point, hailing port: Ticonderoga, Ellen E. Stewart owner, Charles H. Ferguson, master. Disposition: unknown but apparently operated until 1938.116

Another ferry in Orwell a few miles to the south ran between Chipmans Point (Orwell, VT) and Wright (Putnam, NY) and served cross-lake traffic between 1787 and 1973. One of the last ferries at Chipmans Point was Edward Poissant's oil screw cable ferry Stanley B., which had served on the East Alburgh to Hog Island (West Swanton) crossing from 1922 until 1938 when the Missisquoi Bay highway bridge was completed. The Stanley B. was eventually pulled out on the marine railway at Larrabees Point and dismantled.[51]

Wreck E4 is eligible for inclusion in the VSRHP or NRHP places under Criterion A: Event(s) and Broad Patterns of Events and Criterion D: Information Potential

<u>Site Name</u>: Wreck P4

<u>Site Number</u>: VT-AD-1022

<u>Description</u>:

Wreck P4 is a largely buried standard canal boat. The vessel's length of 80 feet (24.4m) suggests it was built before 1858. Based on the intact nature of Wreck P4, the site is eligible for nomination to the VSRHP and the NRHP under Criterion D: Information Potential.

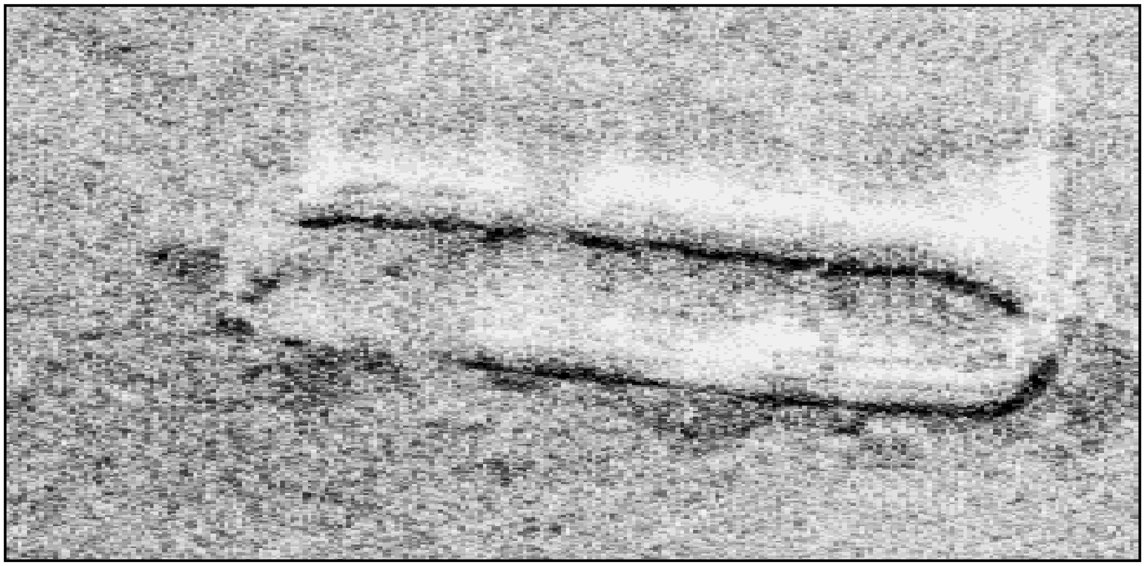

Figure 34: Sonar image showing Wreck P4 (LCMM Collection).

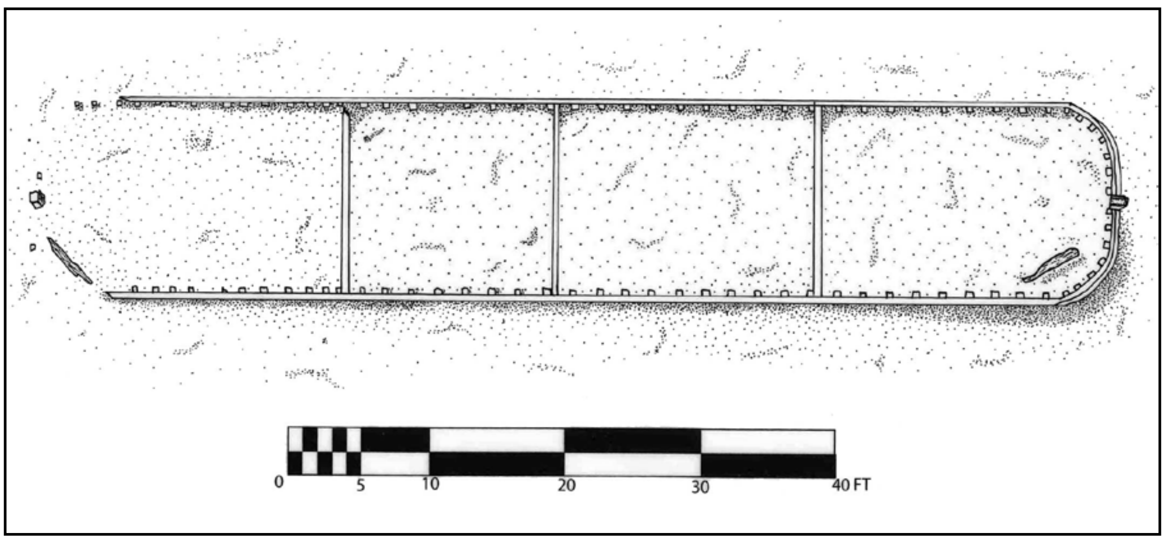

Figure 35: Preliminary archaeological plan view of Wreck P4 (by Chris Sabick, inked by Joanne DellaSalla, LCMM Collection).

Site Name: Wreck I4

Site Number: VT-AD-1370

Description:

Wreck I4 is a largely buried canal boat dating to the mid-nineteenth century. As part of the Gourlie Point Canal Boat graveyard, it is eligible for the VSRHP and the NRHP under Criterion D: Information Potential.

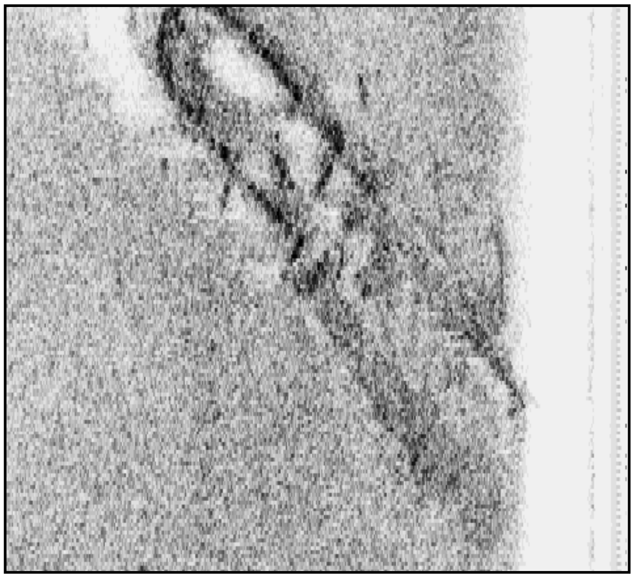

Figure 36: Sonar image of Wreck I4 (LCMM Collection).

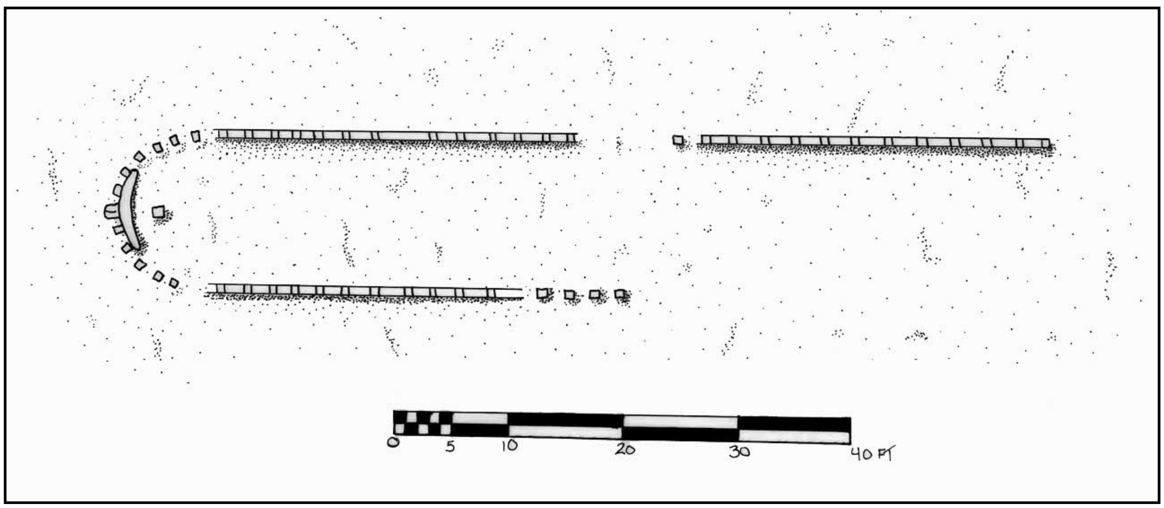

Figure 37: Preliminary archaeological drawing of Wreck I4 (by Adam Kane, inked by Joanne DellaSalla, LCMM Collection)

Site Name: Wreck U4

Site Number: VT-RU-567

Description:

Wreck U4 is an unidentified vessel shown on "NOAA Chart No. 14784, Lake Champlain, Barber Point, NY to Whitehall, NY, 1992." The vessel was not visible on side scan sonar during the 2003 Lake Survey. Divers searched for this site in August 2005 and were unable to locate it. Dive conditions were extremely poor with no underwater visibility and heavy Eurasian milfoil infestation. As a result, this area must be reexamined.[52] Given the lack of information about the extent or type of remains present it is impossible to determine the eligibility for the VSRHP or NRHP at this time.

Site Name: Wreck Q7

Site Number: NYSM 11678

GPS Coordinates: -73.371883, 43.737917

Distance/Direction from Corridor: 303m west
Corridor Mile Marker: 97.3
Description:
Wreck Q7 is the bottom of an 1873-class Champlain Canal boat. The site is 97 feet 8 inches (29.8m) in length and has a beam of 15 feet (4.6m). Although poorly preserved, the study of the site would likely yield important information about canal boat construction, and is likely eligible for the NYSRHP and the NRHP under Criterion D: Information Potential.

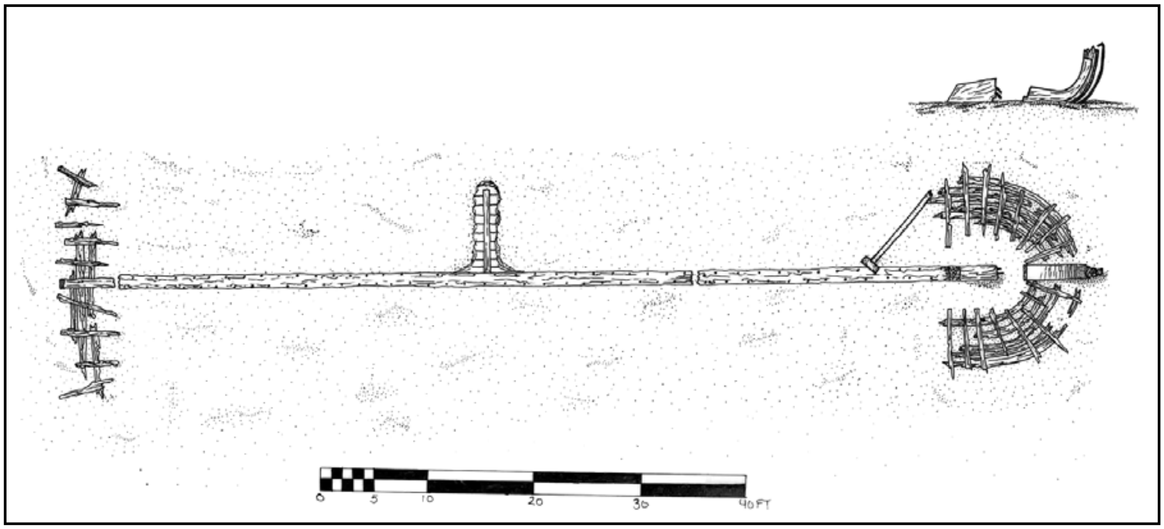

Figure 38: Preliminary archaeological drawing of Wreck K7 (by Adam Kane and Pierre LaRocque, inked by Joanne DellaSalla, LCMM Collection).

Site Name: Wreck P7
Site Number: NYSM 11677
Description:
Wreck P7 is a poorly preserved 1873-class Champlain Canal boat. The remains are 107 feet (32.6m) long and 17 feet (5.1m) in beam. Wreck P7 is unlikely to retain sufficient site integrity to be eligible for the NYSRHP or the NRHP.

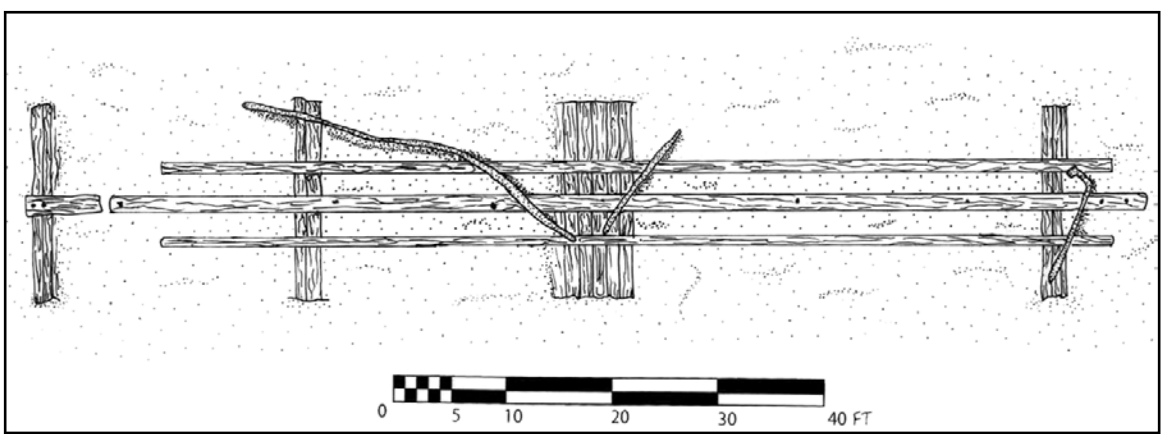

Figure 39: Preliminary archaeological drawing of Wreck P7 (by Pierre LaRocque, inked by Joanne DellaSalla, LCMM Collection).

END NOTES

4835-8567-7344, v. 1

[1] Fischer, Richard M, *Lake Champlain Planning Guide for Water and Related Resources, June 1976* (Boston: New England River Basin Commission, 1976), 13.
[2] Kevin J. Crisman, *Of Sailing Ships and Sidewheelers: The History and Nautical Archaeology of Lake Champlain*, (Montpelier, VT: Vermont Division for Historic Preservation, 1986), 6.
[3] See C. G. Calloway, *Western Abenakis of Vermont, 1600-1800: War, Migration, and the Survival of an Indian People*, *Vol. 197* (Norman, OK: University of Oklahoma Press, 1990).
[4] Russell Bellico, *Sails and Steam in the Mountains: A Maritime and Military History of Lake George and Lake Champlain* (Fleischmanns, NY: Purple Mountain Press, 1992), 9-12.
[5] G. O. Coolidge, *French Occupation of the Champlain Valley from 1609 to 1759* (Mamaroneck, New York Hargor Hill Books, 1989), 16-21.
[6] Bellico, *Sails and Steam,* 12-15.
[7] Bellico, *Sails and Steam*, 21-37.
[8] Bellico, *Sails and Steam,* 62-73.
[9] Bellico, *Sails and Steam,* 87-88.
[10] Bellico, *Sails and Steam,* 92-93.
[11] Bellico, *Sails and Steam,* 95-100.
[12] Bellico, *Sails and Steam,* 102-103.
[13] Bellico, *Sails and Steam,* 104-108.
[14] Bellico, *Sails and Steam,* 108-109.
[15] W. B. Clark, ed., *Naval Documents of the American Revolution*, *Vol 1* (Washington D.C.:Department of the Navy, 1964), 312.
[16] Bellico, *Sails and Steam,* 117-118.
[17] Ralph Nading Hill, *Lake Champlain: Key to Liberty* (Woodstock, Vermont: Countryman Press, 1995), 160.
[18] Kevin J. Crisman, *Lake Champlain Commercial Navigation: Statement of Historical Context -- Draft*. (Montpelier, VT:Division for Historic Preservation, 1990), 6.
[19] Hill, *Lake Champlain: Key to Liberty,* 164-170.
[20] Bellico, *Sail and Steam,* 206-209.
[21] Bellico, *Sails and Steam,* 209-210.
[22] Bellico, *Sails and Steam,* 211-212.
[23] Bellico, *Sails and Steam,* 212-216.
[24] Bellico, *Sails and Steam,* 216-217.
[25] Bellico, *Sails and Steam,* 218-219.
[26] Bellico, *Sails and Steam,* 221-231.
[27] Bellico, *Sails and Steam,* 232.
[28] Crisman, *Lake Champlain Commercial Navigation*, 9-10.
[29] Bellico, *Sails and Steam,* 237-238.
[30] Crisman, *Lake Champlain Commercial Navigation,* 10-11.
[31] Bellico, *Sails and Steam,* 11-12.
[32] Bellico, *Sails and Steam,* 17.
[33] Bellico, *Sails and Steam,* 17.
[34] Bellico, *Sails and Steam,* 13-15.
[35] Bellico, *Sails and Steam,* 16.
[36] Bellico, *Sails and Steam,* 18.
[37] A. P. Barranco, *Ticonderoga's Floating Drawbridge:1871-1920* (Grande Isle, VT: Lake Champlain Basin Program, 1995).

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[38] Frank L. Webster, *The Addison Road* (Blum, TX: privately printed, 1985), 5; *Middlebury Register,* 8 November 1870; Jim Shaughnessy, *The Rutland Road* (Berkeley, CA: Howell-North Books) 29, 35.
[39] *Rutland Daily Herald,* 21 February 1871.
[40] Ibid., *22* February 1871.
[41] Gove, 1972 notes; Rutland Railroad, Valuation Sheet V5/2.
[42] Information provided by Cushman Baker, 8 August 1992 and 26 February 1993.
[43] Gove, 1972 notes.
[44] Kane, Barranco, DellaSalla, Lyman, and Sabick, 59-62.
[45] Adam Kane and Christopher Sabick, *Lake Champlain Underwater Cultural Resources Survey – Volume IV: 1999 Results and Volume V: 2000 Results* (Lake Champlain Maritime Museum: Vergennes, 2002), 151-154.
[46] Kane & Sabick, 60.
[47] Adam I. Kane, A. Peter Barranco, Joanne M. DellaSalla, Sarah E. Lyman, and Christopher R. Sabick, *Lake Champlain Underwater Cultural Resources Survey Volume VIII: 2003 Results and Volume IX: 2004 Results* (Lake Champlain Maritime Museum: Vergennes, VT, 2007), 69-71.
[48] Kane, Barranco, DellaSalla, Lyman, and Sabick, 91.
[49] Kane, Barranco, DellaSalla, Lyman, and Sabick, 67-68.
[50] Kane, Barranco, DellaSalla, Lyman, and Sabick, 74-82.
[51] Kane, Barranco, DellaSalla, Lyman, and Sabick, 72.
[52] Kane, Barranco, DellaSalla, Lyman, and Sabick, 92.