Abandoned in Lake Champlain: Review of the Pine Street Barge Canal Breakwater Ship Graveyard

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Abstract

The Pine Street Barge Canal Breakwater Ship Graveyard along the Lake Champlain waterfront of Burlington, Vermont contains a small assemblage of five abandoned vessels dating from the early half of the 19th century into the middle of the 20th century. The ships within this assemblage reflect the changing social, economic, and technological trends of the Burlington Waterfront. This paper examines the graveyard through the lens of behavioral archaeology, documenting signs of human modification on the wrecks to provide evidence of structural and component removal along with other discernible patterns of salvage. Additionally, site formation processes of cultural and non-cultural transformation signatures are documented to help explain the creation of the ship graveyard. 1

Introduction

The Pine Street Barge Canal and Breakwater is an ideal example of an historic industrial area along the waterfront of Burlington, Vermont. As an inland canal used for offloading lumber and other raw material, the canal and basin within the breakwater were heavily used in the 19th and early 20th centuries. Figure 1 shows the National Oceanic and Atmospheric Administration Chart No. 14785 for Burlington Harbor with a red circle that denotes the general location of the Pine Street Barge Canal Breakwater Ship Graveyard. Over the years, a cluster of five shipwrecks accumulated in this area. While some research has already been conducted on these vessels, they have yet to be examined through the theoretical paradigm of behavioral archaeology. Additionally, the abandoned vessels have not been adequately placed in their historical and local contexts. (VT-CH-793, VT-CH-795, VT-CH-797). Figure 2 depicts a field map of the ship graveyard with the approximate locations of the vessels. Excelsior was constructed in 1850 and abandoned in 1886, Hildegarde was constructed in 1876 and abandoned in 1937, and the Turner & Brievogel barges were constructed in 1960 and abandoned in 1964. Studying the remains of the ship graveyard presented an opportunity to explore site formation processes and behavioral patterns of ship abandonment. It also provided a means to interpret signatures, or evidence, from these processes and their reflections in the vessels’ designated uses and purposes.

Generally, the study of ship graveyards provides a wealth of data on the use-lives of abandoned vessels, especially when analyzing the broader impacts on maritime culture and commerce. The vessels interred within the Pine Street Barge Canal Breakwater Ship Graveyard represent a microcosm of Burlington’s marine industrial era. The primary research question for this research was what the abandonment of the vessels reveals about changes in shipping and transportation in the Burlington, Vermont area. Secondary research questions focused on the industrial, economic, and technological changes in the history of Burlington’s Waterfront. The study also adds important information to the underrepresented study of freshwater abandonment sites and underwater archaeology in this geographic region.

The Development of the Ship Graveyard and Theoretical Interpretation

To understand how the ship graveyard formed, it is important to explore the history of the area. As an ideal location for a maritime port along Lake Champlain, Burlington developed into a commercial center starting in the late 18th century (Hemenway 1867; Rann 1886; Cohn 2003). Historically, the Pine Street Barge Canal area was known as “the cove,” where the beach formed a natural breakwater and mooring for vessels (Hemenway 1867:669). The area was used by Master Builder Richard Fittock for his stores and cargo and to provide lighter services to
Figure 1. National Oceanic and Atmospheric Administration, National Ocean Survey, U.S. Dept. of Commerce, United States – Great Lakes, Lake Champlain Vermont, Burlington Harbor, 18th Edition, January 2019, Chart No. 14785. The red circle denotes the general location of the Pine Street Barge Canal Breakwater Ship Graveyard (Image courtesy of the National Oceanic and Atmospheric Administration). Interred in the ship graveyard are the remains of the lake schooner Excelsior (VT-CH-796), the converted stone ferry Hildegarde (VT-CH-794), and three construction scow-barges from Turner & Brievogel Inc.
deep water ships. Lighter services are provided by smaller vessels, typically barges, which would offload or “lighten” larger cargo ships that had deep drafts and were unable to dock in shallower areas along the shore. Eventually, the Rutland and Burlington Railroad Company established a depot and railyards in the area. The development of the waterfront was further propelled by the increase in commerce created by the canals, steamships, and railroads in the 19th century. Figures 3, 4, and 5 depict historic maps of the Pine Street Barge Canal area and its gradual development from 1853, 1869, and 1890.

Traditional lake sailing vessels used before the creation of the Champlain and Chambly Canal were employed for heavier bulk cargoes in this era. However, the use of canal boats (later, sailing canal boats) replaced traditional sailing vessels as a more efficient and cost-effective freight service after that canal was established. Much of the Burlington waterfront was used by canal boats and, by the 1860s, a breakwater, small canal, and a turning basin were developed in “the cove”. After these additions, it was officially named the Pine Street Barge Canal. This small inland canal facilitated the loading and unloading of canal boats. The canal also serviced firms such as the Kilburn & Gates Lumber Mills and other companies in the late 19th century.

The lumber mill and railroad industry continued to build up around the area into the 20th century, including the establishment of a coal-gasification plant and the expansion of the Rutland and Burlington Railroad enterprise. Much of the area immediately surrounding the Barge Canal area eventually fell into disuse, however, the basin just outside of the Pine Street Barge Canal had already become a dumping ground for Excelsior in 1886. The development
Figure 3. Presdee & Edwards, Map of Burlington, Vermont 1853 (Image courtesy of Bailey Howe Library Digital Collections, University of Vermont).

Figure 4. Sanborn Fire Insurance Map of Burlington, Vermont 1869, Sheet 6 (Image courtesy of Bailey Howe Library Digital Collections, University of Vermont).
of petroleum engines along with automobiles and airplanes late 19th century in the 20th century marked a notable decline in maritime commerce on the lake. Many of the older sailing, canal, and steam vessels further fell into disuse. In 1937, *Hildegarde* was abandoned within the canal breakwater entrance’s southern pier and the Turner & Brevogel Barges were abandoned inside the breakwater basin in 1964. As a result of the coal gasification plant waste product inflows, the Pine Street Barge Canal eventually became a designated toxic site and was listed on the Superfund National Priorities List by the Environmental Protection Agency in 1983. Other boats were eventually discarded into this derelict area and the ship graveyard was formed.

Because the graveyard constitutes a complex underwater archaeological site with a long history, understanding the site’s formation processes is extremely important. *Cultural formation processes* are “processes of human behavior that affect or transform artifacts after their initial period of use in a given activity” (Schiffer 1987:7). This process preserves artifacts in their systemic context (meaning it reflects artifacts when they are actively engaged in a behavioral system) to create the historical record through *reuse*. *Reuse* is when an artifact or artifacts change ownership from one user to another or from one social group to another without the artifact changing in its intended use or form (Schiffer 1987:28). Artifacts are preserved in the archaeological context (artifacts...
that interface with the natural environment in a depositional setting) through the deposition of artifacts and any consequent cultural alterations of material in both records.

The second part of site formation processes include non-cultural formation processes. Non-cultural formation processes are influenced by all occurrences in the natural environment that affect the archaeological record. They affect artifacts in systemic and archaeological contexts by influencing decay patterns, changes in sedimentation, natural disturbances, and the accumulation of ecological evidence that can be used to ascertain ancient environmental conditions. The theoretical concepts of site formation processes have been modified and applied to the study of underwater archaeological sites over the years. Academic studies in maritime archaeology also focus on ship graveyards and how these processes, especially related to abandonment practices, influence the creation of sites (Gates 2019; Gibbs 2006; Muckelroy 1978a, 1978b; Richards 2008; Richards and Staniforth 2006; Seeb 2007; Stewart 1999; Ward et al. 1999). Applying these concepts to the study of the vessels in the Pine Street Barge Canal Breakwater Ship Graveyard yielded comprehensive data and contributed to a broader understanding of abandonment practices. One case study is summarized below.

Use-Life and Abandonment: A Case Study of Excelsior and its Systemic Context

Research on the five vessels in the ship graveyard spans a period of over 168 years, and all the vessels have distinct histories and use-lives that contribute to a better understanding of formation processes in the systemic context. The oldest and most iconic vessel within the ship graveyard is Excelsior. Built in the year 1850 in Willsboro, NY, it served a long career as a bulk carrier on Lake Champlain. It made its first trip on March 28, 1860 (The Burlington Daily Free Press and Times 1867:8) and Alvin Colvin of Port Kent mentions the first trip of the schooner Excelsior on the same date and the last trip on January 21, 1866 (Smith 1885:265). Regarding the type of cargo Excelsior carried, this account mentions the following:

The Iron Business – Four boilers, three large and a smaller one, have arrived at the Rutland depot from South Boston, awaiting the opening of the lake when, they are to be shipped on the "Excelsior" to Port Henry for the iron works company. Two other boilers are yet to arrive for the same company. A trip hammer was also on the same train, consigned for the Keesville nail company.

Gross tonnage is listed as 99.08 with a net tonnage of 94.13.

While the information on the shipbuilder could not be found, other similarly classed vessels were operating in the lake during Excelsior’s use-life. American is a near similarly classed schooner built in the year 1848 in Willsboro, N.Y., two years before Excelsior and most likely by the same shipyard. An historic photograph in Figure 6 depicts American docked with the steamship United States and the canal schooner S. H. Witherbee in Rouses Point, New York, circa 1865 (Cohn 2003:xiv). Another regionally distinct vessel similar to the Excelsior is the North River Schooner. This type of vessel was a shallow draft centerboard schooner used in freighting along the Hudson River in New York during the 19th century (Desmond 1998:200; Verplanck et al. 1908:35). To better understand Excelsior as an intact vessel, information was gathered on the construction elements in the lines and sail plans from the “North River Schooner” in Wooden Ship-Building (Desmond 1998:200). The lines and sections of the vessel in addition to the sail plans are depicted in Figures 7 and 8. From this data, the author was able to digitally reconstruct Excelsior in a conjectural representation of what the vessel might have appeared as shown in Figure 9.
On April 18, 1870, the \textit{Excelsior} “took advantage of a favorable wind, and started for Port Henry yesterday, carrying several large boilers for the iron company at that place” (The Burlington Daily Free Press and Times 1870a). \textit{Excelsior} is mentioned again in the Plattsburgh Republican, stating that “the schooner \textit{Excelsior} has gone into winter quarters at Plattsburgh. The vessel was built at Willisboro Bay in 1853 by Captain Landon and is 110 feet long by 28 feet wide – one of the largest sailboats on the lake” (Plattsburgh Republican 1881:1). Another New York newspaper accounts the following:

\textit{The old Schooner \textit{Excelsior}, well known to many of our readers, is again engaged this season freighting limestone from Westport to the Cedar Point furnaces. She is one of the very oldest vessels on the lake, and is commanded by Captain Dupry, who has been on board of her every season for 22 years (The Essex County Republican 1883:1).}

One of the last mentions of the \textit{Excelsior} is when the wreckage of the vessel was removed from the cove, where “the spars of the old schooner \textit{Excelsior}, which was sunk at the mouth of the cove [Pine Street Canal] last fall, were removed yesterday. This was one of the largest schooners that used to ply on the lake” (The Burlington Daily Free Press and Times 1885). Though limited historic newspaper accounts offer only glimpses into the types of cargo, such as boilers and limestone for the furnaces of New York, it is more

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{american.png}
\caption{American at dock with the steamship \textit{United States} to the left and the canal schooner \textit{S. H. Witherbee} to the right in Rouses Point, New York, circa 1865 (Cohn 2003:xiv).}
\end{figure}
Figure 7. Lines and Sections of 77-foot North River Schooner (Desmond 1998:200).

Figure 8. Sail Plan of North River Schooner (Desmond 1998:200).
than likely that *Excelsior* engaged in other heavy freighting. To understand the *systemic* context of *Excelsior*, we must first look to its use-life and *primary mercantile* phase as an intra-lake bulk cargo carrier.

The main stage of *Excelsior*’s use-life as a cargo carrier may be referred to as its *primary mercantile* phase, where the creation of a vessel is meant to match its projected function (Richards 2008:120). Based on information from the historic record, *Excelsior* experienced the *reuse process* termed *lateral cycling*. Schiffer defines *reuse* as “a change in the user or use or form of an artifact, following its initial use” (Schiffer 1987:27). The activity of *reuse* keeps items within the *systemic* context until they are ultimately discarded and become part of the archaeological record. As a type of *reuse process*, *lateral cycling* is the change in an artifact’s user. From the historical record, *Excelsior* had several changes in ownership along with changes in masters, with at least three known masters and at least three known managing owners.

At the end of its use-life in 1886, *Excelsior* was officially abandoned in the harbor of Burlington. Accordingly, the next phase within the site formation matrix is the process of *discard*. *Discard* describes how the vessel is deposited in a *systemic* context and the *pre-depositional salvage* behaviors that occur before it is abandoned along with their related signatures, or evidence of salvage behaviors (Schiffer 1987:47, 103-105; Richards 2008:145-162). Since any movable items of value are absent from the vessel remains, it almost assuredly underwent *pre-depositional salvage*, where the ship would have remained in floating shape so to safely remove all portable material. The *primary salvage* of this material happened before the vessel was finally abandoned (Richards 2008:155). These processes may also be referred to as *structural minimization* or *hull reduction*.

**Post-Abandonment: The Archaeological Context of *Excelsior***

*Excelsior* was transformed into an archaeological site through *post-depositional salvage* behaviors. The procedure of further breaking apart the ship after abandonment is known as *secondary salvage* processes. The vessel is also bisected with both separate sections...
within the interior and exterior of the breakwater basin wall. Based on observations, the vessel was split into two pieces, an act most likely undertaken to facilitate access into the interior of the basin, as much of the breakwater wall was also removed from this area. Much of the remains are from below the turn of the bilge. Non-cultural formation processes are also evident on the site.

The Lake Champlain Maritime Museum (LCMM) completed the preliminary archaeological documentation on the vessel remains in 2012 as part of a mitigation project for the harbor of Burlington, Vermont (Kane et al. 2010). Documentation conducted on the site found much of the vessel remains in a poor state of preservation. Resting parallel alongside the interior of the northern breakwater pier within the basin, the bow and amidships of Excelsior from below the turn of the bilge are exposed, and an unknown amount of the vessel is buried under sediment and vegetation. Several frames are present with both affixed and disarticulated side planks. Other unidentified timbers litter the area with various iron fasteners. Located rearmost of the bow on the starboard side of the vessel is a large, rounded timber along with another similar partially buried timber. Material culture is present in the bow to amidships with a variety of intact glass bottles, rope, and several shoe soles with heels.

The author recorded the site formation signatures (evidence related to post-depositional salvage behaviors) into a catalog along with an archaeological site plan for the bow section of the ship, denoting where the signatures were observed. Figure 10 shows the digital site plan for this part of the vessel with the locations of the site formation signatures. Examples of secondary salvage include torn and cut floor frames, frames, and damaged bottom planking. Other examples include heavily bent ferrous fasteners such as nails and disarticulated hull planking. Examples of damage from biological agents like zebra mussels are evident by scars and pitting on the wood. Figure 11 is a representative photograph of these examples of secondary salvage activities and damage from biological agents.

![Figure 10. Archaeology Site Plan of Excelsior’s Bow and Amidships Section (Image by Author).](Image)
The stern remains are located on the outside of the northern breakwater wall, residing upside down adjacent and parallel to the breakwater. The remains are oriented with the stern facing southwest and the amidships facing to the northeast. The rudder is absent along with the pintles (iron fasteners used to secure the rudder to the stern of the vessel). The exposed sternpost, gudgeon, garboard strakes, side planking, and keel appear to be in good condition aside from some wear. Some of the ferrous bolts are damaged and the remains of a sacrificial keel are still affixed to the bottom of the keel, although a section of the sacrificial keel is missing from the stern to amidships. A significant portion of the hull is buried under sediment with more of the remains extant.

From the archaeological remains, one pattern discerned is that most of the extant material is related to the very bottom of the vessel. When *Excelsior* underwent secondary salvage, the entire ship was dismantled down to the waterline. This would have made it difficult for salvors to access heavier timbers like the floors and frames given that the vessel would no longer be in floating condition. The most distinctive feature of the vessel is the orientation of the two halves, where the bow and upside-down stern section are located on both the inside and outside of the northern breakwater wall. This orientation is most likely due to the broken stern section being positioned 180 degrees when the entrance to the inner basin was cleared. The use of a derrick crane to do this is a plausible explanation or another similarly classed equipment with the capability of lifting and breaking the submerged ship wreckage.

**Conclusions for Reasons of Abandonment**

As acts of watercraft abandonment and salvage occur within the context of cultural and economic change, there is the potential that deliberate ship discard events may correlate to broader historical trends in economic changes in the Burlington’s waterfront. The introduction of

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new technologies, such as the sailing canal boat, trains, steam engines, and petroleum-based engines are events that impacted Vermont’s broader maritime trade networks. To explain why *Excelsior* was abandoned, potential reasons are explored through the analysis of correlational data relating to several key factors. These factors include cultural, economic, and technological correlations based on statistical information from sources used in the author’s Master’s thesis. ³

As a cultural factor, correlations between population and the abandonment of *Excelsior* in the graveyard do not appear to show any plausible relations. However, the increasing population levels of Burlington and Chittenden County throughout the late 18th century into the 20th century are plausibly related to the increased consumption in imports and exports. Economic data on the products of lumber, coal, and petroleum show gradual increases in conjunction with population growth. For example, as population levels increased in the second half of the 19th century, the tonnages of both lumber and coal products increased as well. In the early part of the 20th century, population levels grew slowly and steadily while lumber and coal products started to decrease. The introduction of petroleum shipping in the region in the early 20th century increased along with population levels well into the latter half of the century.

Analysis of economic data on timber shipping revealed the heaviest amount of timber trade was through Canada in the late 19th century as lumber was coming into the lake through the Chambly Canal. After 1884, timber trade declined as fewer amounts of products came through the port of Burlington. Coincidentally, *Excelsior* was abandoned in the same year. While the vessel is not a canal boat, the time does represent an era of decline in timber product import. It is unclear if the abandonment of *Excelsior* correlates with the coal trade. If *Excelsior* was not abandoned in 1884, it probably would not be possible for it to prosper in hauling coal based on the higher tonnages registered in the 1880s. As most of the coal was arriving through the Champlain Canal on canal boats, it would seem unlikely for a coastal vessel confined to the lake to haul coal from canal boats as they portaged through the canal.

The analysis of technological correlates like the replacement of traditional commercial sailing craft with the newer classes of canal boats provides the most plausible evidence of the decision to abandon *Excelsior*. The changes in transportation in the Lake Champlain region by the late 19th century introduced newer generations of sailing canal boats that could travel through the Champlain and Chambly canals. The dimensions and rigging of *Excelsior* were not compatible with the canal locks and relegated the vessel’s operations solely on the lake. Rail transportation and eventually roads also led to the disuse and eventual abandonment of traditional lake sailing bulk cargo vessels. Additionally use, age, and deterioration are other factors that contributed to the decision to abandon *Excelsior*.

**Future Considerations for Ship Graveyards in Lake Champlain**

Research shows that the vessels within the basin are essentially remnant products associated with commercial activities that rose and declined from the late 18th century and into the 20th century. Each of these vessels had specific use-lives and reached a stage of obsolescence. The potential reasons for decisions made in the abandonment of the vessels in the Pine Street Barge Canal Breakwater Ship Graveyard are correlated to the changing social, economic, and technological trends of the Burlington Waterfront.

As stated by Sami Kay Seeb (2007:215), “Ships’ graveyards are an underdeveloped and under-researched area of the subdiscipline of maritime archaeology.” Research into the collection of abandoned vessels in the Pine Street Barge Canal area helps to provide information into this subdiscipline of maritime archaeology. Along with this collection of vessels including the abandoned canal boats in the canal itself (Kane et al. 2010), the entire Burlington waterfront is littered with the remains of vessels. While it is unclear if this larger collection of vessels were intentionally abandoned, they contribute to the archaeological and historical record of the maritime industry, commerce, and technological change in the port of Burlington. Research into this geographic area for ships’
graveyards is minimal and the study of freshwater abandonment sites will augment the field of maritime archaeology.

The vessels found within the confines of the Pine Street Barge Canal Basin Ship Graveyard represent only a small portion of abandoned ships in Burlington Harbor, let alone in Lake Champlain. Previous research on Carolyn Kennedy’s work on the Shelburne Shipyard Steamboat Graveyard (Kennedy and Crisman 2014; Kennedy 2015, 2016) identified the remains of four 19th century steamboats in the shallow waters adjacent to Shelburne Shipyard in Shelburne, Vermont. It would be interesting to study patterns of use and salvage on these vessels and generate a comparative analysis between them and the vessel remains in Burlington. Collaborative research on ship graveyards in Lake Champlain would contribute to the future of abandonment studies.

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**Notes**

1 This article is derived from the author’s Master’s thesis from the Maritime Studies Program at East Carolina University. The title of the thesis is “What Lies Beneath at The Pine Street Barge Canal Breakwater Ship Graveyard: Site Formation Processes As A Document of Change In Burlington, Vermont (C. 1830-1960).”

2 Engendering ships is an outdated mentality in Maritime Archaeology and improper in the reference of vessels. *Excelsior* is only referred to
in this manner given it is a direct quote found from a primary source.

3 Sources include Vermont census records of the population of Burlington and Chittenden county from 1781 to 2010. The Annual Reports of the Chief of Engineers, United States Army provides economic data for the port of Burlington, Vermont from 1866 to 1971. Information on technological development and use correlates from 1780 to 1990 also aided in connecting historical research, the archaeology, and analysis of the abandoned vessels.