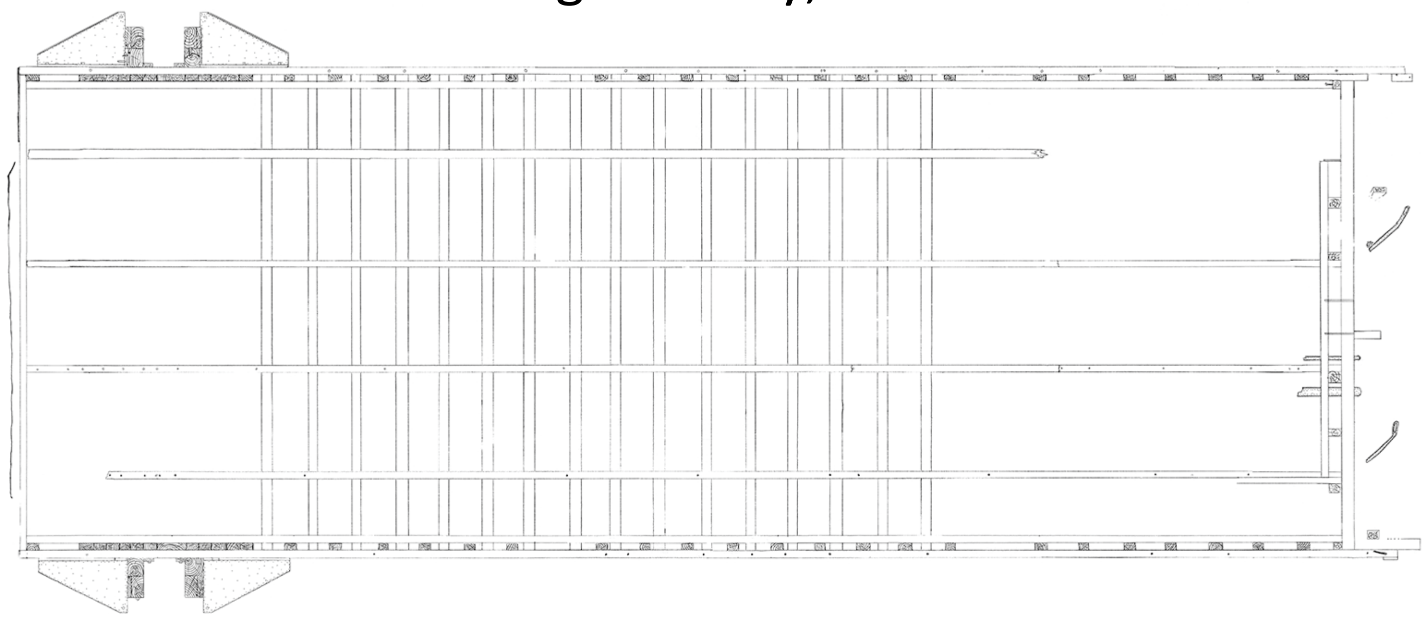
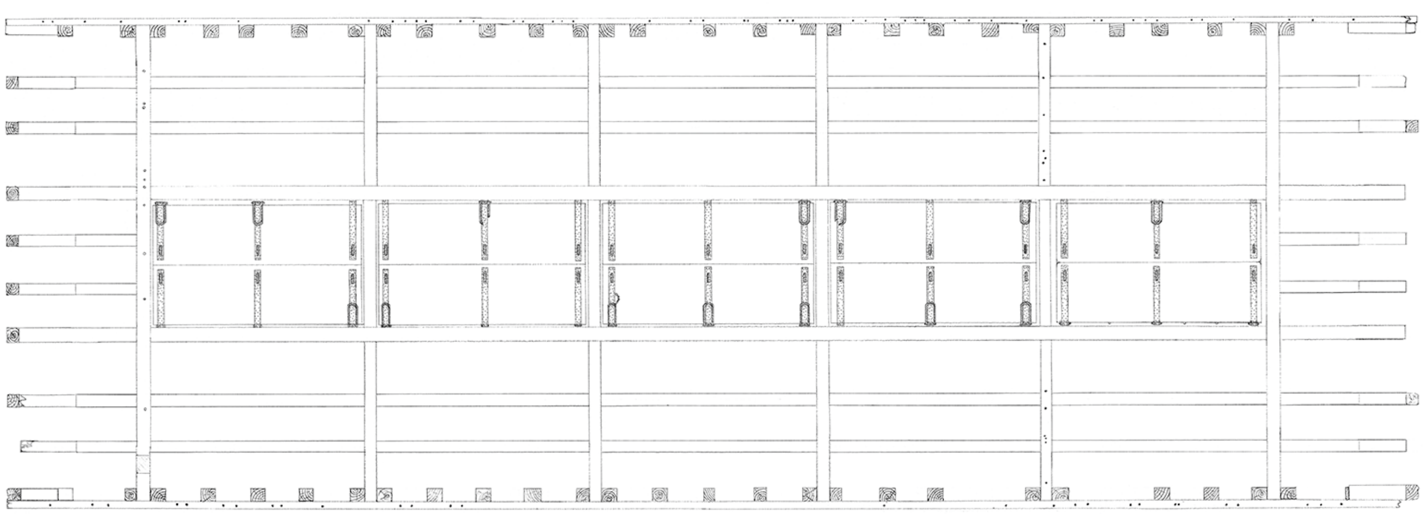
Phase 3 Underwater Archaeological Report for the Onondaga Lake Bottom,

Subsite of the Onondaga Lake Superfund Site,
Onondaga County, New York





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Lake Champlain Maritime Museum

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Phase 3 Underwater Archaeological Report for the Onondaga Lake Bottom, Subsite of the Onondaga Lake Superfund Site, Onondaga County, New York

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September 2014

EXECUTIVE SUMMARY

Since 2007, Lake Champlain Maritime Museum (LCMM) under subcontract to Parsons and on behalf of Honeywell, has been performing archaeological investigations of the Onondaga Lake bottom in support of the remedial activities of the Onondaga Lake Cleanup Plan. These have been detailed the *Phase 1B Underwater Archaeological Report for the Onondaga Lake Bottom, Subsite of the Onondaga Lake Superfund Site, Onondaga County, NY.*[1]

Recommendations from the Phase 1B work were compiled into a *Mitigation Plan*[2] which outlined a mitigation plan for six historically significant properties located within the Syracuse Maritime Historic District that will be impacted during remedial activities in Onondaga Lake (A1/2, A4, A7, A12, A45, and A53). During mitigation fieldwork performed in 2012 and 2013, four previously unknown shipwrecks were also located and documented (A2-1, A2-2, A2-3, and A2-4). This report presents the comprehensive results of the Phase 3 archaeological study of these ten sites.

The ten sites represent a variety of property types.

- Vessels
    - Dump scow (A4)
    - Dredge (A12)
    - Canal Boat (A53)
    - Steam tug/launch (A2-1)
    - Canal packet (A2-2)
    - Steam excursion vessel (A2-3)
    - Barge (A2-4)
- Salina Pier (A1/2)
- Concrete breakwater (A45)
- Aid to navigation: pilings (A7)

The documentation of the ten sites included several methods of data recovery including videography, photography, detailed measured drawings, and the recovery and analysis of wood samples. The archaeological activities complied with the NY State Office of Parks, Recreation and Historic Preservation's *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in NY State* and the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation,* as amended and annotated (48 FR 44716).

The detailed documentation of the maritime infrastructure and vessel remains found within the Syracuse Maritime Historic District represent a diverse and important collection of properties. The vessel remains represent several of the many watercraft types that operated on Onondaga Lake in the late nineteenth and early twentieth centuries. These vessels are now part of a small dataset of freshwater, inland, vernacular craft that played vital roles in the development and maintenance of the commerce throughout western New York and beyond. The documentation of the wreck remains has added a significant amount of valuable data about these under represented vessel types.

The maritime infrastructure remains located within the Syracuse Maritime Historic District are valuable records of the importance placed on the smooth operation of the waterborne commerce on Onondaga Lake. These remains include pilings demarking the navigable channel into the Syracuse Inner Harbor, a breakwater that protected the same area, and the Salina Pier that once hosted a bustling tourist trade.

Salina Pier also played a significant role in the years after the resort trade had ended by acting as a convenient place to dispose of boats that were no longer serviceable. This in turn has added significantly to the resource base of shipwrecks that were available for documentation.

ACKNOWLEDGEMENTS

So many individuals have contributed to the years of research and fieldwork represented in this report that there is not room enough to acknowledge every one individually. Lake Champlain Maritime Museum is particularly grateful for the hard work and dedication of the following individuals and organizations, without whom this study would not have been possible:

Ron Adams
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Onondaga Historical Association
The Erie Canal Museum
Kelly Miller, Parsons
Russell Andrews
NY State Museum
Syracuse University Special collections
University of Vermont Special Collections
The Salt Museum at Onondaga Lake Park
The staff of Candlewood Suites
Honeywell
Parsons
Sevenson

MANAGEMENT SUMMARY

SHPO Project Review Number:

Involved State and Federal Agencies:
NY State Department of Environmental Conservation
NY State Office of Parks Recreation and Historic Preservation
U.S. Environmental Protection Agency

Phase of Survey:
3

Location Information
Location: Onondaga Lake
Minor Civil Division: Towns of Salina and Geddes and City of Syracuse
County: Onondaga

USGS 7.5 Minute Quadrangle Map:
Syracuse West

Archaeological Documentation Overview:
This report presents the results of a Phase 3 underwater archaeological investigation of ten sites located within the Syracuse Maritime Historic District that will be impacted during remedial activities in Onondaga Lake. Twenty-nine days of fieldwork were executed in September and October 2012, and May 2013 by Lake Champlain Maritime Museum (LCMM) on behalf of Honeywell and under subcontract to Parsons, Inc.

Results of Archaeological Documentation:
Ten sites were examined during the Phase 3 documentation study. The documentation included several methods of data recovery including videography, photography, detailed measured drawings, and the recovery and analysis of wood samples. The results of this documentation include scale drawings of the wreck sites and a better understanding of all the sites and their relationship to the proposed Syracuse Maritime Historic District.

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Date of Report:
May 1, 2014

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INTRODUCTION

This report presents the results of a Phase 3 underwater archaeological documentation, executed under subcontract to Parsons, Inc. and on behalf of Honeywell, for the Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site. The work was undertaken by Lake Champlain Maritime Museum (LCMM) to mitigate ten underwater cultural resources that will be impacted during remedial activities in Onondaga Lake (Table 1).

Table 1: Properties mitigated in the Syracuse Maritime Historic District

Wooden Watercraft	**Marine Infrastructure**
A4-1 Dump Scow	A1/A2 Salina Pier
A12 Dredge	A7 Piling Clumps
A53 Canal Boat	A45 Concrete Breakwater
A2-1 Steam tug/launch	
A2-2 Canal packet	
A2-3 Steam excursion vessel	
A2-4 Barge	

This documentation facilitates management and assessment of archaeological resources in Onondaga Lake consistent with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended; the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation*;[3] the NY Archaeological Council's *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in NY State;*[4] and the NY State Historic Preservation Office's *Phase I Archaeological Report Format Requirements*.[5]

The cultural resource assessments included in this report apply only to potential archaeological and architectural resources. LCMM understands that United States Environmental Protection Agency (USEPA) has initiated government-to-government consultations with the Onondaga Nation in compliance with 36 CFR Part 800.4(a)(b) regarding properties of religious and cultural significance. However, at this time, USEPA has not asked Honeywell, Parsons, or LCMM to address the task of identifying religious and cultural properties. Therefore, no analysis has been performed as to whether the remediation of the areas included in this report may have an effect on Properties of Cultural and Religious Significance.

PROJECT LOCATION AND DESCRIPTION

Onondaga Lake is located in Onondaga County, NY and is contained within the City of Syracuse, and the towns of Salina and Geddes (Figure 1 and Figure 2). The lake has an aerial extent of about 4.5 square miles (11.7km^2), with a drainage basin of approximately 233 square miles (603.5km^2).

The Onondaga Lake Superfund Site comprises the Onondaga Lake bottom, seven tributaries, and upland sources of lake contamination. The remedy for the Onondaga Lake bottom subsite was selected in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) and documented in a Record of Decision.[6]

The documentation of the ten sites included several methods of data recovery including videography, photography, detailed measured drawings, and the recovery and analysis of wood samples. Fieldwork was executed by LCMM in September and October, 2012 and May 2013.

PREVIOUS ARCHAEOLOGICAL WORK

The basis of this report is found in the previous archaeological and geophysical work undertaken in and around Onondaga Lake. In 2004, the Public Archaeology Facility of SUNY Binghamton carried out a Phase IA cultural resources assessment of the Onondaga Lake Site.[7] This work recommended a Phase IB archaeological survey be executed in Onondaga Lake and along the shoreline due to the high potential that those areas may contain historic cultural resources.[8] In 2005, CR Environmental of Falmouth, Massachusetts, conducted a remote sensing survey of the lake bottom. The effort recorded side scan sonar, magnetometer, bathymetry, and sub-bottom profiler data primarily in support of the remedial design effort. The survey located 755 sonar targets and 1256 magnetic anomalies on the lakebed.[9] In 2011, LCMM submitted results from a Phase 1B research which further examined 60 of those anomalies and determined that 20 were recommended as eligible for the National Register of Historic Places (NRHP).[10] Additional documentation was recommended on selected sites within the newly designated Syracuse Maritime Historic District to mitigate the impact of remedial activities in the area.[11] This report is the outcome of that mitigation work.

REPORT ORGANIZATION

This report contains five chapters and eight appendices. The Introduction contains background material pertinent to the project. Chapter 2 presents the maritime context for Onondaga Lake. Chapter 3 contains the methodological approach used to gather the archaeological data. The project's results, including historic context information for specific archaeological properties, and the presentation of archaeological data is contained in Chapter 4. Chapter 5 presents LCMM's conclusions, which is followed by the Bibliography. Appendices 1 and 2 contain LCMM's Field Logs and Dive Logs, respectively. A list of the acronyms is included as Appendix 3, while a glossary defining the specialized terms used in the report is found in Appendix 4. The NY State Office of Parks Recreation and Historic Preservation's (NYSOPRHP) Resource Evaluation for the NY State Canal System is attached as Appendix 5. Appendix 6 is a statement by the Onondaga Nation on the spiritual and cultural history of Onondaga Lake. Resumes of key project staff are included as Appendix 7, while the protocol for the discovery of human remains is included as Appendix 8. Appendix 9 details the data for the wood samples that were recovered. The Endnotes are found at the end of the report.

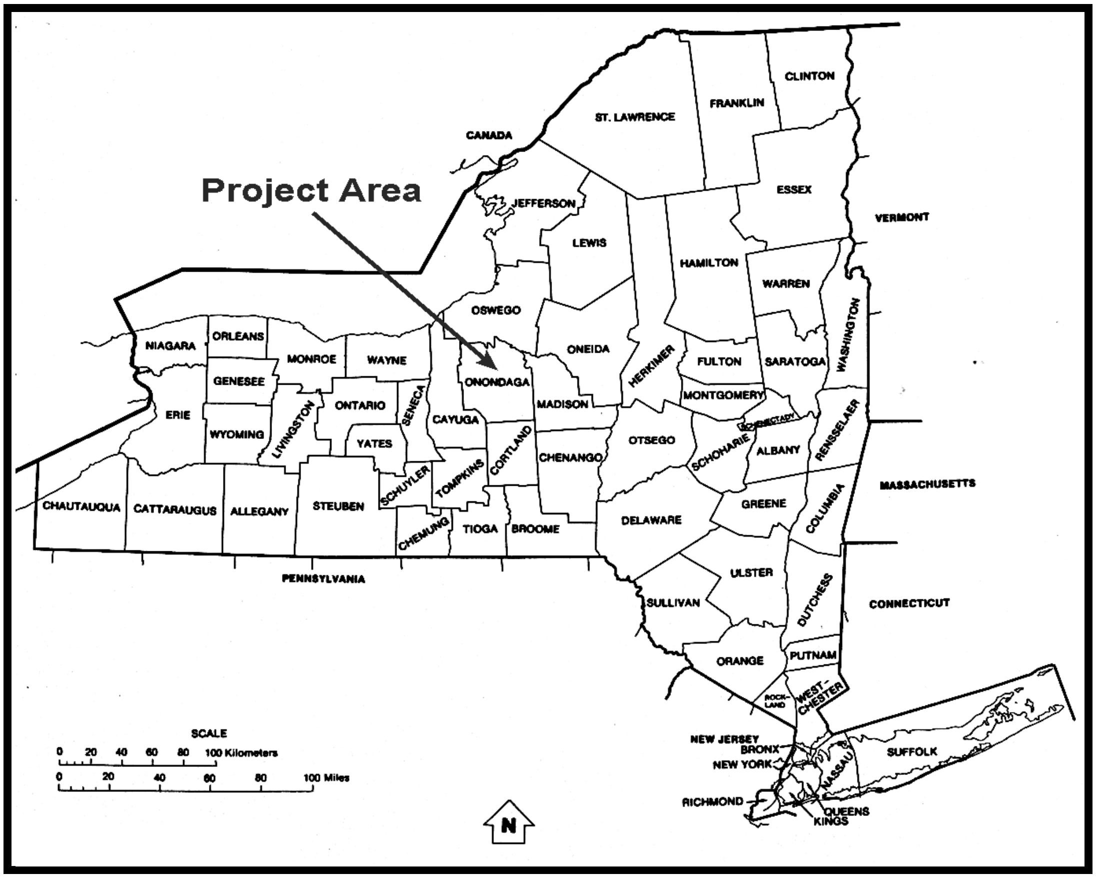

Figure 1: Map of NY State showing the Project Area.

Lake Champlain Maritime Museum

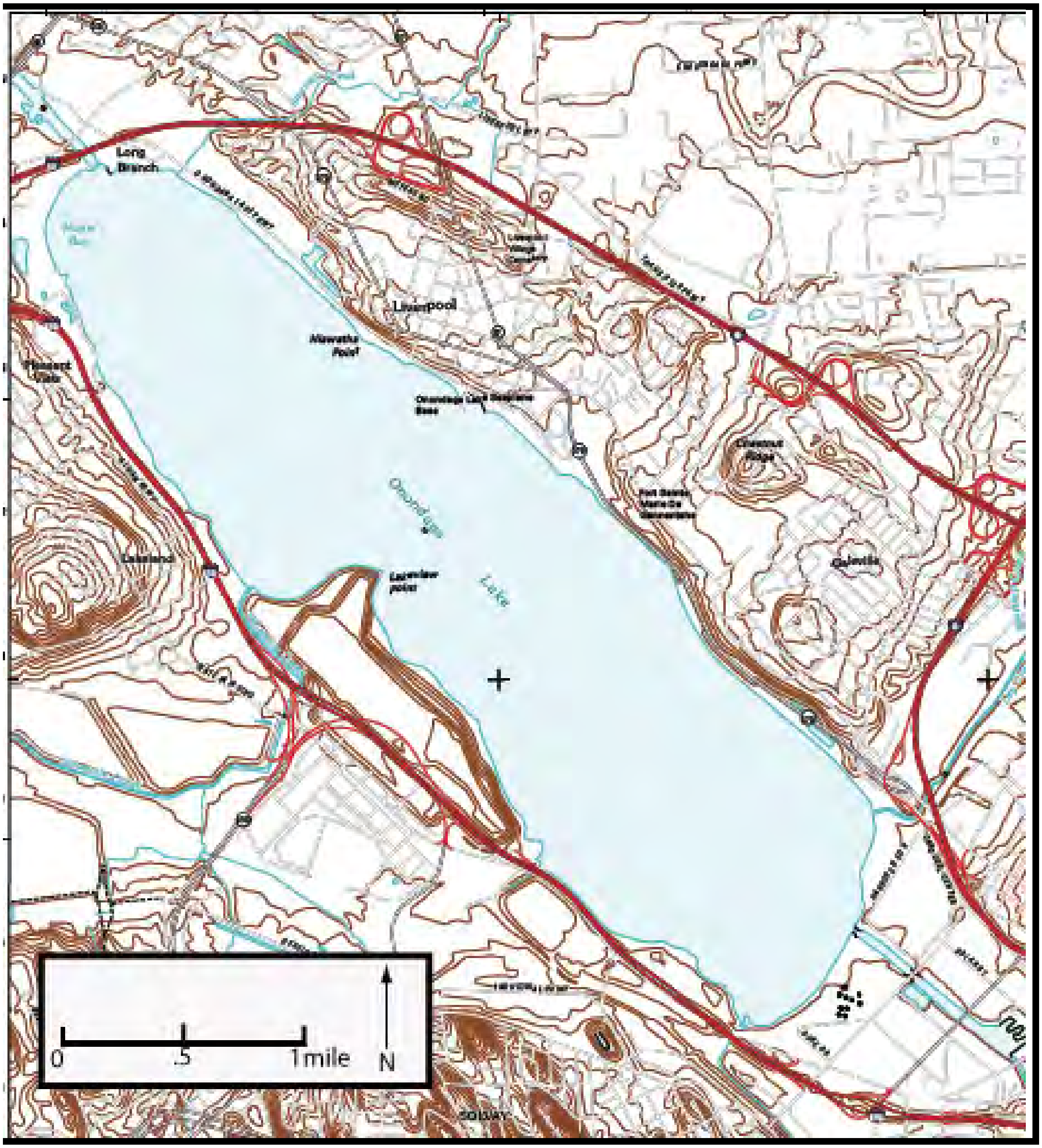

Figure 2: Excerpt from the Syracuse West 7.5 minute Quadrangle showing Onondaga Lake (United States Geological Survey, Syracuse, NY 7.5 Minute Quadrangle, 2010).

ONONDAGA LAKE MARITIME CONTEXT

Onondaga Lake was formed following the retreat of continental glaciers and proglacial Lake Iroquois approximately 10,000 to 8,000 years before present (BP). At a current elevation of 363 feet (110.6 meters [m]) above sea level (ASL) it is part of the Oswego River drainage that flows into Lake Ontario. The lake is currently 4.6 miles (7.4 kilometers [km]) long with a maximum width of one mile (1.6km). Onondaga Lake outflows to the Seneca River, which joins the Oneida River at the Three Rivers junction at Phoenix, NY, to form the Oswego River, a major tributary of Lake Ontario. Onondaga Lake has a surface area of 4.5 square miles (12 square kilometers [km^{2}]), a volume of 35 billion gallons (132.5 billion liters), and a maximum depth of 64 feet (19.5m).[12] The level and shoreline of Onondaga Lake have changed over the past 10,000 to 8,000 years due to climate fluctuations, human modifications and seasonal variations. It is important to understand these changes and how they influenced human habitation around Onondaga Lake in order accurately study the maritime context of this inland lake.

POST-GLACIAL LAKE LEVEL FLUCTUATIONS IN NORTHEASTERN NORTH AMERICA

As part of the larger Great Lakes drainage basin, Onondaga Lake was formed during the deglaciation of northern North America circa 12,000 BP. While similar post-glacial lakes and ponds in the northeastern United States have not been the subject of thorough archaeological study with regards to submerged precontact resources, many have been the subject of paleoenvironmental studies that evaluated the effects of Holocene climatic change on lake levels. These changes in the location and/or presence of shorelines and wetlands influenced precontact human settlement patterns and resource procurement strategies. Studies in the Great Lakes, Finger Lakes and smaller ponds of the northeastern United States and southern Ontario have demonstrated that climate change throughout the early and mid-Holocene (circa 10,000-4,000 BP) had diverse effects on lake level fluctuations in the Northeastern section of the continent, as well as the distribution and formation of wetlands along the margins of these lakes and their tributaries (Figure 3).[13]

Sediment core studies in the Finger Lakes have shown that during the Holocene Hypsithermal climatic period (9000 to 4000 BP) lake levels were relatively high when compared to the drought conditions proposed for the Great Lakes and Mid-West region.[14] This study also indicated that there were a series of low stands during the Hypsithermal in the Finger Lakes region every 1800 to 2200 years (approximately 9,800, 7,800, 6,000, 4,200 and 2,000 BP) with the highest relative lake levels occurring circa 8,800 and 7,000 BP.[15] Sediment core and subbottom profiler data analyses at small closed basin ponds in Maine suggest that there was a 7 to 20 foot (2 to 6m) decline in lake levels during the mid-Holocene, especially circa 6,000 BP.[16] Sediment cores from Crawford Lake in southern Ontario indicate the most significant lake low stand was between 4,800 and 2,000 BP, which is consistent with other sites in southern Michigan and Ontario.[17] Within the Great Lake Basins there were several phases of drier climate and lake low stands, including a major event that spanned ca. 9,000 to 4,000 BP.[18] During the Lake Stanley phase (7,900 BP) water levels in the Lake Huron basin were up to 230 to 328 feet (70 to 100m) *below* present and large areas of lake bed were exposed terrestrial landscapes.[19] While all of these studies demonstrate that lake level changes throughout the early to mid Holocene were prolific in the northeast, they also indicate that the impacts of climate change on lake levels varied depending upon the specific body of water in question.

To date, there has been no in-depth paleo-environmental study of Onondaga Lake to gauge how lake level fluctuation impacted precontact human settlement around the lake. Though the studies highlighted in this section indicate that Onondaga Lake, like other nearby lakes, likely experienced similar changes in lake levels, the timing and extent of these changes remain unclear.

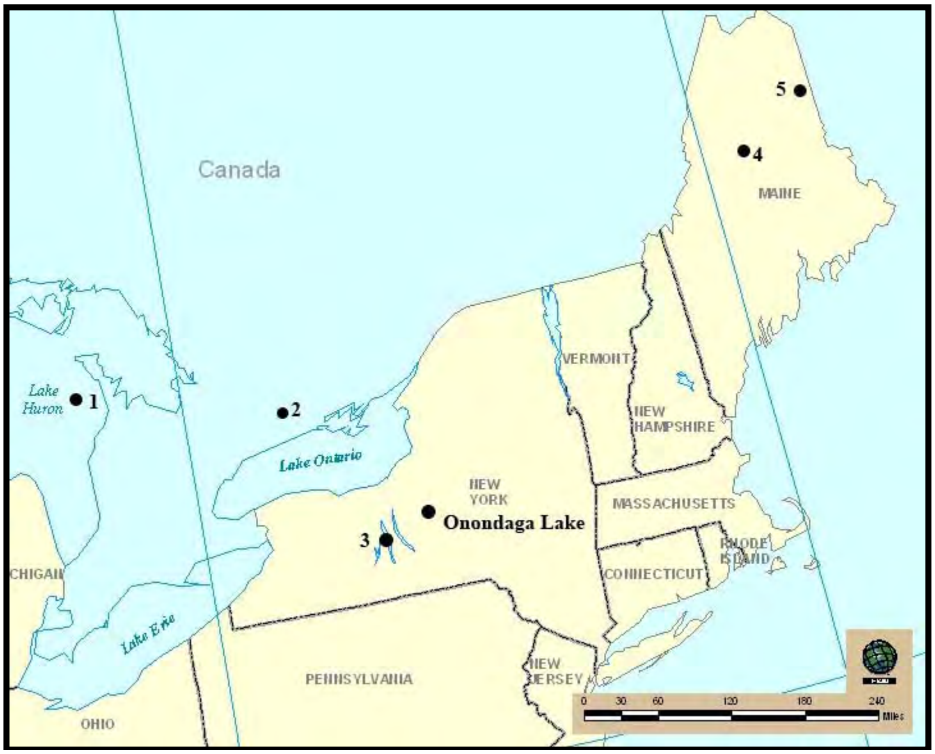

Figure 3: Map of the lakes and ponds discussed in this section: 1-Lake Huron; 2-Crawford Lake; 3-Finger Lakes; 4-Mattews Pond, Maine; 5-Whitehead Lake, Maine (after Environmental Systems Research Institute).

HISTORIC LAKE LEVEL CHANGES

The Phase IA report contained an extensive overview of historical records and maps regarding the changes in Onondaga Lake levels and alterations to the shoreline. The following synopsis is based primarily on those findings.[20]

Historically, Onondaga Lake experienced natural lake level fluctuations during times of spring runoff and dry summer spells, and this was likely true prior to European settlement. Much of the lake shoreline was once composed of soft spongy bog and marshland which was greatly affected by these seasonal lake level fluctuations.[21] When inland water travel became an important component to European expansion west during the early nineteenth century, engineers devised ways to control lake levels to benefit inland water travel. In 1822, Onondaga Lake was lowered approximately two feet (.61m) so that navigation between the lake and the Seneca River would be more easily attained. At the northern end of the lake, an outlet about 3,300 feet (1006m) long and five feet (1.5m) deep was cut, and a reef to the north was dynamited, allowing waters to more easily flow out of Onondaga Lake.[22] This resulted in a nearly 20 percent decrease in lake volume and in the drying up of marshy bogs along the lake shore.[23]

This northern outlet was eventually abandoned, allowing the lake to return to pre-1822 levels; however, in 1841 it was re-cut, and lake levels again may have dropped nearly two feet (.61m).[24] Hohman suggests that the lake may have been approximately 364 feet (111m) ASL at this time (1822 to circa 1898), and that prior to the nineteenth century the lake level may have been approximately 365 to 369 feet (113 to 112.5m) ASL.[25]

Construction of the Oswego Canal in the 1810s and 1820s along the eastern shore of the lake required the marshy shoreline to be reinforced with timber. Various mid-nineteenth and early twentieth century maps indicate that the reclaimed shoreline along the southern and southeastern part of the lake was anywhere from 200 to 3000 feet (61 to 914m) inland from the contemporary shoreline.[26] A 1908 Hopkins map identified areas of "reclaimed land," and the original shoreline of the southern part of the lake as approximately 300 to 1000 feet (91 to 305m) inland of the contemporary shoreline. The 1908 Hopkins map is also the first to indicate that the Solvay Process Company began placing waste into and along the shoreline of Onondaga Lake. Along Lake View Point, the Solvay Company had piled waste over 80 feet (24.4m) high in the mid-twentieth century, greatly altering the shoreline in that area.[27]

Other parts of the Onondaga Lake shoreline were greatly altered during the late nineteenth and early twentieth century. The construction of docks, wharves, roads and railroads, the dredging of basins, alterations made to river courses, and the placing of industrial waste along the shore all contributed to changes in the contours and depth of Onondaga Lake for well over a century. In particular, in 1915 Onondaga Lake level was raised to accommodate the construction of the NY State Barge Canal. In 1929, the mouth of Nine Mile Creek was moved west of Lake View Point. Additionally, in 1977, 3.7 acres (1.5 hectares) of the southwestern part of the lake were filled in by the county. Today, at an elevation of 363 feet (110.6m) ASL, it is proposed that Onondaga Lake is 2 to 3 feet (.61 to .91m) lower than the lake level prior to modifications which began in 1822.[28]

PRE-CONTACT PERIOD MARITIME CONTEXT

The Phase IA Archaeological Report provides an overview of the Pre-contact context for NY State and the primary patterns of pre-contact Native American land-use in the region.[29] The broader pre-contact period is divided into two eras based on subsistence practices: the hunter-gatherer/pre-agricultural subsistence era (12,000 BP to 1100 BP) and the agricultural/hunter-gatherer subsistence era (1100 to 350 BP). These pre-contact eras are further classified based on pre-contact periods established by Ritchie.[30]

Throughout all of the pre-contact eras, waterways of the Northeast were important landscape features in relation to subsistence (fishing and animal migrations), travel (watercraft) and settlement patterns. Native American groups relied on drainages and water courses during the highly mobile Paleoindian and Archaic periods, as well as during the sedentary periods when settlements were established near water courses and lakes or coastlines. What follows is a brief outline of the primary pre-contact periods identified for NY State, with a focus on the maritime context for each period. More specifically, this context will focus on the archaeological evidence for maritime resource procurement and the use of watercraft. For a more in-depth discussion of general material culture and settlement patterns see Hohman.[31]

Paleoindian Period (12,000 to 9,500 BP)

During the Paleoindian Period (12,000 to 9,500 BP) the Onondaga Lake area was submerged below pro-glacial Lake Iroquois. As the continental glaciers receded to the north, and Lake Iroquois drained, smaller lakes, like Onondaga Lake, Oneida Lake and the Finger Lakes were established in small lowland depressions within the Oneida Lake Plain. Throughout this time of major environmental transition, Paleoindian hunter-gatherers adapted their migrations and movements to this evolving landscape. Fluted points, the most indicative artifact type related to the Paleoindian period have been recorded by Ritchie at numerous locations along the present day Seneca River to the north of Onondaga Lake.[32] This would imply that as Lake Iroquois receded, these river water courses were important travel corridors for both hunter-gatherer groups as well as the animals they hunted. The location of the points may also represent a relict shoreline of Lake Iroquois that was contemporary to the arrival of these groups of people to the region.

Paleoindian groups may have followed large megafauna before they went extinct, and in the later Paleoindian period, when the smaller lakes and ponds were established, they followed migrating elk and caribou herds. While a number of Paleoindian points have been recorded in Onondaga County, a lack of recorded Paleoindian projectile points in the immediate area of Onondaga Lake may be due the marshy nature of the land as Lake Iroquois receded. Also, as Onondaga Lake was established, the lake level may have been either extremely high, or extremely low, during the Paleoindian Period, and contemporaneous sites may now be submerged or many miles away from the present day shoreline. Additionally, historic era activities around the lake may have erased evidence of Paleoindian occupations. It is uncertain if Paleoindian groups used watercraft in the region of Onondaga Lake since the remains of watercraft have yet to be found in the archaeological record.

Early Archaic (9,500 to 5,500 BP)

Ritchie suggests that peoples of the Early Archaic period were still highly mobile, practicing a broad spectrum hunting and gathering strategy as the environment was still in a constant state of flux.[33] There is a lack of archaeological evidence relating to the Early Archaic period in northern NY. This could be a result of archaeological testing bias or Versaggi has suggested this may reflect that the environmental conditions in interior NY could not have supported long-term human occupation at this time.[34] Rather, she believes that smaller groups may have exploited "several small resource-rich zones, such as valley floors and upland bog margins, [that] could have provided the necessary resources for short-term occupations by small hunting and gathering groups migrating north from the warmer coastal regions."[35] Whether Early Archaic groups traveled via foot or in watercraft is still uncertain, but considering the predictability of fish and the numerous rivers, streams and lakes in central NY, it is highly likely that maritime activities played a major role in their subsistence and travel patterns.

The Late Archaic Period (5,500 to 3,500 BP)

The Late Archaic period in the Northeastern United States is characterized by a more hospitable and predictable environment, resulting in the establishment of resource rich deciduous forests and a climate that had annual changes in the form of four seasons.[36] Hunter-gatherer groups continued to follow seasonal migration of land animals and seasonal availability of aquatic resources.

The Lamoka Phase is well established based on archaeological findings as representing a fishing culture in central NY. Ritchie notes that during Lamoka Phase there was a preference for waterside locations, both as temporary and permanent habitation sites, particularly near shallow and weedy sections of larger lakes, small shallow lakes, the margins of large marshes near larger bodies of water, or large streams with weedy sections.[37] Various sites from this phase yielded large assemblages of fishing tools, particularly the Lamoka Lake site, located in Schuyler County, southwest of Onondaga Lake. Nearly 8,000 stone net weights and small projectile points were found, indicating that fishing and hunting of waterfowl were important activities. Additionally, a large collection of un-barbed bone fish hooks were recovered from the site, as well as some evidence that spear fishing may have been common. From this site it can be hypothesized that fishing with nets became prominent, as did the importance of the resources used to make these nets. A fishnet made of "Indian-hemp fiber" which was woven into a net with about a two inch (5.1cm) mesh, was found at the site.[38]

The Brewerton Phase is best represented by the Brewerton type site located at the outlet of Oneida Lake. People of this phase appear not to have placed as much importance on fishing as they did during the

Lamoka Phase. Brewerton sites tend to yield a smaller number of notched sinkers (or stone plummets), barbed fishing hooks and spear fishing devices. The Brewerton site, however, is located near the rifts below Oneida Lake, an optimal location for the seasonal fish runs, where fish can be trapped and speared.[39] Also noteworthy at the Brewerton site was a large number of woodworking tools, such as grooved axes, gouges, and adzes.[40] Ritchie notes that the presence of gouges in site assemblages implies the construction and use of the dugout canoes.[41]

The Frontenac Phase is best represented by the Frontenac Island site located in Cayuga Lake. It is the only island in the Finger Lakes, about an acre (.4 hectare). Excavations unearthed various faunal remains, including birds, reptiles, mammals, mollusks and fish.[42] Fishing gear included notched stone net sinkers, bone fishhooks, bone gorges, fishing spears, and stone plummets. Ritchie suggests that stone plummets were used for line fishing, and to assess water depth. He also notes that unlike the Lamoka sites, there were no tools found that indicate the manufacture of nets.[43] Woodworking tools were also part of the site assemblage, and it can be assumed that some type of boat building was required at this island site.

The Transitional Period (3,500 to 3,000 BP)
The Transitional Period is characterized by hunting and gathering groups with an increased reliance on plant materials. Frost Island Phase sites are more common to the north of the Finger Lakes, such as the type site along the Seneca River. The assemblage from this site yielded notched pebble sinkers, suggesting that fishing with nets was likely.[44]

The Orient Phase appears to be centered on the southeastern part of NY; hence, much of what is known is based on sites near Long Island. However, recent discoveries have shown that this phase may have extended into the northern Hudson region. It appears that shellfish was an important food source, gathered from mudflats and shallow bays.[45]

The Early and Middle Woodland Period (3,000 to 1100 BP)
The Early and Middle Woodland periods are marked by the increased interaction between peoples in north and central NY with groups to the west in Ohio (i.e. Adena, Hopewell) and north and west in the Great Lakes region. The most important cultural factor during this broader period is the sharing and exchange of ideas and cultural materials with neighboring regions. It indicates that although regionally groups of people were becoming more sedentary and establishing permanent settlements, they were also highly mobile with the long distance movement of ideas and materials, most likely making use of canoes for inland waterway travel. Stylistically, material culture distinguishes the Early and Middle Woodland sites from one another, but Hohman notes that their land use patterns were both based on an "organized system where seasonal base camps with as many as 100 individuals were established in major river and lake valleys near streams confluences."[46] With a larger base camp established, daily or even weekly forays for nearby resources were carried out by smaller groups, and this type of logistical subsistence pattern resulted in various site types representing these time periods.[47] It is likely that during this period native peoples used dugout canoes, while innovative methods for constructing lighter craft may have been developed at this time.

The Early Point Peninsula Phase is represented by smaller campsites around the shores of streams and lakes, within coves and islands. These sites had a relative paucity of projectile points, suggesting that hunting was less important when compared to fishing and collecting of freshwater mussels. Additionally, extensive use of wild rice beds is suggested for this phase. Fishing gear found at sites of this phase includes grooved ovate pebbles, net sinkers, fishhook barbs, copper fishhooks and gorges, a conical antler toggle-head harpoon, and barbed bone points. No bone fishhooks, per se, have been identified for this phase.

There is a lack of large pottery at sites from this phase, which suggests that bark and wooden artifacts were important for storage. Ritchie points out that people of this phase likely represent "small mobile, probably bark-canoe-traveling fisherman, hunters, wild rice gatherers, with little baggage."[48]

Late Woodland Period (1100 to 350 BP*)*

The Late Woodland period marks the transition between the pre-agricultural/hunter-gatherer subsistence and the agricultural/hunter-gatherer subsistence eras.[49] Archaeological evidence from the Late Woodland period clearly shows that maize agriculture was in place and groups of people began to settle down into permanent agricultural settlements. The Late Woodland is divided by two phases: the Owasco Phase and the Iroquois, or Haudenosaunee Phase. Both phases are marked by the establishment of a sedentary/agricultural subsistence base, with hunting and fishing still an important component.

Owasco Phase is the first phase in which corn, beans and squash were cultivated and the use of the bow and arrow became common. Ritchie suggests that fishing during this phase may have been the work of the women, older children or old men, since there appears to be less emphasis on this subsistence practice over time. Fish were captured by spearing with a barbed bone point fixed to a shaft and carried out at rift and rapids of rivers, using nets, or angling with hook and line with barbless and barbed fishhooks.[50] Interestingly, a trot-line was found that dates to this period. It was composed of "two-strand twisted Indian-hemp fiber equipped with nineteen dropper lines, each carrying a compound hook contrived from two hawthorn spines. It was baited, weighted with a flat sinker, and left over night on a favorable bottom."[51] The device could catch a number of fish at once.

By the fourteenth century, the Owasco people had become what we historically know as the Iroquois, or Haudenosaunee. They established large settlements clustered around the inland lakes of NY, and the Mohawk Valley.[52] Villages became large, housing up to 350 people and located along major drainages. The villages had to be moved every two decades due to localized resource depletion. The immense amount of wood used to build the palisaded villages, a sign of tribal warfare, and to support the population meant that wood became scarce over time.

Also during the Late Woodland period, it is supposed that the first bark canoes were constructed, resulting in quicker and easier travel along rivers and streams when compared to the dugout canoe that had been used for many millennia. Information about Haudenosaunee bark canoes comes primarily from early European accounts.

Native American Canoes

The three basic canoe types constructed by Native American groups in the Northeast over 11,000 years are skin boats, dugout canoes and birch bark canoes. Each of these vessels reflected the environmental conditions and technological innovations of its time. Paleoindians were probably the first to use watercraft beginning around 11,000 years ago. These hunter-gatherer groups likely hunted and fished along seashores and presumably built small skin craft to harvest the marine food resources. These forms of boats were popular among Native Americans of the northern latitudes, where the landscape is barren of trees and sea mammals played a major role in subsistence and cultural innovation.

As freshwater inland lakes were established by 10,000 years ago, forests of hard and soft wood species developed around the post-glacial lakes. Native Americans adapted their watercraft design to these environmental changes. The Archaic and Woodland peoples built small craft from tree bark, skins from terrestrial animals, or hollowed-out logs. Unfortunately, few examples of watercraft from these periods 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 the area. At least a dozen dugout canoes, however, have been uncovered in lakes and ponds throughout Vermont and Ontario. The archaeological examples of these simple boats probably date between the Late Woodland period (1100 to 400 BP) and the nineteenth century.

Watercraft made of dugout tree trunks, called dugout canoes, were the primary vessel form starting about 10,000 years ago.[53] Dugouts were heavy, weighing between 200 to 300 pounds when wet and were difficult to carry at portages. They therefore were primarily used on larger bodies of water, like lakes and ponds, though smaller, individual dugouts may have functioned well on rivers. Most of dugouts that survived in the archaeological record have been found submerged in ponds. It appears that these vessels were cached, or stowed, over seasons when semi-sedentary groups of hunter-gatherers would travel to their fall/winter camps. The dugouts would then remain protected for when the group returned and the lakes and ponds were no longer iced over.

By approximately 600 years ago bark canoes became the primary vessel type in the Northeast. An average bark canoe was approximately 16 feet (4.9m) long, but others could also be as small as 11 feet (3.4m) or as large as 30 feet (9.1m). Regardless of their size, bark canoes were easier to handle, as they were much lighter than dugouts, yet construction was more complicated and required more specialized tools and construction components. Bark was most easily harvested in the spring, when sap was running. Winter and summer bark was more difficult to harvest and inferior.[54] Gum or tallow was applied as a resin to make the vessels water tight. Unfortunately, the delicate nature of birch bark canoes has prevented any early specimens from surviving in the archaeological record. Anthropologists and archeologists agree that the bark canoe probably evolved out of the late Woodland period some 2000 or more years ago. However, none has survived from before the 1700s.

Haudenosaunee Canoes

Haudenosaunee bark canoes were typically built of elm bark as opposed to birch bark. Birch bark was available, but scattered and therefore elm and other barks were more common on Haudenosaunee canoes. They may have used white cedar for the ribs and roots of the white cedar, tamarack, or eastern larch for sewing the pieces of the bark together. For more temporary canoes, saplings and branches may have served for the ribs. Early accounts note Haudenosaunee canoes as being rather large and primarily labeled as war canoes. The war canoes may have been temporary canoes, constructed hastily for the task at hand and then abandoned. On large bodies of water within their territory, the Haudenosaunee used dugouts, but for navigating streams and for use in raiding their enemies they employed bark canoes (Figure 4).[55]

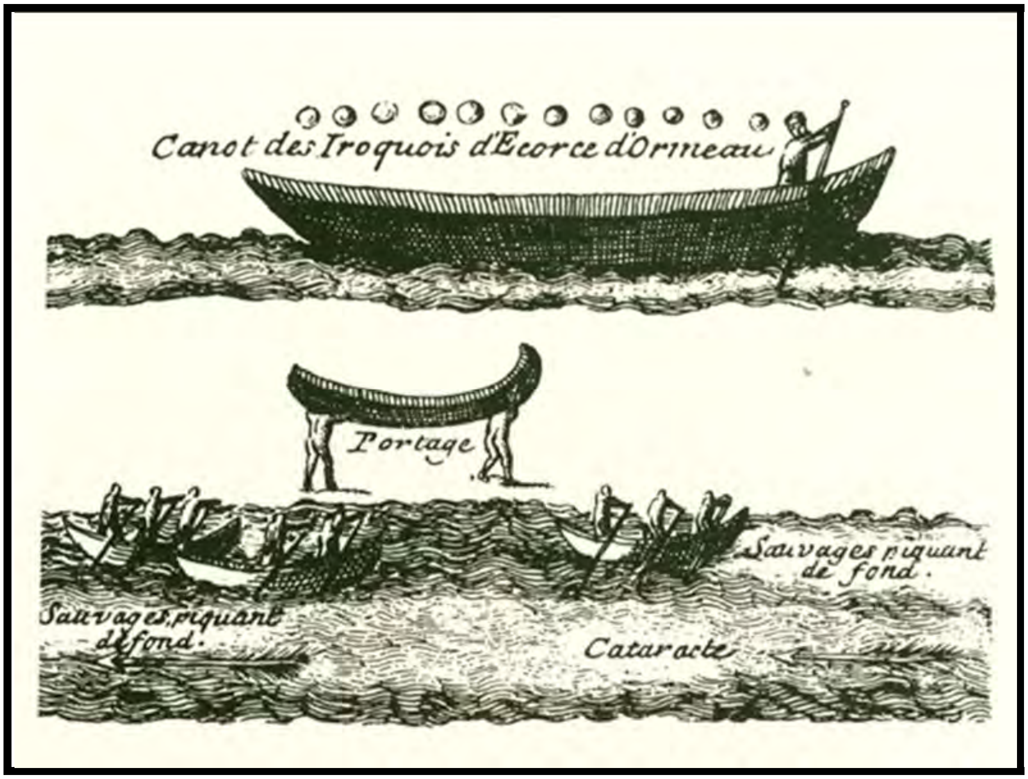

Figure 4: Excerpt of canoe imagery from French explorer LaHontan's notes (from Adney and Chappelle 2007).

Contact Period (350 to 200 BP)

The Owasco are believed to be the antecedents to the Onondaga people who came to call the area of Onondaga Lake home.[56] The Onondaga have long inhabited the area around Onondaga Lake, possibly dating back to the twelfth century. It is believed that the Haudenosaunee (or Iroquois) Confederacy was established at Onondaga Lake, a central location for the joining tribes, as far back at 1000 BP.[57] The Confederacy of the Haudenosaunee was established to bring peace to the region and to unite the native groups. The five original nations of the Haudenosaunee were the Mohawks, Oneidas, Onondagas, Cayugas and Senecas. The Tuscaroras joined the confederacy circa 300 BP. The Onondaga are considered the People of the Hill and the keepers of the fire and wampum.[58]

Archaeological sites affiliated with the Onondaga near Onondaga Lake are all located to the south along tributaries that flow into the lake.[59] Archaeological evidence and historic accounts note that Onondaga fishing villages were located at the mouth of lakes and rivers.[60] The Onondaga village of Kaneeda is said to have been located at the outlet of Onondaga Lake at Onondaga Creek. This fishing village site was recorded by amateur archaeologist Dr. William G. Hinsdale of Syracuse in the 1930s.[61] The site yielded Haudenosaunee pottery dating to the circa 400 BP, along with net sinkers, deer bones and flakes. These fishing villages may have been seasonal, as Snow describes Haudenosaunee fishing during Fishing Moon cycle as seasonal, taking place in the spring and involving the movement of whole families.[62] They would harvest the migrating fish by the thousands as they slowed down at the falls and rapids of rivers, "using cordage twisted from Indian hemp fiber…woven into nets and lines…The hollowed dried galls of goldenrod served as floats, while flat pebbles were notched to make sinkers."[63]

PRECONTACT/CONTACT PERIOD ARCHAEOLOGICAL SENSITIVITY FOR SUBMERGED SITES IN ONONDAGA LAKE

As noted in this section, inland lakes as well as their margins and inlets/outlets, offered diverse resources and areas for habitation for precontact and post-contact Native American groups in the Northeast. Onondaga Lake, one of the smaller Finger Lakes of NY State, was part of an interconnected system of waterways, all rich in aquatic and terrestrial resources. Adjacent dry land near riverine confluences offered ideal locations for short-term seasonal and/or long-term habitation sites. The lake itself and the surrounding environs (i.e. tributaries, wetlands, and forests) would have provided fish, game, wood, and plants that made habitation in close proximity to the lake ideal. Additionally, travel and fishing activities on the lake may have involved the use of dugout and bark canoes.

In support of this potential, there are 29 documented Precontact/Contact period archaeological sites within 1.6 km radius (1 mile) of the shoreline of Onondaga Lake. All of these sites are listed in the NY State SHPO database and are either near Onondaga Lake or along major tributaries that flow into or out of the lake.[64] The known Precontact and Contact era archaeological site types are varied (small campsites, mounds, burial places, contact era villages) and demonstrate that Native American land use around Onondaga Lake was substantial, especially on dry land near confluences or on spits of land jutting into the lake. The presence of ceremonial and spiritual land use shows the importance of the lake for activities other than resource procurement and settlement.

Climate changes may have greatly influenced the way precontact peoples used the land around the lake. Onondaga Lake was formed roughly 10,000 B.P. when glacial lake Iroquois retreated. Since that time, the shoreline of Onondaga Lake may have been altered as lake levels fluctuated due to episodic drought or periods of increased moisture. As discussed previously, it is not currently possible to state exactly how these climatic episodes impacted this particular body of water. However, given the historically known presence of wetland margins along the western shoreline of Onondaga Lake, and the presence of salt springs on the south and east portions of the lake, it is likely that Onondaga Lake was an important resource procurement area throughout the human history of the region.

None of the known Precontact archaeological sites identified in the area are located on the immediate shoreline of Onondaga Lake. An exception may be the Contact period Kaneeda village site on the south shore of the lake near the outlet of Onondaga Creek. The location of the outlet changed over the years and the exact location of the village is not known. The absence of recorded sites adjacent to the shoreline may be a result of the natural configuration of the shoreline. A great majority of the shoreline adjacent to the underwater APE for this project was once wetland and swamp, as noted on eighteenth and nineteenth century maps (Figure 5). Today, this land is composed of made lands created through the deposition of waste fill (typically Solvay waste) by infilling shallow water areas or marshes. These marshes and wetland were likely attractive for resource procurement by Native American groups, but they were less likely to be habitation areas.

A geomorphological study of the land portion of the APE conducted by Geoarchaeology Research Associates (GRA) indicated that "thick marl deposits (found below fill in Wastebed B) are indicative of basin and subaqueous shoreline deposits, which are neither conducive to prehistoric settlement, nor archaeological preservation."[65] The boring logs along the project APEs support the historic map information which noted a variety of swamps adjacent to the lake. This characterization can be extended to the drowned shoreline where portions of the swamps noted on the late eighteenth century map would have existed prior to the raising of the lake to current levels. Whether these swamp lands existed along the project APE shoreline of Onondaga Lake continuously over the past 10,000 years is, again, uncertain.

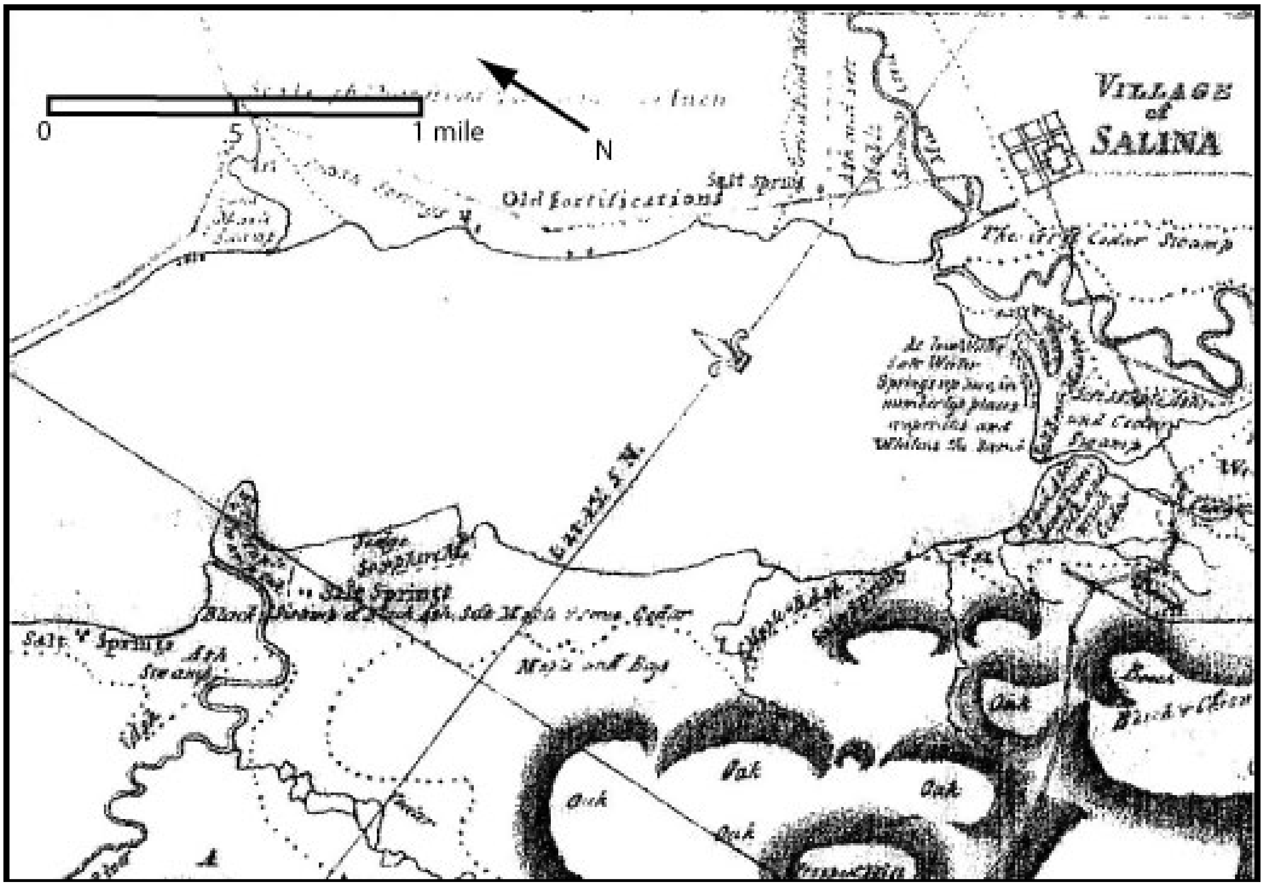

Figure 5: Late eighteenth century map of Onondaga Lake with the project shoreline APE labeled as swamps and springs.

HISTORIC CONTEXT

The arrival of European settlers around Onondaga Lake began in the early 1600s with the appearance of fur trade explorers and Jesuit missionaries to the region. The French adopted the bark canoe early on, realizing that it would be invaluable in the exploration and trade in the interior of the continent. Streams could be navigated and explored, and overland portages could be easily maneuvered. This implementation of the Native American bark canoe allowed the French, and the early fur trade, to quickly penetrate the heavily wooded areas of interior NY and around Onondaga Lake.

The Jesuit priest Simon LeMoyne visited Onondaga Lake and noted the salt springs at the southern end. The salt was recognized as an important resource in the area and Onondaga Lake was identified as "Salt Lake" on eighteenth century maps (Figure 6). The Jesuits established a mission on the east side of the lake in 1656, Ste. Marie de Ganeentah, which was vacated in 1658. The Onondaga welcomed the French presence since they felt in need of an ally, as the Mohawk had found in the Dutch traders. The disagreements and jealousy between the Mohawk and Onondaga led to a bloody dispute and inter-tribal warfare, much the result of European influence causing uneasiness among the Confederacy.[66] The French returned to Onondaga Lake in 1696 under the orders of the governor of New France, Count de Frontenac. Arriving in nearly four hundred boats via the Oswego River to Onondaga Lake, they established a fortification on the south shore en route to the main village of the Onondaga tribe to the south (Figure 6). According to Thomas, the remains of this 1696 fortification are currently located nearly 1,200 feet (366m) from the present day shoreline, a result of historic lake level changes and the addition of fill along the shoreline.[67]

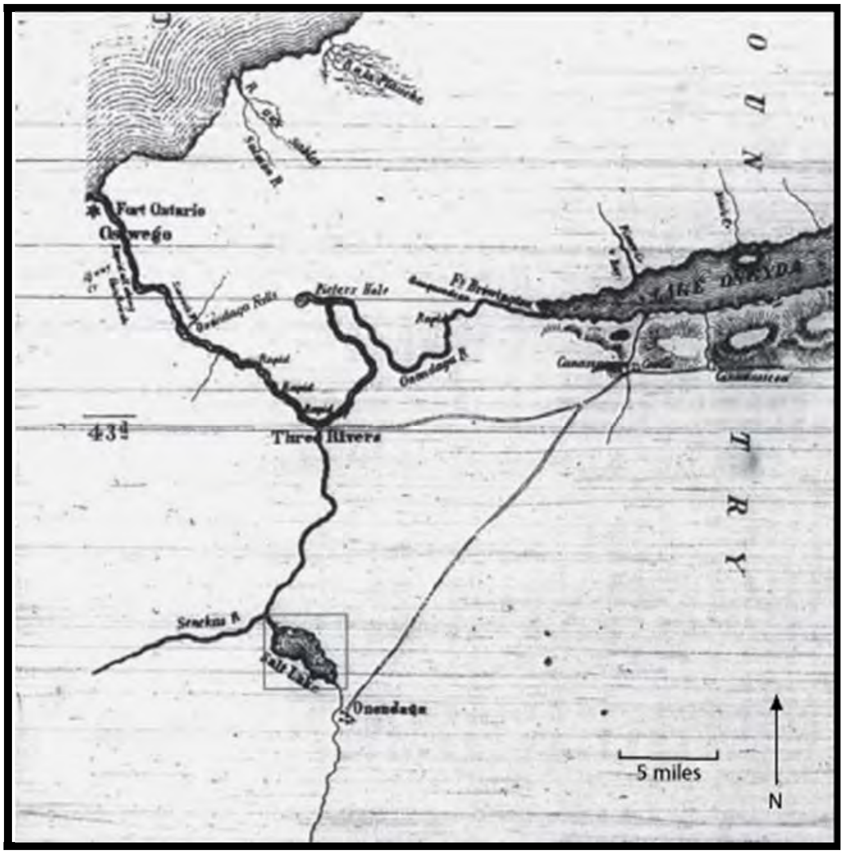

Figure 6: Eighteenth century map of Native American settlements in NY (from Bruce 1896, excerpted from Hohman 2004).

Throughout the 1700s, the Onondaga region, like most of the Northeast, was impacted by the myriad of wars between the French, British, Native Americans, and ultimately, the Americans. After the Revolutionary War, a slow trickle of European settlers made their way west, some settling in the Onondaga Lake region and establishing the salt industry. At this time, improvements were proposed to inland waterway travel, particularly westward to connect Albany with the Great Lakes. Rapids and shallow stretches of rivers and streams meant that boat travel was limited to light and small craft with less than a two foot (.61m) draft which could be lifted and dragged. Canoes and wooden bateaux were utilized.[68]

In 1786, Ephraim Webster was the first to officially settle on Onondaga Lake, establishing a trading post and camp at the mouth of Onondaga Creek on the east side. Upon his death, his estate, including the salt springs, became public lands of NY State. Onondaga County was established in 1796 and families began to settle around the lake. The towns of Salina, Geddes and Liverpool were all established prior to 1800. The marshy shorelines of the lake allowed for outbreaks of cholera and malaria in the region, making the immediate shoreline of Onondaga Lake a relatively inhospitable place.

The Canal Systems and Onondaga Lake

Just before the turn of the nineteenth century the Western Inland Lock and Navigation Company began to construct short canals connecting lakes and rivers, and deepening shallow areas. The NY State Commission also began prospecting for canal routes that would connect Albany to Buffalo, and in effect connect the Hudson River to the Great Lakes. James Geddes, a resident of Salina who lived on Onondaga Lake, was appointed the NY State Surveyor General. Geddes' involvement in the salt industry meant that he lobbied strongly, and successfully, for the canal to pass through the village of Syracuse. Construction of the Erie Canal began on July 4, 1817, and it officially opened October 25, 1825. At 343 miles (552km) long, it cost $352 million to build, and was completely funded by the State of NY. It was 4 feet (1.2m) deep and 40 feet (12.2m) wide, with 15 by 90 feet (4.6 by 27.4m) wide stone locks.

The Erie Canal did not run through Onondaga Lake; the actual canal segments needed to be protected since vessels were towed by mules and horses throughout its course, and a wide lake was not an optimal location logistically. Instead, the narrow canal ran through the center of Syracuse and then to the south of the lake. Extensions to the canal around the lake and into the lake were soon proposed, particularly to benefit the salt industry. In 1819, a law was enacted that authorized a navigable side-cut, approximately one mile long (1.6km), from the Erie Canal to the salt works in Salina.[69] Onondaga Lake at the time was accessible to smaller vessels via the northern and southern outlets at Onondaga Creek and the Seneca River. However, there was no direct route from the Seneca River and Onondaga Lake to the canal system. The salt industry petitioned for permission to connect the Salina side-cut and the Seneca River to lessen the expense of getting wood to the salt works. Areas around Onondaga Lake and the Seneca River were still covered in forested land, and the connection of these water routes made the movement of wood to the salt works more practical and economical.[70]

In 1820, the State of NY sold portions of the land they had acquired from the Webster estate, keeping their claims on the salt springs and appropriated the money to lower the level of Onondaga Lake to that of the Seneca River. By 1822, an outlet about 3,300 feet (1006m) long and five feet (1.5m) deep was cut, reducing the lake level 2 feet (.6m) and causing marshlands along the shoreline to eventually dry up.[71] This allowed improved navigation between the Erie Canal and the Seneca River via Onondaga Lake.

This project was the impetus for the development of the Oswego Canal, the first feeder canal constructed, which connected the Erie Canal at Syracuse to Lake Ontario. James Geddes was again the head surveyor for the project. The first section of the Oswego Canal, running along the eastern shore of Onondaga Lake and from the northern outlet to Three-mile rift, was completed in 1826 (Figure 7). On April 28, 1829 the Oswego Canal was opened to navigation throughout its entire extent. The canal bank along the eastern shore of Onondaga Lake was at times problematic. The soil was loose and prone to washing out, and it became necessary to secure it on both sides with a facing of timber.[72] Additionally, once the Liverpool portion of the Oswego Canal was completed, the Salina side cut to Onondaga Lake was abandoned as a navigable channel, as was the Onondaga outlet, causing sediment to build up and block the flow of water. Ultimately, Onondaga Lake attained its former pre-1822 elevation.

Figure 7: 1898 USGS Map of Syracuse showing the Oswego Canal on the east side of the lake (United States Geological Survey, Syracuse, NY 7.5 Minute Quadrangle, 1898).

In 1837, the state of NY took over the abandoned Salina side-cut, and in 1842 the Onondaga outlet was excavated to depth of 5 feet (1.5m); the lake level dropped to that of the Seneca River once again. This work was repeated in 1856 and the Salina side-cut was extended.[73] To access Onondaga Lake from the Oswego Canal vessels had to travel through Lock #15, or Mud Lock, originally built in 1828 and made of wood, to the Seneca River, and then into the lake via the northern outlet. Due to the unstable soils of the area, Mud Lock had to be completely rebuilt in 1836 of stone. It was then enlarged in 1862 and 1887, allowing even larger boats on the Oswego Canal, and in effect into the lake.

The significant amount of traffic on the Erie Canal resulted in proposed enlargements and improvements. In 1835, work began on expanding the entire canal route, both locks and prisms, and improving its navigability. It took until 1862 to complete this work, in addition to deepening the Oswego, Seneca and Cayuga, and Champlain Canals. The Erie Canal was straightened and increased in size to 7 by 70 feet (2.1 to 21m) and the locks enlarged to 18 by 110 feet (5.5 to 33.5m).

By the 1860s the railroad had become a major competitor for moving both people and goods west. To keep up with the competition, construction began on the second enlargement of the canal system. In 1903, survey work began for a new 1000 ton barge canal. The NY State Barge Canal opened in 1918 and made use of bodies of water like Onondaga Lake and Oneida Lake; the use of steam powered tugboats and steel canal boats lessened the concern for protected water travel and the need for towpaths.[74] The old Oswego and Erie canal systems adjacent to Onondaga Lake were then abandoned. The new Oswego Canal connects with the Erie Barge Canal north of Onondaga Lake at Three Rivers. The Erie Barge Canal system passes through Onondaga Lake as a route to Syracuse, where a southern harbor was constructed past the southern lake outlet (Figure 8, Figure 9 and Figure 10).

Figure 8: 1926 navigational chart showing the northern entrance to Onondaga Lake via the Onondaga Outlet. Barge Canal vessels could access the lake via the Seneca River, part of the Barge Canal, and through the Outlet (U.S. Lake Survey Office, *NY State Canals, Erie Canal, Brewerton to Cross Lake and Syracuse and Oswego Canal, Three River Point to Oswego*, 1926).

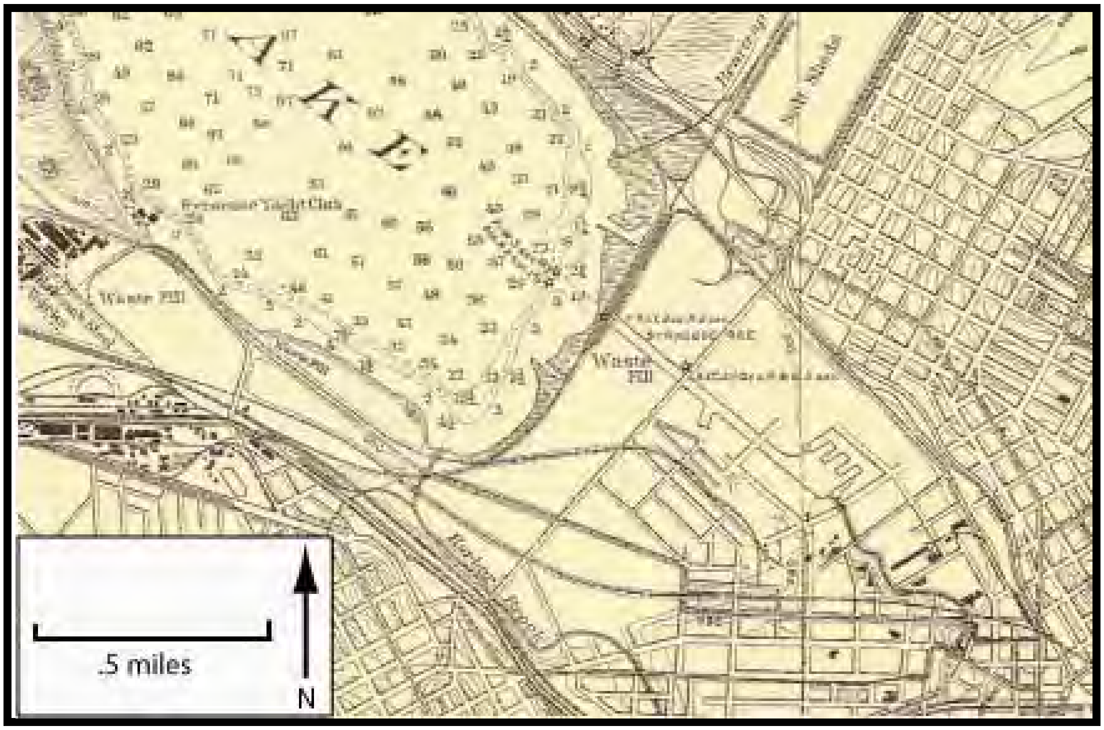

Figure 9: 1926 navigational chart of the southern part of Onondaga Lake, showing access to the harbor at Syracuse (U.S. Lake Survey Office, *NY State Canals, Erie Canal, Brewerton to Cross Lake and Syracuse and Oswego Canal, Three River Point to Oswego*, 1926).

Figure 10: Steel Barge at the southern terminal at Onondaga Lake (courtesy Onondaga Historical Association).

Industries and Pollution

The opening of the Erie Canal brought many immigrants west, and established a workforce in the region of Syracuse for agriculture and manufacturing. By 1784, James Geddes had founded a salt manufactory at the southern part of the lake. The state, however, had retained ownership of the salt springs on the southeastern part of the lake to prevent a monopoly on the salt industry. Instead, it levied taxes on each barrel of salt to pay for the construction of the canals.[75] An 1833 account of Syracuse describes it as a "thriving village [that] owes its importance principally to the immense quantity of salt produced in its neighborhood, the whole adjacent country being impregnated with it, and springs from which immense quantities are manufactured rising in various directions."[76] Syracuse became a city in 1848, and was coined "Salt City."

In 1833, there were about 100 salt factories at Salina, 30 at Syracuse, 26 at Liverpool and about 30 at Geddes.[77] The salt was manufactured through a process called solar evaporation, which made use of the sun by laying the salt out in large vats, as well as boiling it (Figure 11). The boiling process burned large amounts of timber which was transported from the Seneca River and Onondaga Lake to the manufactories, first via the Lake and the connecting side-cuts, and then through the Oswego Canal in 1826. The state-owned salt spring in Salina was thought to have "the strongest saline water yet discovered in the world, 40 gallons yielding about a bushel of pure salt."[78] The salt was shipped in barrels on the Oswego and Erie canals and about 1,600,000 bushels were produced in 1833.[79]

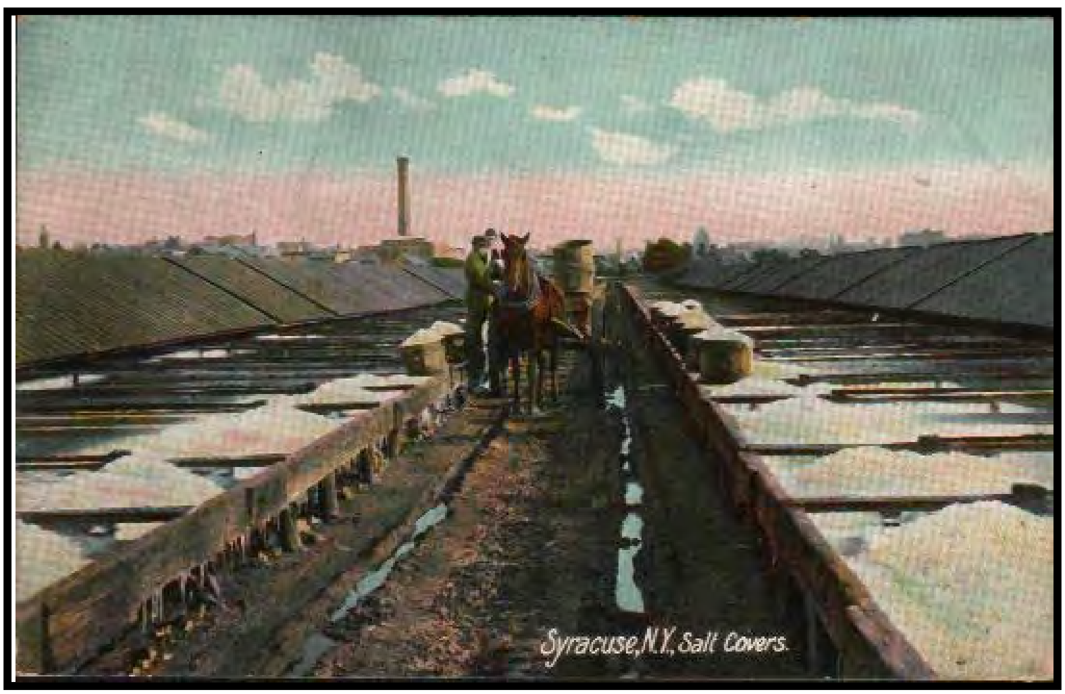

Figure 11: Postcard showing the solar evaporation method in the salt sheds near Syracuse (from www.vintageviews.org, n.d.).

Salt production remained the primary industry in the area, reaching peak production of over nine million bushels in 1862. The arrival of the railroad to the area provided a boost to the economy. Beer brewing began to replace salt as main industry around Syracuse as German immigrants arrived in the 1870s.

In 1884, the Solvay Process Company (SPC) came to Onondaga Lake to manufacture soda ash, a product with numerous applications, including the manufacture of glass and detergents (Figure 12). The area provided the ideal environment and resources needed for the Solvay process of creating soda ash: there was salt water from the nearby springs; calcium carbonate from the surrounding limestone bedrock; and easy disposal of waste product into and around Onondaga Lake. Millions of pounds of chloride, sodium, and calcium, were discharged into Onondaga Lake.[80]

SPC added a new plant in 1918 to produce chlorine and a variety of organic chemicals resulting in hundreds of thousands of pounds of mercury, among other various chemicals, being released into the lake. Between 1900 and 1940, a number of other industries were established in the region, including steel, pottery, pharmaceutical, air conditioning, appliance, and electrical manufacturing facilities, many of which contributed other solvents and organic chemicals such as benzene and polychlorinated biphenyls (PCBs). Allied-Signal (a successor to SPC) closed the soda ash production facility in 1986, and the company now operates under Honeywell International.

Figure 12: Postcard of the Solvay Process Works (from www.vintageviews.org, n.d.).

As the industrial revolution took hold and the population around the lake grew, the disposal of domestic and municipal waste into those waters became common. During the turn of the twentieth century, sewage waste was discharged directly into Onondaga Lake, as well as into Onondaga Creek and Harbor Brook.[81] This issue escalated in the 1920s when the city installed a 1700 foot (518m) long outfall sewer in to the lake. The excessive raw sewage in the lake led to increased nitrate and phosphorous concentrations in the water, which in turn led to algae blooms and fish die-offs.[82]

The environmental impact of the pollution was detrimental to other smaller commercial enterprises. In the 1800s, a viable commercial cold-water fishery was sustained by the various fish from the lake; whitefish, Atlantic salmon and sturgeon were particularly popular. However, by 1890 the fishery had closed and by 1898 the whitefish population in the lake had disappeared. Ice-harvesting, another profitable business, was banned in 1901 due to impurities in the water; swimming was banned in 1940, and fishing (due to mercury contamination) in 1970.[83]

Recreation on the Lake

Onondaga Lake became a recreational hub beginning in the 1870s, competing with such places as Saratoga, Lake George and the Thousand Islands. As described by one local writer in the *Syracuse Daily Journal* on July 31, 1871, it was "the most beautiful lake in the State … to indulge in the luxury of bathing, rowing, fishing, picnics, and chowders." Resorts and amusement parks sprung up all over the western and southern shores, offering entertainment, dining, swimming, boating, fishing and carnival like attractions (See Figure 7). The larger of these resorts included: Iron Pier (1890); White City (1906); Lake View Point (1872); Pleasant Beach Resort (1874); Rockaway Beach (1892); Maple Bay (1889); Long Branch Resort (1882); and Manhattan Beach (1880s). Visitors could access the resorts via the Erie Canal, either by taking a packet along the five mile route of the Oswego Canal on the west side of the lake to Mud Lock and then into the lake. Or, piers were constructed at the southern part of the lake (Salina Pier, Geddes Pier, Iron Pier) where steamers and naphtha launches frequently picked up passengers from the canal and the train and took them to the various resorts (Figure 13, Figure 14, and Figure 15) Each resort constructed a landing dock to accommodate the steamers. In 1887, a passenger steamer trip across the lake cost a visitor only 25 cents.[84] A published profile featuring the popular steamer *Milton S. Price* noted that one of the more popular excursions were leisurely weekend picnic cruises, which at the time were organized by local groups, including churches, in addition to those hosted by the transportation companies, clubs and resorts.[85]

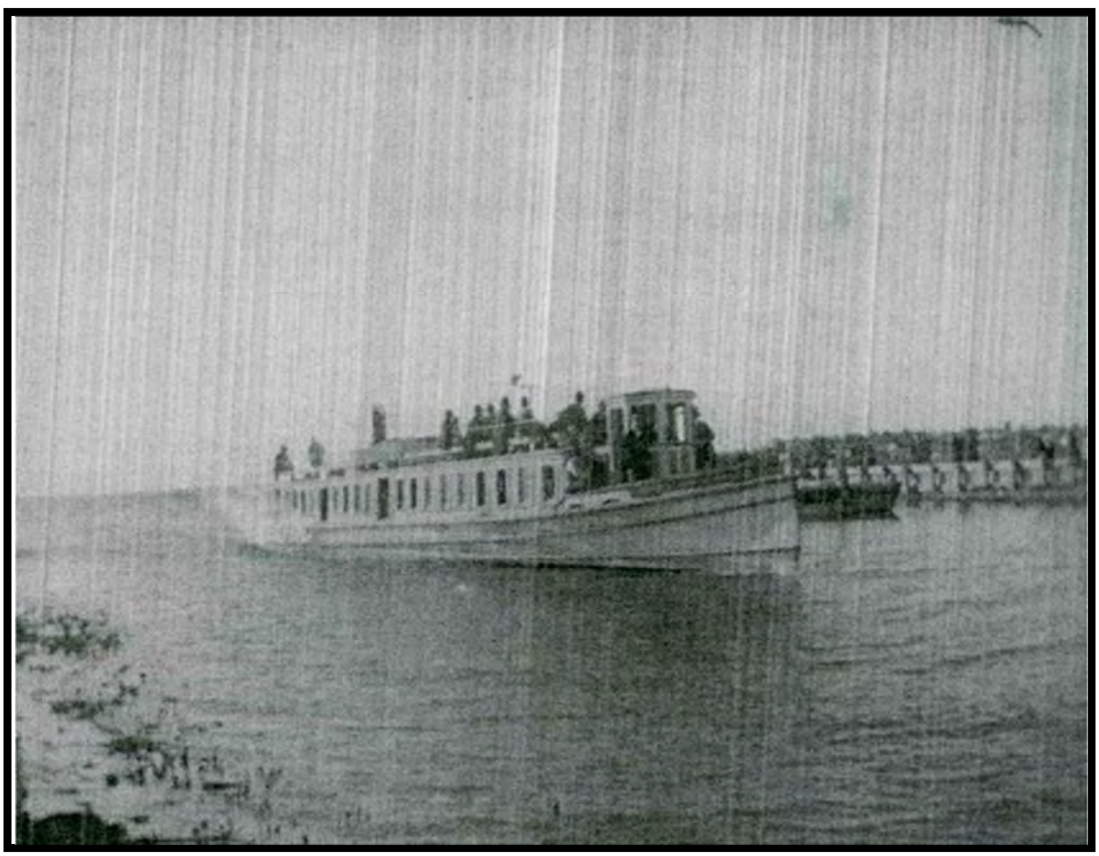

Figure 13: Steamer *Milton S. Price* entering the Iron Pier (courtesy Onondaga Historical Association).

Multiple access routes and methods of transport to the resorts were available by the 1890s, limiting the importance of the steamboats. The first lakeshore boulevard was constructed in 1894, but was abandoned by 1902 because it was built on unstable ground and flooded annually.[86] A trolley line was built along the western shores of Onondaga Lake in 1899, shuttling visitors from Syracuse to the resorts in a matter of minutes, and making canal passenger travel to the resorts less popular.

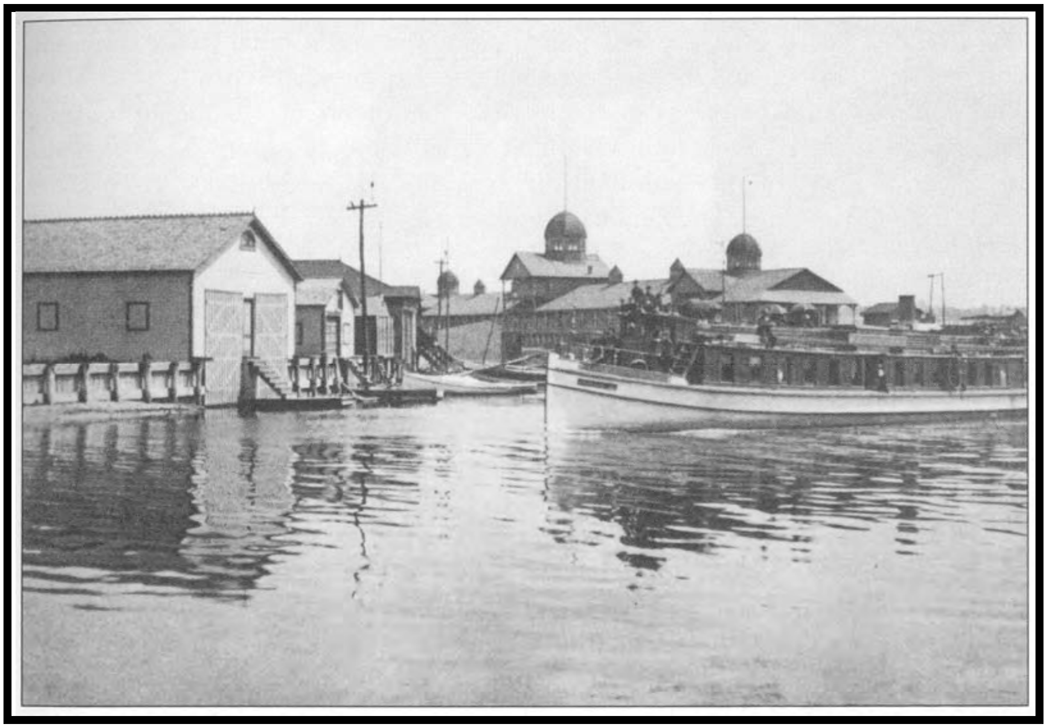

Figure 14: A steamboat loaded with guests approaches Iron Pier (1899, Onondaga Historical Association Collection).

The resorts era, however, was relatively short lived. Annual spring flooding frequently damaged these lakeshore properties, and many buildings had to be rebuilt on stilts. Other resorts closed due to growing competition as newer resorts opened. After closing, the Salina Pier was sold to the Syracuse Rapid Transit Company (SRTC), who attempted to use the grounds to lure the local baseball team away from their field at the Iron Pier resort.[87] The effects of pollution on the lake also contributed to the decline of Onondaga's vacation status, as swimming and fishing were ultimately outlawed. The lake level was raised 3 feet (.91m) in 1915 to accommodate the new Barge Canal, and this put many resorts underwater. Later in 1953, the construction of Route 690 along the western shore destroyed the last remaining resort, Pleasant Beach.[88]

Onondaga Lake was also a focal point for civic and community celebrations. In September 1877, a mock naval engagement was held to commemorate the victory by Oliver Perry during the Battle of Lake Erie. Steamers including *Milton S. Price* ferried passengers to a closer view of the action, while boats launched hourly from the Salina Pier and other locations to transport visitors amongst the festivities.[89] The featured events of the day were a pair of staged explosions, which sank two former canal boats.[90]

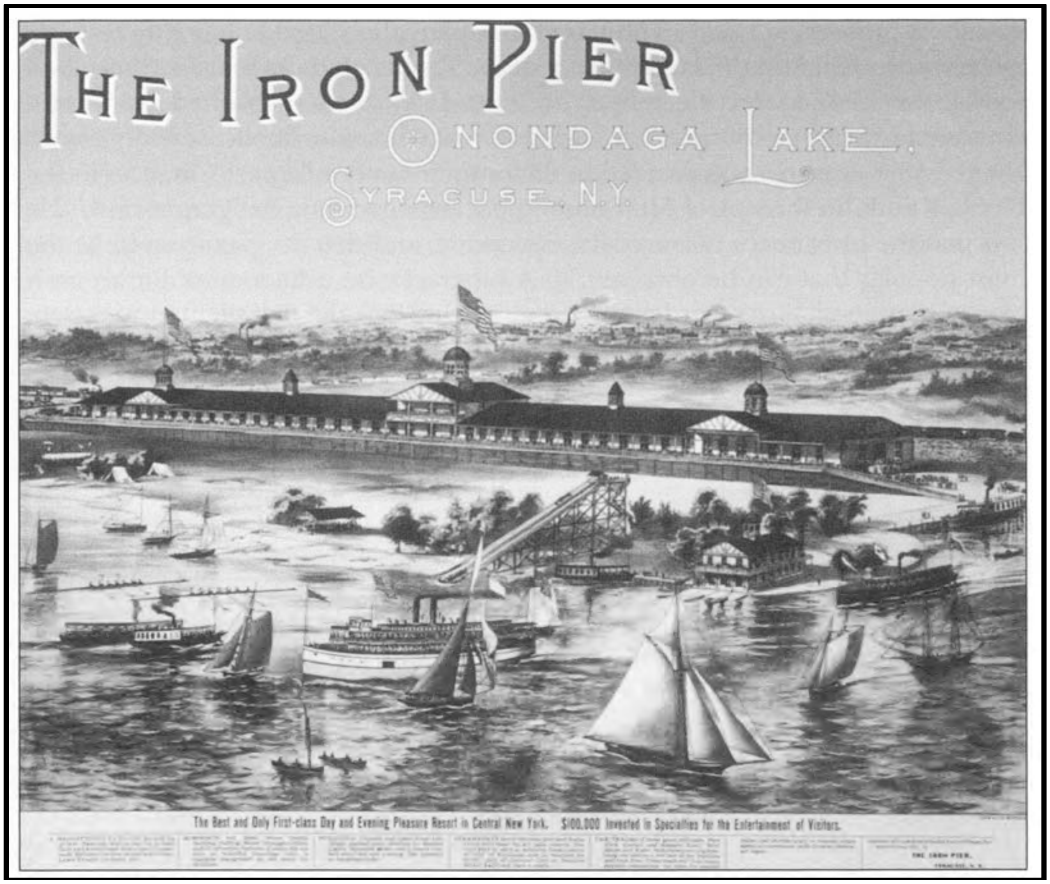

Figure 15: Advertisement for Iron Pier, 1890 (Lithograph by Gies and Co., Buffalo; Original image property of Helen Heid Platner).

Yacht Clubs on Onondaga Lake

The Onondaga Yacht Club, located on the eastern shore of the lake, was founded in 1883, celebrating shortly thereafter with an Opening Regatta in 1887. The main buildings were constructed in 1938, and additions were completed in the 1950s. This yacht club has remained in service ever since, hosting annual regattas, and occasional speed boat races.[91]

Figure 16: Postcard of the Boulevard with the Syracuse Yacht Club on the right and a trolley on the left (from vintageviews.org, n.d.).

The Syracuse Yacht Club was built in 1898, just south of Lake View Point. This massive three-story building rested on piers out over the lake and included boathouses on its northern side (Figure 17). It quickly became one of the more popular clubs, with over 2,000 members and more than 150 launches and sailboats using its facilities on a given day. It featured a fleet of twelve steam-powered yachts when it first opened.[92] The Syracuse Yacht Club's clubhouse burned down on May 10, 1917, and was never rebuilt.

Figure 17: Postcard showing the Syracuse Yacht Club (from vintageviews.org, n.d.).

Ice Boating

Rockaway Beach became the headquarters of the Onondaga Ice Yacht Club in 1901. Though iceboating began on the lake in the 1890s with roughly 13 iceboats on the lake, by 1901 the number had nearly doubled to 25 vessels.[93] The sport remained popular until the 1920s. Each iceboat was unique: canvas sails varied from 20 to 30 feet (6 to 9m) long, vessel length ranged from 16 to over 35 feet (4 to 11m) (Figure 18). They were constructed of redwood, ash, walnut and various other wood types. The boats traveled at incredibly fast speeds, and spectators loved to come and watch the races on Sundays at Rockaway Beach. While accidents did happen, only one fatal iceboat crash on Onondaga Lake made significant headlines. On Christmas Day 1904, two iceboats, *Blitz* and *Warner*, collided on the lake. The accident claimed two lives, and *Blitz* was left to sink to the bottom when the lake thawed the following April.[94]

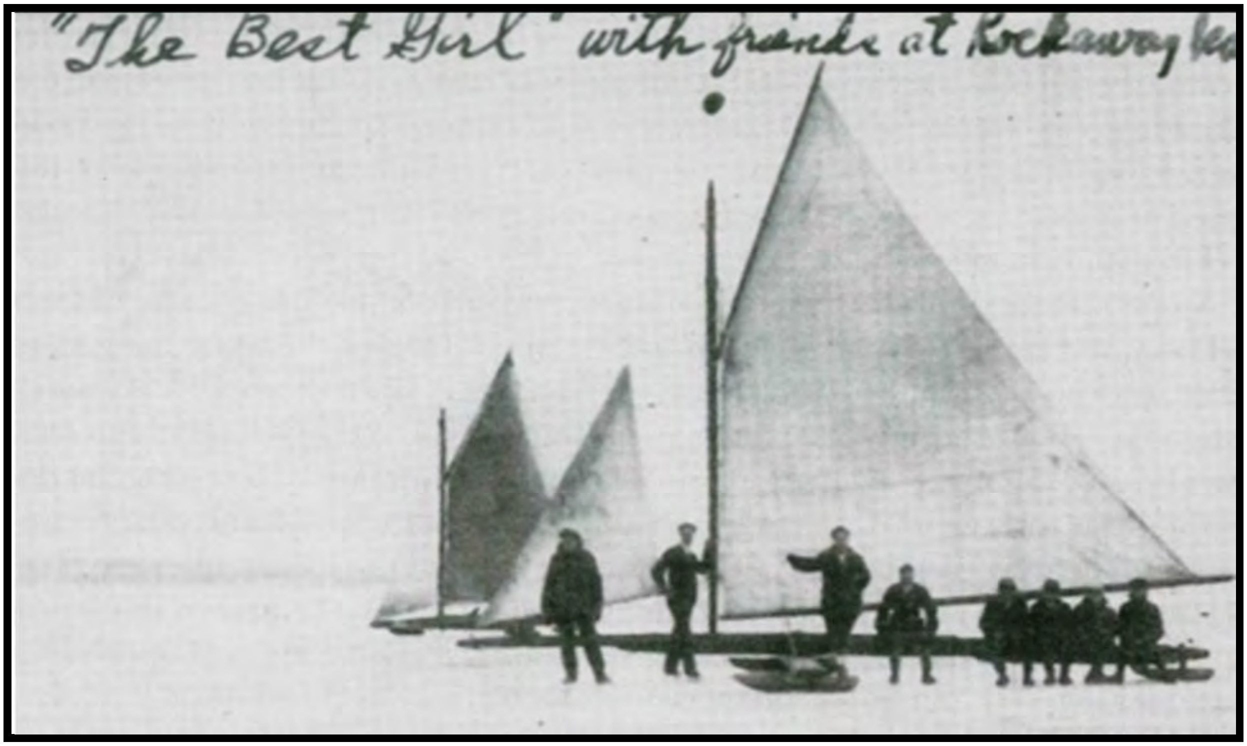

Figure 18: Ice boat *Best Girl* at Rockaway Beach circa 1900 (from Thompson, 2002).

1930s East Shore Revival

After the Great Depression, work relief programs were instituted that developed the east shore of the lake for tourism and recreation. Between 1931 and 1933, over one thousand men worked to create Onondaga County Park, which included the restoration of Mud Lock, the filling in of the abandoned Oswego Canal, the building of the Salt Museum and the Ste Marie Jesuit Mission, as well as the establishment of Danforth Salt Lake where the old salt springs had once been.[95] The Onondaga Lake Marina was constructed at Liverpool in 1940, providing slips for pleasure boats traveling the canals and local residents.

Contemporary Use

In 1941, the Onondaga County parks commission repurposed an abandoned barge canal boat, QB-13, for use by local groups of Sea Scouts for training and social events. The vessel, originally 80 feet (24.4m) long and modified to 125 feet (38.1) long, was mounted on cement trolley poles, and painted and furnished with tin can candle holders by the Scouts.[96] Today, Onondaga Lake is once again a popular recreation area. Catch and release fishing is making a comeback and recreation paths lining the lake are very popular with pedestrians and bicycles. While swimming is still not recommended, boaters frequent Onondaga Lake, and lakeside residents enjoy the view from the shoreline.

VESSELS LOST IN ONONDAGA LAKE

Onondaga Lake has claimed numerous watercraft over the last 150 years. A number of those vessels that were abandoned or lost remained a part of the working maritime landscape into the 1880s. Some were transformed into crude fishing platforms, or sunk to serve as foundations. One became a working boat shop, while others were simply left to float and rot.[97] The following is a list of the boats known to have been lost in the lake:[98]

- Iceboat *Blitz* 1904 to 1905: This vessel sank in April of 1905. On Christmas Day 1904, *Blitz* crashed into the iceboat *Warner. Blitz* was not recovered and sank when the ice melted the following spring.
- Tug *Stillwater:* Built in 1915, the tugboat *Stillwater* was scuttled in Onondaga Lake in February 1940.
- Unknown Vessel Type: sunk 1857
- Sailboat: sunk 1857
- Unknown Vessel Type: sunk 1858
- Two Canal Boats: A September 1877 *NY Tribune* article notes that "two large canal boats are to be blown up by torpedoes on Onondaga Lake next Monday on the anniversary of Perry's [1813] naval victory."
- Sailboat and/or Yacht: An August 1879 *Watertown Re-Union* article reports that "Dug Remington, book keeper for Warne & Cook, was drowned in Onondaga Lake to-day by the capsizing of a sailing yacht. His companion, Clarence Baumgras, was rescued shortly afterward. John Harwood and a party of three were also sailing in his yacht, and when near the middle of the lake the boat upset and sunk. All were rescued after being in the water an hour."[99]
- Steamboat *Lyttle*: burned 1892 according to a number of newspapers. The *NY Times* writes "The Lake steamer Lyttle was burned to the water's edge on Onondaga Lake Wednesday night. The craft had just been tied up to her dock at the iron pier after discharging a load of excursionists. The boat was worth $3,000."[100]
- Derelict vessels *Maud*, *Silver Cloud*, *Venus*, *Florence* and *Razzle Dazzle,* c. 1889: abandoned in the "graveyard on Bear Creek" which is now known as Ley Creek. The Syracuse Standard writes "The wreck of the Razzle Dazzle early in the season was deplored by all. Her crew shivered her timbers in trying to move Salina pier by running her head on while running before a gale. She has been taken to the grave yard on Bear creek where she lies with the Maud, Silver Cloud, Venus, Florence and a little cutter.[101]
- Steamboat *John Greenway*: Boiler exploded on Onondaga Lake in 1885 (but likely did not sink). The following is an account of the accident:

> Syracuse, May 24. -- The excursion steamer JOHN GREENWAY, which runs on Onondaga Lake and the canal, started yesterday afternoon from its landing in Geddes for a trip across the lake. The steamer had in tow the barge JUDGE RIEGEL, on board of which was about 20 residents of Geddes, who had been invited to take a ride. The steamer was commanded by CHARLES KINNE, the Captain and owner, who has run the boat on the lake for the past 12 years. The boat was to begin its Summer excursion trips today, and the Captain started out yesterday on a preliminary trip to test the machinery. A few minutes before 5 o'clock, when the steamer had reached a point about a mile east of the outlet, two sharp reports were heard, and the steamer was instantly enveloped in clouds of steam. The passengers on the barge heard a shout, and saw a form fling itself out of the cloud into the water. WILLIAM GRAUGH, a deckhand, seized the rope connecting the two boats and pulled them together. Capt. KINNE was found writhing in pain and struggling to get out of the suffocating steam. He was carried into the barge's cabin. ANTONIO KINNE, the engineer, who was picked up from the water into which he had thrown himself, was also taken to the barge. JACOB GRASSMAN, who had been sitting by the railing of the upper deck, had been burned on the hands and arms. Capt. KINNE was scalded from head to foot. In places the skin rolled itself up, and the

> man looked as if he had been flayed alive. DR. J. R. YOUNG, of Liverpool, and DR. J. W. KNAPP, of Geddes, were called as soon as possible. The helpless steamer and barge had drifted a quarter of a mile down the lake, toward the southern shore. A few rowboats put out from Liverpool and Salina and took away the passengers. Capt. KINNE lingered in great agony until 5 o'clock this morning, when he died. ANTONIO, the engineer, is badly burned, and it is thought fatally. The flue plates of the boiler and the steam chimney were blown out. The boiler had been declared to be unsafe a year ago, and was known by competent engineers to be in a bad condition. The Captain had been repeatedly warned that he was risking his own life and those of his passengers in running the boat, but he insisted that she was safe. The boat was run by an utterly incompetent engineer and a stubborn Captain. She had carried thousands of passengers every Summer, and experienced engineers express wonder that her boiler had not exploded long ago.[102]

- Two cabin cruisers: sunk 1971
- Fiberglass Boat: sunk 1985
- Air National Guard Plane: 1955

VESSEL TYPOLOGY

This vessel typology was created to provide a list of boat types that potentially traveled Onondaga Lake during the historic period (1700 to present day). This typology was compiled from two primary sources, unless otherwise noted.[103] A description of Native American watercraft can be found in the section on Native American watercraft.

Batteaux (1600s to 1820s)

These vessels were small, flat bottomed, and pointed at both ends, with a shallow draught. Typically about 30 to 40 feet (9.1 to 12.2m) long, they were rowed, poled or sailed by a crew of 2 to 4 boatmen. Batteaux were typically built without plans. They were able to haul cargo of 1½ to 2 tons (1,361 to 1,814kg).

Durham Boats (1790s to 1850s)

Durham boats were developed at the same time the canal systems were conceptualized around 1790. They had a shallow draft of 2 feet (.61m) but could carry seven times as much cargo as bateaux (Figure 19). They were the “tractor-trailers” of the era. In shallow water they were propelled using long poles with heavy iron tips pushed against the bottom. In deeper water like Onondaga Lake, they were rowed or sailed. Durham boats became the first type of boat used on the Erie Canal when it opened in 1825.[104] They could be as long as 60 feet (18.23m) and as wide as 8 feet (2.44m).

Mohawk River Boats (1700s to 1850s)

These are similar to Durham boats, but were developed on the Mohawk River. They were flat-bottomed with sharp bows, and measured 50 feet (15.2m) or longer, with a breadth of about 8 feet (2.4m). With decks at the bow and stern, they also had walkways along each side so they could be poled by a crew of five to seven boatmen. The boats were fitted with a single mast stepped in a tabernacle for ease of lowering.

Rafts (1700 to 1880s)

Rafts were used in the nineteenth century for timber transport. Crews lived on board in tents or crude cabins. They controlled the rafts with very long sweeps (oars) which also provided some propulsion. The railroad replaced timber rafts in the 1880s.

Canal Boats

Erie Canal boats were built by multiple small operations along the canal, each with its own unique style of vessel. Boatyards would produce just a few boats a year, initially putting a lot of detail into each boat. However, they evolved into "nothing more than floating boxes with square ends to minimize labor and maximize cargo capacity."[105] As the canal and its locks were enlarged, the sizes of canal boat grew to adapt to these changes (Figure 19 and Table 2). Prior to 1860, most canal boats were built plank-on-frame; however, the use of larger, cheaper wood led to the construction of slab sided (edge-fastened) vessels.

Table 2: Vessel dimensions as the canal size changed.

Year	Length (feet)	Width	Draft
Durham boat	50 to 60	10 to 8	2
1817 to 1862	78	14.5	3.5
1862 to 1915	97	17.5	6.5
1915	150	25	10

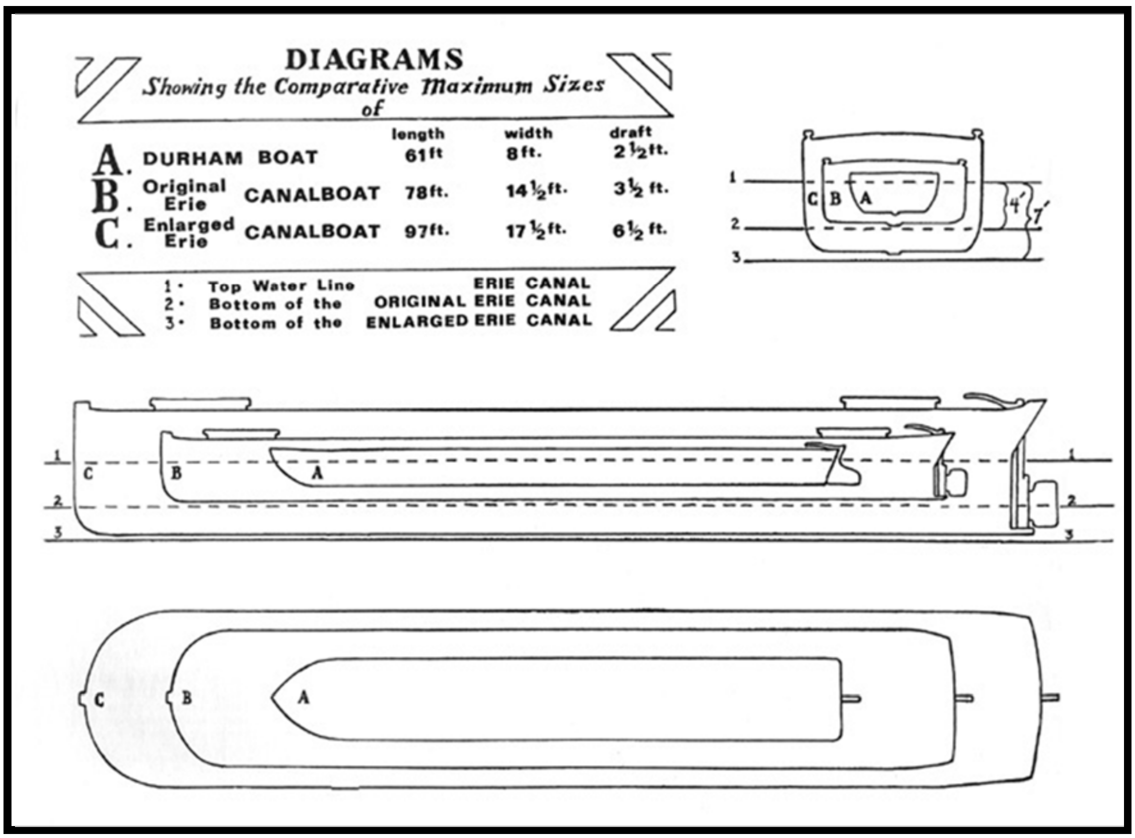

Figure 19: Diagrams showing the comparative maximum sizes of Durham boat [pre-Erie Canal], an original Erie canal boat and an enlarged Erie canal boat (from www.eriecanal.org).

After the completion of the canal expansion in 1862, state law mandated that all canal boats be built with rounded bows to minimize the impacts of accidents on the canal. Prior to this, canal boats were quickly constructed with squared bows and sterns which lead to damage to the canal prism as sharp cornered boats gouged into the canal embankment. Also, the corners were easily sheered-off allowing cargo to be dumped into the canal. In the 1860s quality lumber became scarce along the canal due to nearly 50 years of canal construction and local development. This resulted in many smaller shipyards abandoning boat building and instead focusing on canal boat repairs and maintenance. Places on the western end of the canal, such as Buffalo, Rochester, Tonawanda and Lockport, became major boatbuilding hubs, since western lumber was more easily shipped to these ports. Along the Oswego Canal communities such as Phoenix, Fulton and Syracuse remained viable canal boat building centers with lumber shipped in from Canada. Additionally, yards in Ithaca survived along Cayuga Lake.

The various types of Erie Canalboats reflected the primary cargo or purpose each would serve. Some carried goods; others carried passengers. Most Erie Canal boats contained crew/family quarters, a kitchen, a hold and a stable for horses or mules, and were steered by a large barn door rudder. They were pulled along the canals by teams of two horses or mules, typically housed in the bow (Figure 20). Each team would work six-hour shifts and the "Hoggee" or driver would sleep with his team. At the end of a wooden canal boat's life, it was common to abandon the vessel in a stream or feeder off the main canal.

Figure 20: Horse being taken out of its stable (courtesy Albert R. Stone Negative Collection, Rochester Museum & Science Center).

In the last decade or so of the 1800s, self-propelled canalboats, and tugs towing or pushing barges became more common on the canal. Construction of the NY State Barge Canal was completed in 1918 and steel barges and tugs replaced all older forms of canal boats.

Canal Packets (1819 to 1860)

Packets were boats that traveled the canal and carried passengers and their luggage. They had sharper lines than cargo boats. Average dimension for early packets were 71.9 feet (22m) in length, 12.7 feet (3.9m) in breadth, and a depth of hold of 7.2 feet (2.2m). The passenger berth cabin took up most of the boat. They were replaced by the railroad in the 1850s.

Canal Line Boats (1819 to 1860)

Operated by freight lines, these vessels transported both passengers and freight. In 1833, more than half of the boats on the canal were of this type. These boats had deck houses running their entire length. They were primarily used for carrying general freight, and possibly a few passengers. They had fewer windows than packets and had one or more wide sliding doors on each side of the house for loading and unloading goods.

Lake Boats or Lakers (1820 to 1915)

These vessels had hatches running the entire length of the deck. They were the strongest built so they were sturdy enough to be towed across the lakes in the canal system. They had rounded bows, watertight decks and hatches, and when used on the lakes would be towed in a raft with other boats behind a steamer.

Bullhead Canal Boats (1819 to 1915)

One of the most expensive boats to build, the bullhead canal boat was used for cargoes of flour, grain, and other products requiring an absolutely dry cargo hold. Similar to packet and line boats, these also had full length deckhouses, though even fewer windows. The cargo was loaded through wide doors in the side of the house (as in a line boat). Bullhead boats were strongly built because of their heavy cargos and had holds well lined to prevent damage to the cargo from moisture.

Canal Scows (1819 to 1862)

Scows were primarily used to carry non-perishable cargoes on short trips within the canal system. They were also used as maintenance vessels, carrying building materials or dredge spoil. The scows had less freeboard than canal boats, and had ends with steeply raked or curved athwartship planking. Maintenance scows had cabins at each end that were only sunk 2 or 3 feet (.61 to .9m) into the main deck.

Canal Deck Scows (1819 to 1862)

These square-ended boats had a sloped bow and stern and were the prototype for the State repair scows. They were useful for hauling bulk cargo with minimum protection. They were more strongly built than the open scow and retained their flat square appearance. These vessels drifted out of existence when the state mandated rounded bows in 1862, although state repair deck scows were exempt.[106]

Canal Open Scows (1819 to 1915)

The hull shape was the same as the deck or repair scow, but these were the cheapest vessels to construct. They hauled heavy bulk cargos such as sand, gravel, construction stone, and coal. They were edge fastened with dimensions in 1880 of 98 feet (29.9m) long 17 2/3 feet (5.4m) wide and 9 to 10 feet (2.7 to 3m) depth of hold. The weight varied from 40 to 45 tons (36,287 to 40,823kg). They were originally small and flat but evolved with the enlargements to a more rounded and heavier size.[107]

NY State Repair Scows (1819 to 1918)

The state repair scows remained the same throughout the entire period of the Old Erie Canal; they were constructed under contract with state specifications. They were primarily deck scows, and maintained square bows despite the 1862 ban on this design. Their length remained 70 feet (21.3m) despite enlargements of the canal and in 1875 they were 14½ feet (4.42m) wide. These boats were designed to be fast, with a shallow draft and were always pulled by horses.

Steel Canal Barges (1918 to 1990)

Upon the 1918 enlargement of the Erie Canal, the advent of modern welding techniques prompted new canal boat construction techniques. A new line of 1,000 ton (907,184kg) steel barges and tugs were designed to make use of the enlarged canal. Some of these steel barges were self propelled; others were towed by steel tugs (Figure 21).

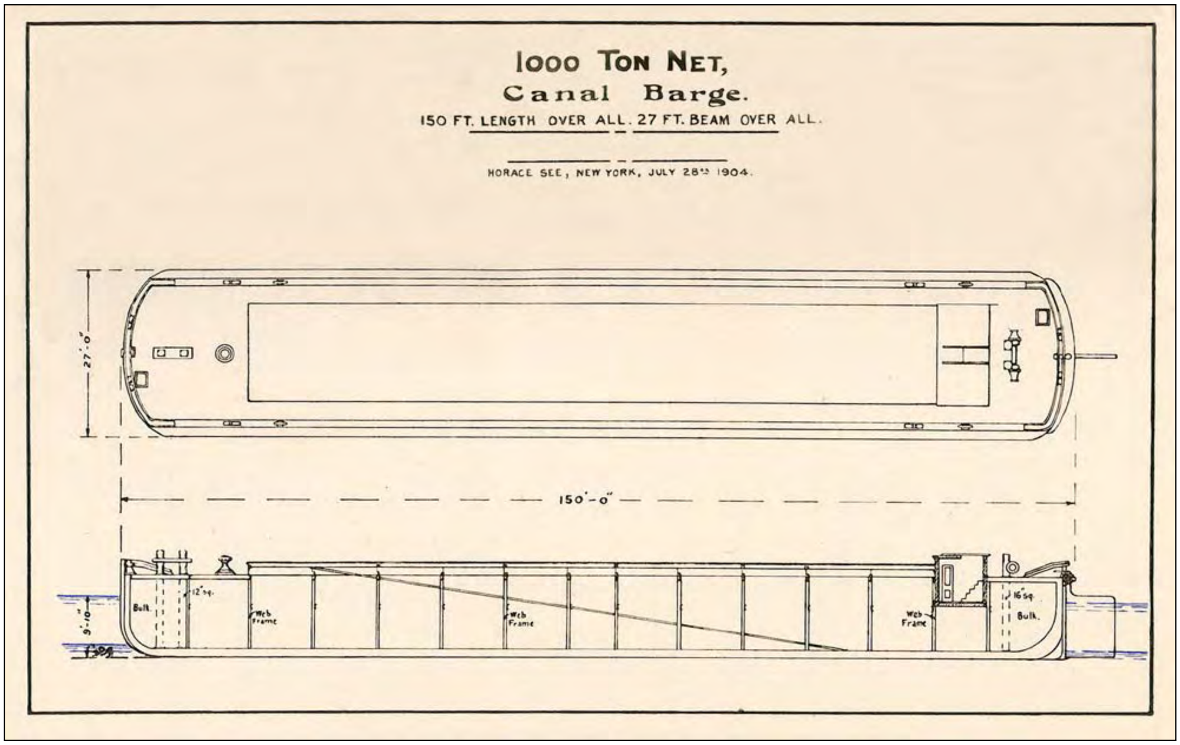

Figure 21: Diagram of a steel canal boat (from *Annual Report of the State Engineer and Surveyor of the State of NY, for the fiscal year ending September 30, 1904*, 1905).

Barges (1820 to present)

Barges, as a general vessel type, had rectangular shaped hulls, and were typically not self-propelled. This class of vessel was used throughout the nineteenth and twentieth centuries in North America for a wide variety of tasks. The number of barge varieties extant during this period was limited only by the different types of cargoes and tasks for which they were required. Currently there is no comprehensive typology for late nineteenth/early twentieth century barges, making their classification difficult. In a 1985 study, Norman Brouwer placed barges into three broad categories: hold barges, deck scows, and covered barges. Hold barges had hatches on the main deck to facilitate the storage of cargo in the hold. The hatches normally had covers so that perishable cargo could be protected from the elements. Deck scows did not have large hatches on the main deck; all of their cargo was stowed on the main deck. Canvas tarps, if necessary, were employed to protect the cargo. Covered barges also stowed their cargo on the main deck, but were fitted with a permanent deck house to shelter the cargo.[108] Within these broad categories there exist numerous subdivisions.[109] The barge categories below are the most common types, however, this list is by no means comprehensive. Other types not described here include, but are not limited to: excursion barges, ice barges, refrigerated and heated barges, concrete barges, floating grain elevators, car floats, livestock barges, piledrivers, and steam winch scows.

Deck Scows (1820 to present)

Open deck scows, also known as flat scows, had an unenclosed deck used to transport non-perishable goods that did not require protection from the weather, such as brick, stone, iron ore or coal. Most of the deck was open for cargo, although a small cabin was often located near the stern.[110] Open deck scows were also used as working platforms. The term scow is frequently used interchangeably with the term barge, but this is not technically correct. "Scow" denotes the shape of a vessel's hull, while "barge" implies that a vessel is not self-propelled. Many scows were also barges, but many barges were not scows. The hull shape of a scow was flat-bottomed with vertical sides, and sloping or raked ends. The ends were normally straight, but angled at about 45 degrees. Most scows were decked, with the hold serving as a buoyant pontoon that supported the cargo on the deck.[111] The hold contained a number of fore-and-aft and transverse structures used to support the deck and cargo above.

Rock Scows (1819 to present)
Rock scows, also known as bulkhead scows, were designed to carry large quantities of crushed stone, sand, and other loose materials. The materials were placed on the main deck and held in place by timber bulkheads at the bow and stern. These timber bulkheads were the defining feature of this vessel type, although they also tended to be built stronger than other scow types because of the heavy loads carried on deck.

Dump Scows (1820 to 1950s)
Various styles of dump scows were designed for the purpose of holding and dumping of fill. A basic description is a vessel with an internal flotation and a trap door bottom used in canal construction. Brouwer describes two primary types: the hopper barge and the side dumping scow. The hopper barge has dimensions of 133 feet (40.5m) long, by 35 feet (10.7m) wide, with a 14 feet (4.3m) depth of hold. The barge had curved ends forming one quarter of a circle from keel to deck. There is a hatch that is closed by a pair of timber doors that are held closed by chain bridles. Once the contents of the hopper were dumped, the doors could then be closed. The side dump scow is described as a standard scow hull with a raked bow and stern. It has three longitudinal bulkheads located at one-quarter, one half and three quarter points of the width of the vessel. The deck was sloped 45 degrees on either side, with four bays separated by bulkheads. Dumping would have been done by opening the bays.[112]

Derrick Lighters (1820 to present)
Derrick Lighters were structurally almost identical to open deck scows, but were fitted with hoisting equipment. This equipment was normally in the form of one or two spars. One spar was mounted in the stern just forward of the cabin, while the second was mounted in the bow. The spars were fitted with booms to facilitate the loading and unloading of cargo.[113]

Dredges
The canal system required continual waterway maintenance and deepening, making dredges a common sight on the canals from the 1820s into the mid-twentieth century (Figure 82 and Figure 83). Dredges were typically unpowered vessels with scow-shaped hulls. Many were equipped with spuds, vertical posts which could be raised and lowered to hold a vessel in place. Various dredging mechanisms, typically steam driven, were employed resulting in vessel types such as spoon dredges, wheel dredges, clam shell dredges, bucket dredges, ladder dredges and cutter head dredges.

Steamboats
The first steamboat on the canal was launched in 1823. Most canal boats moved throughout the canal with tow-horses or mules; however, on the open water of lakes and rivers, they needed to be towed by steamers. Most steamboats had a deck house and an engine below decks. They were powered by coal, with either a vertical beam engine or a crosshead engine. In the 1880s, propeller driven steamboats became more common than the sidewheelers, allowing more room on board. Also in the 1880s the United States instated a law that required all vessels with a steam engine to have a licensed steam engineer on board. This made it impractical for smaller entrepreneurs and private owners to operate such vessels. Steamboats varied in size from small steam yachts, to smaller day excursion vessels with two decks, to vessels over 100 feet (30.5m) in length.

Steam Towboats (1820 to 1950)
This vessel had a long, narrow, one-story deckhouse which contained crew spaces at both ends and the upper engine room and upper boiler room amidships. The wheel house was at the forward end, raised a few steps above the deck on smaller boats, or placed on top of the deck house. The decks had a noticeable sheer, rising higher at the bow than the stern. Heavy mouldings were placed around the sides at deck level to withstand buffeting by barges.

Excursion Steamboats (1800s)
This includes a wide variety of vessels types and sizes. Some excursion steamers were as large as 200 feet (61m) long, while smaller day trip boats were closer to 60 to 80 feet (18.3 to 24.3m) with a top deck and canopy. One example of an excursion steamboat was *Colonial* (Figure 22).

Figure 22: Steamer *Colonial* carrying passengers on Onondaga Lake, 1900 [detail] (The Erie Canal Museum, Syracuse, NY, eriecanalmuseum.org).

Steam Canal Boats (1880 to 1950)
Similar in construction and size to other canal boats, these vessels were self propelled with a steam engine below deck.

Steam Line Boats (1850s)
Similar to towed line boats, these vessels were some of the first to utilize steam commercially, with over 100 in use by 1862.

Tugboats

Steam Tugs (1820 to 1915)
Steam dugs were designed to pull multiple canalboats through open waters of lake and/or at times through the canal. Various styles developed.

Canal Tugs (1915-present)
These powerful vessels were designed with a low profile. Many were built with hydraulic systems for raising their pilothouses where heights were not restricted. Canal tugs were built with both wood and steel hulls. Originally steam powered, they eventually became gasoline and diesel powered (Figure 23).

Drill Tugs (1915-present)
These smaller tugs were used to shift barges within a terminal area. They averaged around 75 feet (23m) in length and 250 horsepower.

Pleasure Craft
Various forms of pleasure craft existed on Onondaga Lake over the past two centuries. Sailing vessels of all types, and motor boats made of wood and fiberglass. Row boats, canoes and small kayaks were common. In the mid-1800s steam propelled pleasure yachts were replaced by tube boiler engines and then gasoline engines for speed boats. Ice boats became popular in the late 1880s, as did naphtha launches.

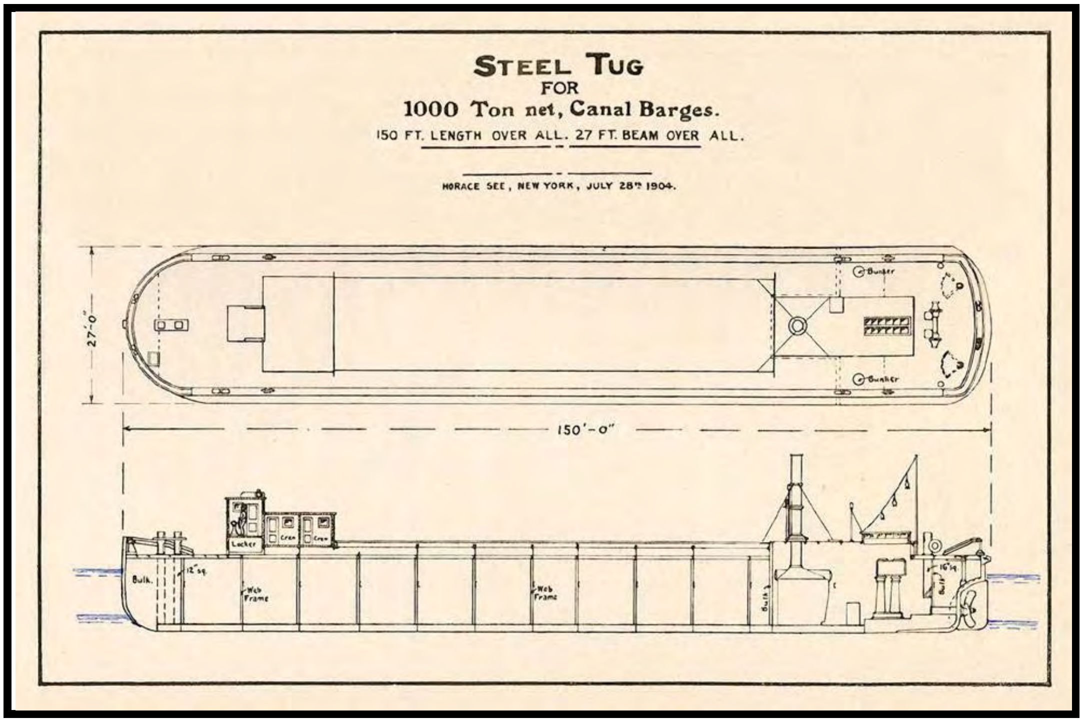

Figure 23. Diagram of a steel tugs (from *Annual Report of the State Engineer and Surveyor of the State of NY, for the fiscal year ending September 30, 1904,* 1905).

SYRACUSE MARITIME HISTORIC DISTRICT

The Syracuse Maritime Historic District is a proposed National Register district comprised of the remains of eleven wooden watercraft, six areas of marine infrastructure, and three rock mounds. The 20 contributing properties are listed in Table 3 below.

Table 3: Contributing Properties to the Syracuse Maritime Historic District

Wooden Watercraft	**Marine Infrastructure**	**Rock Mounds**
A2-1 (Steam Launch/Tug)	A1/A2 (Salina Pier)	A34 (Rock Mound)
A2-2 (Canal Packet)	A7 (Piling Clumps)	A75 (Rock Pile)
A2-3 (Steam Excursion Vessel)	A38 (Iron Pier Marine Infrastructure)	A76 (Rock Pile)
A2-4 (Barge)	A45 (Concrete Breakwater)	
A3 (Barge)	A72 (Pilings)	
A4-1 (Dump Scow)	A73 (Bulkhead)	
A4-2 (Dump Scow)		
A12 (Dredge)		
A35 (Unknown Boat Type)		
A53 (Canal Boat)		
A55 (Canal Scow)		

The District is contained in 58 acres (23.9 hectares) of Onondaga Lake bottom lands. The boundaries are delineated by the lake shoreline to the east and Salina Pier remnants to the north. The southern and western boundaries are lines drawn to encompass the extent of the contributing properties (Figure 24).

The 2010 remote sensing and dive verification efforts in the Syracuse Maritime Historic District located eleven archaeological sites. Upon completion of the 2010 field campaign there was concern that given the density of sites, there was the possibility that additional undiscovered sites could still remain within the District. Therefore, a methodological approach designed specifically for the District, comprising a re-examination and dive verification of magnetic anomalies, and systematic diver survey in waters within 200ft (61m) of the shoreline, was executed in 2011. Twenty two additional magnetic targets were identified from the extant geophysical data. None of these targets was identified as an archaeological site, 13 remain unidentified and nine were determined to be modern debris. The systematic shallow water survey located four previously unknown archaeological sites. During mitigation fieldwork in 2012, four more previously unknown archaeological sites were located near Salina Pier.

The Syracuse Maritime Historic District's development can be tracked on mid-twentieth century navigational charts. Charts from the U.S. Lake Survey Office from 1915, 1926, 1932 and 1937 show no wrecks or derelict vessels in this area.[114] However, the 1942 edition shows derelict vessels in the approximate locations of A3, A12, A4-1 and A4-2, Salina Pier A1/2 and adjacent wrecks A2-1, A2-2, A2-3, and A2-4 (Figure 31).[115]

The formation of the Syracuse Maritime Historic District is linked to the development of the Syracuse Inner Harbor and the NY State Barge Canal system. Prior to the establishment of the Barge Canal, the Oswego Canal paralleled the northeastern lakeshore with access to Onondaga Lake provided from the canal's "Mud Lock" on the Seneca River. From the river, the Onondaga Lake Outlet provided access to the lake. The 1915 barge canal expansion abandoned the canal adjacent to the lake in favor of a navigable channel through Oneida Lake and the Seneca River. With the re-routing, access to Syracuse was provided through the Seneca River into Onondaga Lake. A new inner harbor into Syracuse was constructed with an outlet into the southeastern corner of Onondaga Lake. With increased navigation on Onondaga Lake it became a convenient location to dispose of unwanted vessels. The State's Canal Laws had specific provisions designed to prevent obstructions to navigation in the canal. A person who obstructed canal navigation through any number of actions including "sinking a vessel" was fined a sum of $25 per obstruction, and the boat was subject to seizure and sale by the canal system.[116] However, the disposal of a boat in the open waters of Onondaga Lake yielded no such punitive actions.

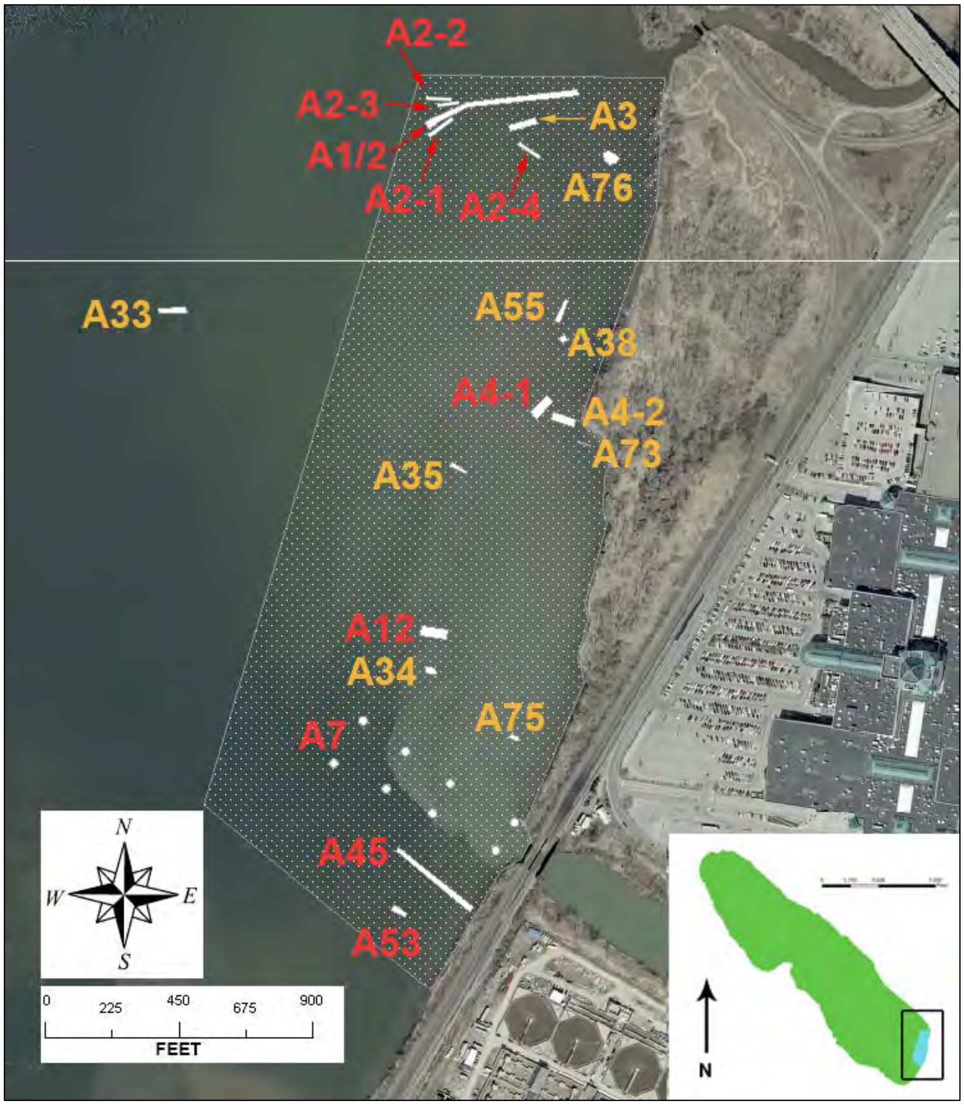

Figure 24: Map of the southeastern portion of Onondaga Lake showing the Syracuse Maritime Historic District. Sites in red were documented in the 2012-2013 field season, the results of which are presented in this report.

The rerouting of the canal and canal laws provided an important foundation for the District's origin, but other economic and cultural factors were also at work. From an economic point of view, the Syracuse Maritime Historic District's formation during and just after the Great Depression is not a coincidence. The 1930s were an era of declining commerce on NY State Barge Canal System. As demand declined, many wooden vessels were abandoned rather than being kept in service. Secondly, the establishment of the Barge Canal and its vastly increased lock size signaled the end of wooden canal boats. With the replacement of wooden boats with steel-hulled vessels, the unwanted watercraft were disposed of in backwater areas all along the canal route.

The final causal factor in the establishment of the Syracuse Maritime Historic District was the decline of Salina Pier and Iron Pier Resorts. Although the active use of the resorts predates the District (Salina Pier, 1870s to 1910s and Iron Pier, 1890 to 1906), their decline and abandonment were an important pre-requisite for the disposal of boats in this part of the lake. The disappearance of these resorts created an area of existing neglected marine infrastructure in a shallow water area abutting vacant lands. The disposal of watercraft in this ignored, swampy area was unlikely to warrant any demands for their removal.

Syracuse Maritime Historic District Significance Evaluation

National Register Evaluation		
Integrity of:	Location	The Syracuse Maritime Historic District remains at its original location, thus LCMM recommends it retains integrity of location.
	Design	The distribution of sites in the District lacks purposeful design. However, the individual contributing properties retain design elements such as spatial organization, technology and materials that are reflective of the builders' original activities. LCMM recommends that the Syracuse Maritime Historic District retains integrity of design.
	Setting	In the 80 years since boat disposal activities began at the site, the surrounding area retains a similar wetland/backwater setting which was one component of its formation. Additionally, the entrance to the adjacent Syracuse Inner Harbor and the Salina Pier and Iron Pier in-water remnants, both of which were causal factors in the district's formation, remain in place. LCMM recommends that the Syracuse Maritime Historic District retains integrity of setting.
	Materials	Significant portions of the sites in the Syracuse Maritime Historic District are buried beneath the lake bed. Although this makes the assessment of the configuration of those materials difficult, if not impossible, it is safe to conclude that those materials remain intact. Moreover, those buried materials will be in a better state of preservation than those exposed above the lakebed. The fabric of the barges can reveal the boatbuilders' construction preferences and (potentially) regional boat building traditions. LCMM recommends that the Syracuse Maritime Historic District retains integrity of materials.
	Workmanship	The sites in the proposed district have significant potential to yield information about the boatbuilders' skill and techniques. LCMM recommends that the Syracuse Maritime Historic District retains integrity of workmanship.
	Feeling	The District's feeling, or combination of its features with its setting, is conveyed by the sites which remain exposed above the lake's surface (A3, A4-1, A7 and A12) and the undeveloped shoreline. The district also has a similar viewshed to that of 50 to 80 years ago. LCMM recommends that the Syracuse Maritime Historic District retains integrity of feeling.
	Association	The contributing properties are sufficiently intact to convey to an observer that this is the area of the lake where boat disposal activities occurred. LCMM recommends that the Syracuse Maritime Historic District retains integrity of association.
Criterion:	A: Event	The Syracuse Maritime Historic District has a clear association with a pattern of events comprising the commercial use of the NY State Barge Canal. Areas of significance include commerce (all), transportation (all),

		engineering (dump scows A4-1 and A4-2), and government (canal scow A55). LCMM recommends that the Syracuse Maritime Historic District is eligible under Criterion A.
	B: Person	No known individually significant persons are associated with the Syracuse Maritime Historic District. LCMM recommends that the Syracuse Maritime Historic District is ineligible under Criterion B.
	C: Design/ Construction	The properties in the Syracuse Maritime Historic District represent a significant and distinguishable entity with features that both lack individual distinction and individually distinctive features. Contributing properties A3, A4-1, A7 and A12 because of their partial exposure serve as focal points for the district. They embody the distinctive characteristics of twentieth century barge construction (which include edge-fastening construction and longitudinal bulkheads); and marine infrastructure. LCMM recommends that the Syracuse Maritime Historic District is eligible under Criterion C.
	D: Information Potential	The sites in the Syracuse Maritime Historic District are likely to yield information about early twentieth century boatbuilding techniques and their operational history. The contributing properties are each likely to answer specific research questions that are not addressed in the archival record. What are the structural and mechanical requirements for wooden dump scows (A4-1 and A4-2)? What are the design and engineering considerations for the construction of dredges (A12)? LCMM recommends that the Syracuse Maritime Historic District is eligible under Criterion D.

LCMM's analysis suggests that the Syracuse Maritime Historic District retains integrity and is eligible for the NRHP under Criteria A, C and D.

METHODOLOGY

RESEARCH DESIGN

The National Park Service has produced numerous bulletins to provide technical information on the survey, evaluation, registration and preservation of cultural properties as it pertains to the NRHP. The bulletins used in the evaluation of Onondaga Lake's submerged cultural properties include: *How to Apply the National Register Criteria for Evaluation*, *Guidelines for Evaluation and Registering Archeological Properties*, *Guidelines for Evaluating and Documenting Historic Aids to Navigation*, *Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places*, and *Guidelines for Evaluating and Registering Historical Archaeological Sites and Districts*. The archaeological study was non-destructive and no artifacts were recovered.

Specific research questions for each site, and the types of archaeological data required to address these questions, were developed and outlined in the *Mitigation Plan for Archaeological Properties in the Onondaga Lake Bottom, Subsite of the Onondaga Lake Superfund Site, Onondaga County, NY*.[117] These research questions are associated with NRHP eligibility criteria defined for each of the sites. They are presented in this report in the section Archaeological Results.

ARCHAEOLOGICAL METHODOLOGY

The investigation of the ten contributing properties on the bottom land of Lake Onondaga were carried out under an archaeological permit granted by the NY State Museum. The methods used in the archaeological examinations are standards in the field, and have been refined by Lake Champlain Maritime Museum (LCMM) staff over the past 25 years. The archaeological study was non-destructive and no artifacts were recovered.

Measured Documentation
The designated sites documented during this project represent historic vessels and marine infrastructure features.

A vessel's hull structure lends itself to use as a reference grid for recording the locations of features. Baselines, consisting of fiberglass reel tapes, were established on the site. Using multiple baselines and off-set measurements, archaeologists recorded where features were located. Small steel rulers were used to map smaller details of the shipwreck. Other recording tools included clipboards with drafting film, staplers, and awls. Recording of curved portions of a structure was aided by the use of a digital goniometer, a digital level set in a 1 foot (30.5 cm) wide waterproof housing. The level allows the curvature of a structural member to be recorded in a series of 1 foot (30.5 cm) increments as the goniometer is "walked" along a baseline. This methodology has been used dozens of times by LCMM archaeologists over the past twenty-five years on Lake Champlain, and has proven effective at accurately capturing the complex curves found in vessel hulls.

The documentation of the non-vessel properties also employed baselines, though these were placed to the side of the site or laid down the centerline of the feature. Off-set measurements were employed to tie in the notable features and delineate the extent of the site, while steel rulers were used for documenting details.

The field techniques implemented by LCMM archaeologists were designed to gather the data necessary to accurately reconstruct the vessel's or feature's structure. Data was gathered in a logical progression from general to detailed. Documentation initially focused on the site's overall construction or arrangement, with later dives devoted to filling in specific construction details. Because this project had the advantage of continuity of crew, individual team members were given large portions of each site to record in detail. All field measurements were recorded in feet and inches, which was the system of measurement by which the vessels and features were originally constructed.

Field notes were initially recorded on drafting film with the site name and number, date, area of investigation, the recorder's name, and the field note number. Immediately after the dive, archaeologists recopied their field notes onto graph paper. These recopied notes were also used to record observations too complex to note while working underwater. Recopied note numbers correspond with original field note numbers, and all were inventoried.

Each archaeologist converted his or her field measurements into scale drawings. Definitions of the different drawing types that were produced are below.

- Plan View: A drawing showing the site as if viewed from above looking straight down.
- Port/Starboard Exterior Elevation: A drawing showing the structure as viewed from the side.
- Centerline Elevation: A drawing showing a longitudinal section of the vessel or feature.
- Cross Section: A drawing showing a transverse section of the vessel or feature.
- End Elevation: A drawing showing the structure as viewed from the end.

Photographic Documentation
Overall site photographs and documentation of the piling clumps (A7) were carried out with a digital SLR camera with a resolution of more than six mega-pixels. Where appropriate and plausible a scale was placed in the photo. A detailed photographic log was maintained, recording the feature, the photograph orientation, and any feature details shown in the image. Management of the digital files after field work has followed the guidelines outlined in the *NRHP Photo Policy*.

Videographic Documentation
Videographic documentation of the contributing properties was gathered using a Sony HDR-HC3 HDV 1080i Mini DV Handycam in a Light and Motion Blue Fin housing. Archaeologists made sufficient passes with the video camera to insure thorough coverage of the site. Features of particular interest were documented thoroughly by videoing them from as many angles as possible. Some sites had very poor underwater visibility, making this technique ineffective.

Wood Sampling
A total of 108 samples of the wooden components of the sites were gathered and examined to determine what type of wood was used (see details in Appendix 9). Sampling was achieved using a chisel and hammer to extract a small piece of wood, approximately 1x1 inch (2.5x2.5 cm). Each wood sample was placed into a plastic zipper-lock bag with a small amount of water, and labeled with site name, date, archaeologist initials, and timber name/number. Examination and identification of each wood sample was undertaken by Roy Whitmore, Professor Emeritus of Forestry at the University of Vermont.

Datasets

Remote Sensing Data
Remote sensing data for Onondaga Lake was collected by CR Environmental, Inc. in 2005.[118] This survey recorded four datasets: 1) bathymetry to identify the lake bottom surface; 2) side-scan sonar to characterize debris, obstructions and other surficial features of the lake bottom; 3) sub-bottom profiling to supplement the assessment subsurface stratigraphy; and 4) magnetometer data to identify debris and obstructions containing iron within or on top of the lake sediments.

Aerial Surveys
Aerial imagery for Onondaga Lake from Google Earth® and Microsoft® Virtual Earth were examined to identify shoreline and shallow water features.

Previous Archaeological and Historic Research
In 2004, the Public Archaeology Facility conducted a Phase 1A archaeological resource assessment for the Onondaga Lake Superfund Site on the behalf of Honeywell.[119] In 2010, LCMM conducted a Phase 1B archaeological resource assessment on behalf of Honeywell.[120]

Additional Historic Research
Navigational charts of Onondaga Lake from 1915, 1926, 1932, 1937, 1942, and 1947 were examined for the locations of potential cultural resources.[121]

DIVE METHODOLOGY AND SAFETY PRACTICES

This section provides an outline of procedures which ensured the safety of project divers and facilitated the effective completion of project goals and objectives. The diving operations for this project met all federal requirements for safe diving. All diving activities were in accordance with the strictest provisions of U.S. Army Corps of Engineers and LCMM diving safety manuals and diving guidelines. The safety of project divers was given priority in all decisions and actions undertaken during diving operations. During all diving operations conducted as part of this project, all persons diving and working under the auspices of LCMM abided by this Dive Safety Plan.

Diving Operations
The primary dive platform was securely anchored or moored during all diving operations. All dive operations took place within 100 feet of a dive flag.

Dive teams consisted of four people: one diver, one standby diver, one tender, and one dive supervisor. Each diving member of a team helped the other diving member don, remove, and adjust equipment. The Diving Supervisor checked to ensure that all divers were properly rigged and adjusted immediately before the diver entered the water. No diver entered the water until clearance from the Diving Supervisor had been given. Each diver checked all equipment for proper function immediately upon submerging and upon reaching the bottom before conducting any work.

Schedule and Duration of Diving
Diving took place over 29 days in September and October 2012, and May 2013. Dives and divers were restricted to no-decompression limits. In calculating no-decompression limits the next greater time and next greater depth was be used on standard U.S. Navy Diving tables.

Environmental Conditions
Water depths in the project area did not exceed 35 feet, and currents were negligible. Underwater visibility was between 1 and 10 feet. Water temperatures varied between 50 and 65°F. Divers donned a range of dry suit undergarments according to that dive's thermal conditions. Divers encountered dense mats of aquatic vegetation, including the invasive Eurasian watermilfoil (*Myriophyllum spicatum*) (Figure 25), requiring careful swimming to avoid entanglement, and systematic site clearing.

Figure 25: Divers encountered dense mats of vegetation, including the invasive Eurasian watermilfoil (*Myriophyllum spicatum*) on sites in the Syracuse Maritime Historic District (LCMM Collection).

Hazard Analysis

A range of hazardous chemicals are found in Onondaga Lake's bottom sediments. Mercury contamination is found throughout the lake, with the most elevated concentrations detected in sediments in the Ninemile Creek delta and in the sediments and wastes present in the southwestern portion of the lake. Other contaminants present within Onondaga Lake sediments include benzene, toluene, ethylbenzene, and xylenes (BTEX), chlorinated benzenes, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and polychlorinated dioxins and furans (PCDD/PCDFs). The Human Health Risk Assessment for Onondaga Lake found that that contamination in Onondaga Lake presents risks to human health that are above EPA guidelines. In addition, the primary sources of these cancer risks and non-cancer health hazards are due to mercury, PCBs, and PCDD/PCDFs as a result of the consumption of Onondaga Lake fish. However, studies showed that reasonable maximum exposure cancer risks (3.7 × 10-6) for exposure to south basin sediments for construction workers exceeded the low end of the target risk range of 1 × 10-6. All other reasonable maximum exposures (RME) risks for future construction workers were less than the target range.

In general, LCMM divers did not impact the bottom sediments, except for occasional inadvertent contact. The diving equipment and techniques employed prevented any sediments or lake water from touching the diver's and other crew members' skin.

All divers were subject to a decontamination protocol:

1) Upon exiting the water, the diver was washed down with lake water from a high volume hose;

2) The diver was sprayed with a solution of Alconox and water and scrubbed with a brush (Figure 26);
3) The diver was rinsed with clean water;
4) The diver doffed his/her gear;
5) The diver was rinsed with clean water;
6) The dive gear was rinsed with clean water.

Figure 26: During the decontamination procedure, this LCMM diver is sprayed with a solution of Alconox and water (LCMM Collection).

Personnel

The dive team consisted of four individuals: a Diving Safety Officer (DSO), an Assistant Diving Safety Officer (ADSO), and two archaeological divers. Each dive team member met the training and qualification requirements established in USACE Safety and Health Requirements Manual (EM 385-1-1).

Dive Platform

Dive operations were staged out of Onondaga Lake Park Marina. This site was ideal due to its central location to the project area, ample space for equipment preparation and break-down, and access to restroom facilities. The dive platform utilized was a 30’ (9.14m) pontoon boat (Figure 27). The dive vessel carried a spare parts kit, tool kit, first aid supplies, and potable water. The dive vessel conformed to U.S. Coast Guard specifications according to class, and had on board all required safety equipment. The vessel was equipped with a safe and secure dive platform/ladder used by divers, aided by their tender, when entering and leaving the water.

Figure 27: Dive platform at Onondaga Lake Park Marina, 2013 (LCMM Collection).

Diving Equipment

The SCUBA equipment was currently certified. A full set of back up equipment was available in the event of equipment malfunction. SCUBA equipment included:

1) Full face mask demand regulators;
2) A primary SCUBA cylinder (either a standard 80 cubic foot aluminum or a steel 95 or 104 cubic foot cylinder);
3) A pony bottle (30 or 18 cubic foot aluminum) with regulator;
4) The regulator attached to the primary cylinder will be equipped a submersible pressure gauge;
5) A depth gauge;
6) A bottom timer;
7) A buoyancy compensator device (BCD) capable of floating the diver;
8) A dive knife;
9) A dive light;
10) Drysuits equipped with dry gloves and latex hoods;
11) Surface to diver and diver to diver communications (Wireless OTS Aquacom);
12) An inflatable signal device; and
13) Dive Alert

Safety Considerations

All diving was performed in accordance with the U.S. Army Corps of Engineers "Safety and Health Requirements Manual" EM385-1-1 dated September 2008 and with the U.S. Navy Diving Manual. Safety was a primary goal of this project, and diver safety was given priority in all decisions and actions undertaken during diving operations. All dive operations were guided by the *Dive Safety Plan* created by LCMM specifically for the work carried out in Onondaga Lake, and by LCMM's *Safe Diving Practices Manual*.[122] Safety oversight was provided by Parsons.

A dive briefing preceded each day of diving. The briefing included an assessment of safety aspects, potential hazards, tasks to be undertaken, emergency procedures, and any necessary modifications to operating procedures. The DSO noted dive briefing attendees and topics discussed on the dive log. All dives were logged throughout the dive, and written comments for the dive log were required of the returning diver immediately upon completion of each dive. Upon completion of a dive and prior to the commencement of the next dive the returning diver informed the dive supervisor about diving conditions observed and specifically about any hazards or potential hazards encountered. Divers remained awake for at least one hour after a dive. Divers waited at least 12 hours before flying after any dive; this was extended to 24 hours following multiple days of diving.

An international diving flag (Alpha flag) and a civilian “diver-down” flag (red with white diagonal stripe) was raised on the diving platform prior to, and lowered following completion of, all diving operations. One crew member was designated as the traffic observer with the task of alerting passing craft of diving operations.

Accurate timepieces were carried by all diving personnel. Fire extinguishers were aboard the dive platform and in each vehicle used. The dive team had a 16 unit first aid kit, a spineboard with flotation, and oxygen on hand during all diving operations. All personnel were familiar with safety procedures and with the locations of safety equipment. There were no accidents or injuries during the fieldwork; if there were, they would have been reported to the diving supervisor immediately, and a report of injury form would have been completed.

Bottom times did not exceed two hours, and divers performed no more than two dives each day. Diving was conducted only on days that weather and conditions permitted safe diving. Diving was not conducted if any of the following conditions prevailed: high winds, thunderstorms, waves exceeding two feet, low surface visibility conditions (less than 100 feet of visibility), or currents exceeding 1 knot.

Fieldwork was executed by Pierre LaRocque (LCMM Archaeologist, Dive Safety Officer, and Vessel Captain), Adam Kane (LCMM Archaeological Director and Dive Safety Officer), Sarah Tichonuk (LCMM Archaeologist), and Christopher Sabick (LCMM Archaeologist).