Tiffany A. Pecoraro. Great Lakes Ship Traps and Salvage: A Regional Analysis of an Archaeological Phenomenon. (Under the direction of Dr. Bradley A. Rodgers) Department of History, April 2007.

This thesis examines the historic utility of Great Lakes maritime salvage and ship traps using the archaeological investigations of North Point Reef Ship Trap as a point of departure. North Point Reef Ship Trap is an archaeological site assemblage situated just off the coast of Alpena, Michigan within the waters of Thunder Bay in Lake Huron. The ship trap contains 55 shipwreck and isolate locations, representing a period of historic activity between 1850 and 1930. In order to analyze the highly complex distribution of archaeological remains, temporal and behavioral indicators were correlated with evidence from the historic record. Using this approach, the underlying social, political, economic, and environmental factors contributing to the phenomenon's formation were identified.

To demonstrate the historic function of regional salvage and ship trap locations, the Great Lakes shipping industry's practices were investigated within a region wide commercial context. It was found that a cycle of intensive commerce existed historically, creating an environment conducive for disaster. Great Lakes ship captains routinely navigated through hazardous nearshore areas in order to ensure maximum profit returns for company owners. Subsequently, a high maritime casualty rate resulted. To mitigate losses from increased shipwreck rates, a commercial salvage industry was established. As salvage practices became more reliable, shipwreck locations were seen as valuable commodities that could be recovered, refurbished and returned to commercial service. By extension, regional ship traps were also perceived by many as commercial assets that contained precious commodities that could be retrieved for profit.

GREAT LAKES SHIP TRAPS AND SALVAGE: A REGIONAL ANALYSIS OF AN ARCHAEOLOGICAL PHENOMENON

A Thesis Presented to

The Faculty of the Maritime Studies Program

Department of History

East Carolina University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts in History

By

Tiffany A. Pecoraro

April 2007

For my husband, Aaron, my children, Raven, Gabe, and Zane,
and with much gratitude to all my professors and advisors.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

In the fall of 2005, archaeologists from East Carolina University's (ECU) Program in Maritime Studies conducted a survey of submerged cultural resources along North Point Reef in Lake Huron's Thunder Bay, near Alpena, Michigan. The survey objective was to locate and record the remains of the passenger/freight propeller *Congress* among a number of previously identified submerged shipwreck sites. After one week of field work, and the discovery of additional wreck sites mounting, it was clear to ECU researchers that North Point Reef held far greater research potential than one ship's documentation. In total, the archaeological survey located the remains of 55 individual shipwreck sites, isolates or associated debris. The multitude of shipwreck remains and general overlay of isolated historic debris suggested that North Point Reef was most likely a ship trap. In the historic record, ship traps are specific geographic locations known to contain navigation hazards that were potentially fatal to mariners and their vessels. While not officially referred to as "ship traps" in the historic literature, these hazardous locations, and other known navigation obstructions, provided the impetus for the construction of lighthouses, navigations buoys, life saving stations, and coastal piloting guides.

In an archaeological context, ship traps are similarly defined as any maritime hazard that acts as a collection point for multiple shipwrecks (Murphy 1997:377). By extension, the definition should also include any collection point that reflects multiple groundings or strandings. Archaeologically, this type of phenomenon is distinct from a singular shipwreck site because the conditions for disaster produce more than just an isolated event. The specific conditions for disaster also distinguish the site type from multiple abandonment or ships' graveyard sites as a ship trap's archaeological context is not the result of intentional deposition. Ship traps, therefore, should be defined as naturally occurring, multiple collection points that reflect a temporal range of activity within a broader matrix of cultural processes. In other terms, a ship trap is a physical location with known navigational hazards that mariners brave repeatedly, despite the risks, and not always successfully, in order to complete the passage of a regular trade route.

Relative to the study of maritime archaeology, a ship trap presents an opportunity to ask broader questions about the collection as a whole. Individual shipwrecks within a ship trap undeniably contain significant information about the systemic context, or cultural system, to which they are directly associated. As a collection, however, the shipwreck assemblage can provide a chronological procession of data that has the potential to reveal a pattern of social behaviors characteristic of the systemic context through time. Once a long term pattern of behavior is identified, transitions and fluctuations within the systemic context, as represented by the archaeological data set, can also be examined. For example, changes or adaptations in technology can be detected when a temporal component exists within a site, as can trends in both specific and general societal activities.

According to Michael B. Schiffer (1987:3-5), an archaeologist must understand the systemic context that produces a site and its associated assemblage in order to successfully interpret past cultural behaviors. Moreover, Schiffer asserts that archaeological inferences should be consistent with known behaviors of the overarching cultural system responsible for the creation and deposition of a site or artifact. Schiffer further cautions that without an identified systemic association, archaeologists may form unsubstantiated conclusions that are based solely on spatial relationships in a site's artifact distribution. This warning is particularly important for multiple overlapping sites with more complex artifact distributions, as is the case with ship traps.

Further analytical considerations that pertain directly to ship traps are numerous ongoing environmental and cultural site formation processes. According to Keith Muckelroy's (1978:165-169) theoretical construct for site formation processes, there are many archaeological 'filters' and 'scramblers' that skew depositional evidence in a maritime environment. Whether created by cultural or natural forces, Muckelroy proposed that 'filters' and 'scramblers' are important considerations for shipwreck analysis as they effectively remove and mix evidence in an archaeological context. Pursuant to this, both Michael Schiffer and Larry Murphy have put forward analytical studies that focus on understanding natural and cultural site formation processes in order to better interpret the archaeological record (Muphy 1990; Schiffer 1987). In particular, Schiffer (1987:18) proposes that non-cultural and environmental (n-transforms) and cultural (c-transforms) site formation processes have the capacity to create false patterns in artifact distributions. Schiffer also strongly advocates cross referencing known behaviors in the historic record to ensure that site formation processes are distinguished from assumed behavioral indicators thought to be responsible for site deposition and distribution. Murphy (1990) further characterized the specific types of false distribution patterns in an underwater setting with his observations on natural environmental processes. According to Murphy the affects of wind, wave and current action effectively sort shipwreck remains according to size and bathymetric situation (1990:14-15, 53).

In addition, recent theoretical positions put forward by Gibbs (2006) and others (Murphy 1983; Souza 1998; Stewart 1999; Richards 2002; O'Shea 2002) contend that shipwreck sites have the potential to reveal cultural dimensions outside of the obvious physical nature of activities represented by a site. That is, the presence or absence of artifacts and vessel components at a shipwreck site can provide clues regarding the decision making process that created the necessary circumstances for the physical formation of a site. In addition, these specific cultural behaviors can then be further used to address comparative questions about maritime resources found in similar archaeological contexts (Schiffer 1976, 1887; Gibbs 2006). The potential for drawing inferences across time and space further emphasizes the importance of defining both a site's systemic context and archaeological context for use as interpretive mechanisms. Moreover, incorporating a comparative aspect into research designs is also of the greatest relevance to the discipline, as supported by Gibbs (2006:7) statement that "the lack of comparative analysis… (is) by far the most enduring failure of the sub-discipline (maritime archaeology)."

With this in mind, the current research aims to identify the underlying cultural and environmental processes that contributed to the formation of ship traps in the Great Lakes during the nineteenth and early twentieth-century. Moreover, the study takes particular care to correlate the systemic context of North Point Reef Ship Trap with that of the archaeological context in an analytical framework that considers both natural and cultural site formation processes. Using the shipwreck remains at North Point Reef as a point of departure, the maritime cultural dependence and utility of ship traps will be examined against the Great Lakes commercial shipping industry's intensive historic activity. Furthermore, the study will demonstrate how ship traps were not only a result of this particular systemic context, but fast became advantageous locations used by commercial agents to recoup losses from shipwrecks caused by intensive commercial practices. In broadening the scope of research beyond a site specific circumstance, the study can serve as a baseline for ship trap classification and identification in the Great Lakes and potentially other coastal environments.

Project Parameters

The city of Alpena is situated on the eastern side of Michigan in Thunder Bay along the western shore of Lake Huron. North Point Reef, the focus of the current study, is located just south and east of Alpena and within the confines of the National Oceanic and Atmospheric Administration's (NOAA) Thunder Bay National Marine Sanctuary (TBNMS). Figure 1 below depicts the 2006 project location of the North Point Reef survey area within the boundaries of the sanctuary.

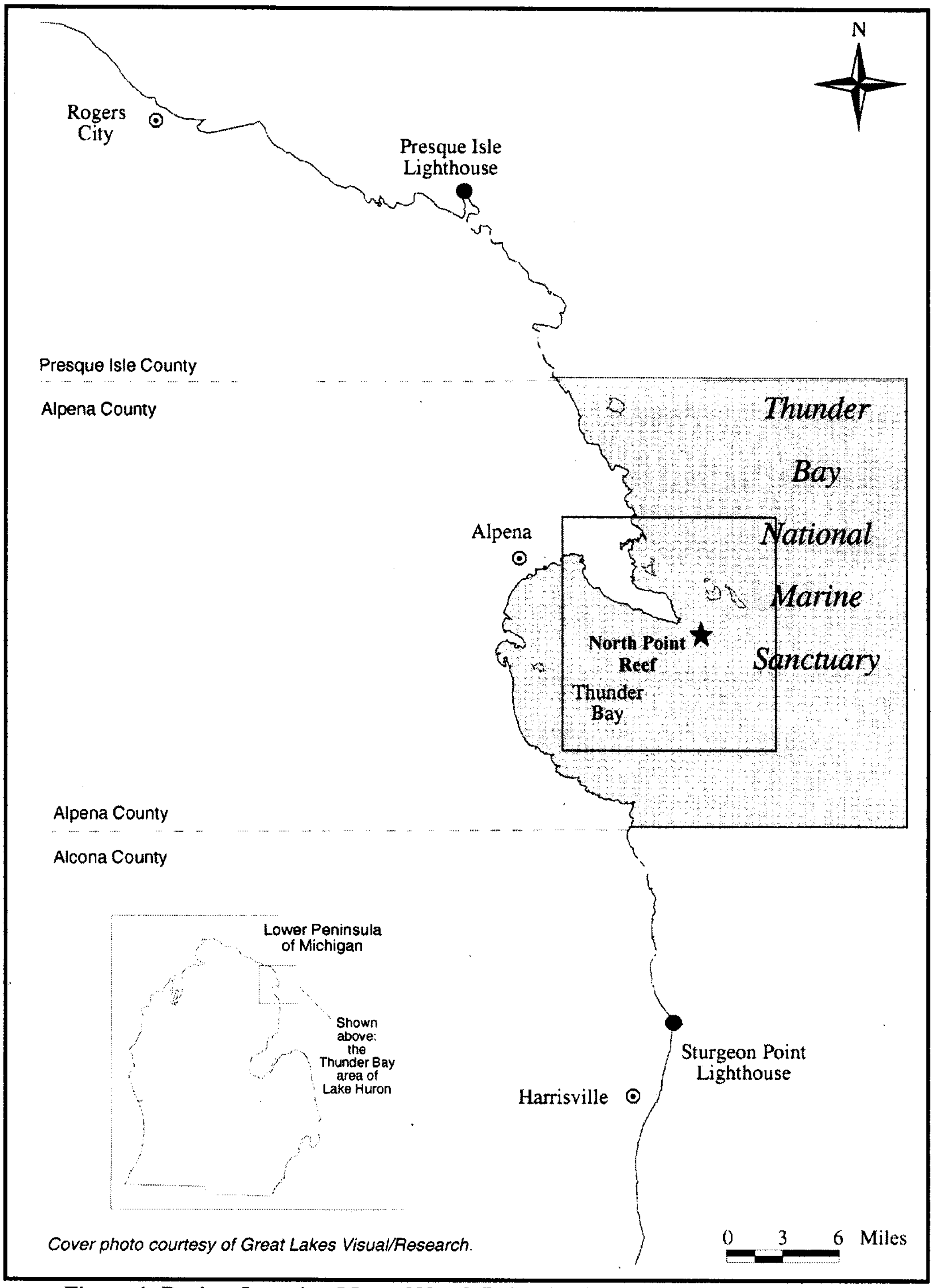


Figure 1. Project Location Map of North Point Reef, Thunder Bay, Lake Huron (Adapted from NOAA 1999: frontispiece)

From the region's earliest settlement period, the bay was recognized for its sheltered waters and abundance of natural resources. Consequently, by the 1850s Alpena began to transform into a major trade center for the Great Lakes fishing and lumber industries. In 1870 the growing port city was recognized as one of the region's main timber producers and held a prominent position along local and regional trade routes. At this time, North Point's shallow water limestone reef was also noted as being notoriously treacherous for commercial mariners. The location experienced frequent shipwrecks due to the reef's close proximity to Alpena harbor and the high volume of traffic along this particular commercial shipping route.

Given the area's high number of documented shipwrecks, students and staff from East Carolina University (ECU) conducted an archaeological survey along North Point Reef during the fall of 2005. The work was performed in conjunction with NOAA's TBNMS and the State of Michigan's Department of History, Arts, and Libraries (MHAL). The objective was to use previous cultural resources inventory data of the North Point Reef area to definitely locate the remains of *Congress.* Historic reports document that *Congress* grounded on North Point Reef, burned to the waterline, and sank three miles west of Thunder Bay Island lighthouse on October 26, 1868 (*Buffalo Commercial Advertiser* 1868c; *Chicago Tribune* 1868; *Toledo Blade* 1868). The reported cargo at the time of the ship's demise was salt, apples, railroad iron, and stoves. As local divers have reported seeing rail iron in the vicinity of North Point Reef, ECU was invited to perform a survey of potential wreck sites along the reef to definitively locate the remains. The research design also included plans for a Phase II non-disturbance site recording of the vessel remains.

Although the remains of *Congress* were not identified during the survey, ECU archaeologists encountered 55 individual site locations over a distance of 1.5 linear miles. The sites ranged in size from isolated pieces of rail iron to a complex shipwreck site containing a boiler bed, articulated hull fragments, anchor, capstan and windlass. Students documented several of the sites using traditional Phase II Pre-disturbance recording methods that result in scaled drawings. A modified pre-disturbance recording method was also utilized to create expedient sketch maps and photographic records of additional sites. The number and variety of scattered vessel remains on North Point Reef indicate that the area operated historically as a ship trap. As stated previously, ship traps are an important maritime phenomenon both archaeologically and historically. From this preliminary assessment, the reef's assemblage was analyzed to determine the existence of supporting evidence and identify depositional characteristics.

Site Location

Thunder Bay is situated on the western shoreline of Lake Huron. Its waters are located in Alpena County, Michigan, in an area bound by the geographic features of South Point and North Point. The geology and topography of the bay area is predominantly characterized as "nearshore" in NOAA's *Environmental Impact Statement/Management Plan for Thunder Bay National Marine Sanctuary* (NOAA 1999). Nearshore areas are defined as those bottomlands extending up to the 25 foot depth contour line. It is also noted that low water rock shoals and reefs are typical to the region's nearshore locations. Specifically, Thunder Bay has a gradually sloping bottom that extends from the flats of the nearshore area to the open water area of Lake Huron. Depths of Thunder Bay range from 25 feet to approximately 60 feet at its eastern boundary. The geological composition of both nearshore and bay bottomlands is primarily carbonate rocks of limestone and Karst with an overlay of glacial till and alluvial sediment. This is also consistent with the composition of the broader open lake bottomlands in Lake Huron (NOAA 1999:168-171).

The defining geological boundary for Thunder Bay's northern extension is North Point. Due north and east of this location, the coast turns into a treacherous network of islands, rock shoals, reefs, underwater cliffs, and sink holes. It encompasses a geographic area that extends 15 miles along the coast from North Point, terminating just north of Presque Isle Point and Middle Island, and five miles seaward, east of Thunder Bay Island. Historic documentation indicates a continuous reef line extended from Thunder Bay Island north up to Middle Island, but a review of current topographic maps provides contradictory evidence (Boulton 1876:194). Bottomlands within the area, however, do fall within the twenty-five foot contour line, and are, therefore, typified by the nearshore characterization. Directly north of North Point are the waters of Misery Bay and Crooked Island. The area is comprised of numerous exposed rock islets and limestone sink holes. Two miles east of North Point are Sugar, Thunder Bay, and Gull Islands. Again, the water between the three islands contains characteristic rock shoals, shifting sand bars, and reefs.

For geological context, Figure 2 depicts the bathymetry of both Thunder Bay and the study area on North Point Reef.

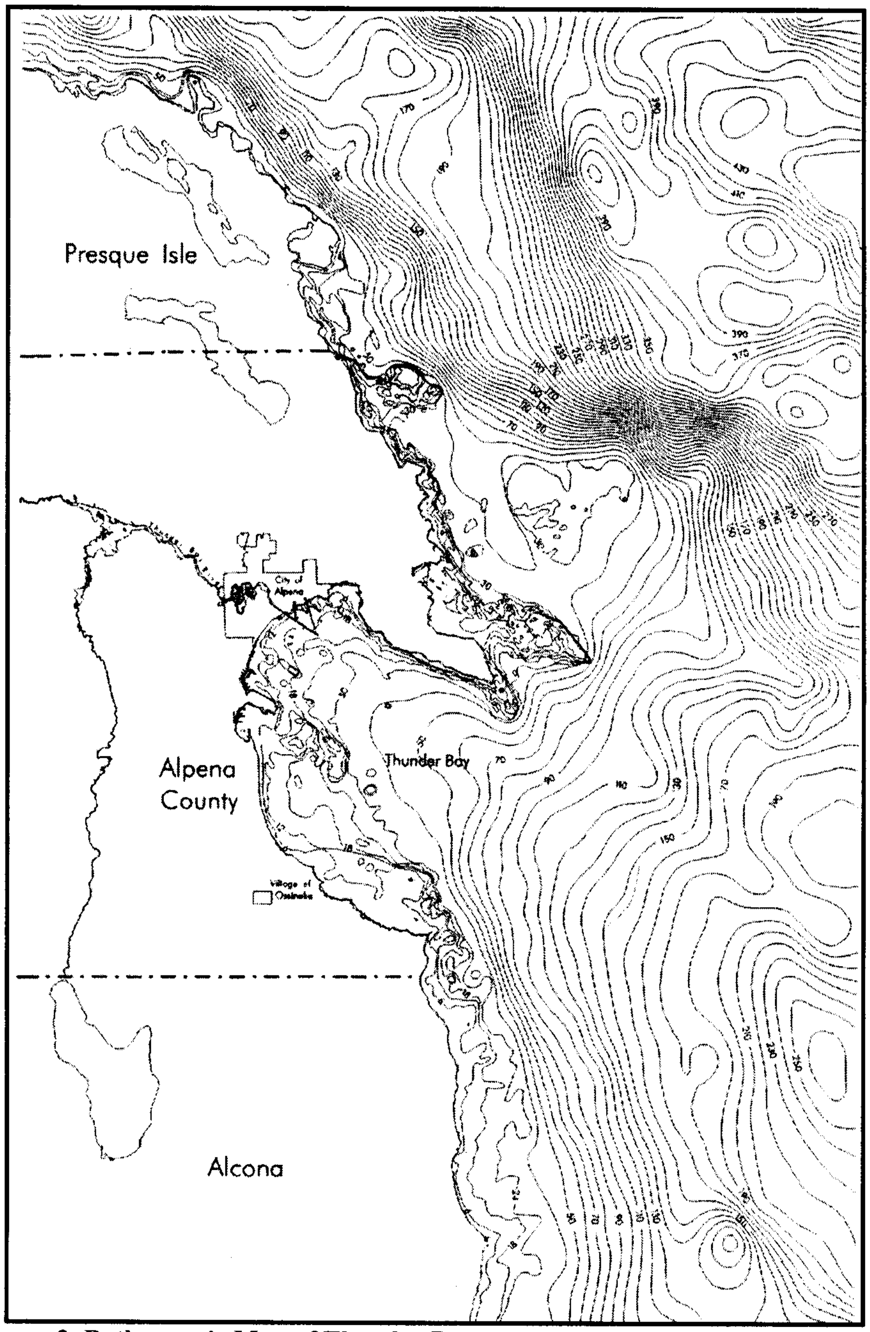


Figure 2. Bathymetric Map of Thunder Bay and the North Point Reef study area (NOAA 1999:171).

North Point Reef, the current project location, extends approximately three miles southeast into the open waters of Lake Huron from the mainland peninsula. The feature marks the beginning of the geographic area described above. The depth of the reef ranges from zero to 30 feet. Given its location to the bay, the reef acts as a breakwater and is a high energy environment. In addition, the reef is subject to freezing conditions during winter, as are all nearshore areas. Typical freeze-up occurs the last week in December and continues through the second week of February (NOAA 1999:173). These environmental factors are important considerations in regards to ongoing site formation processes active on the area's extant cultural remains.

Methodology

Prior to ECU's 2005 site survey, survey work in the North Point area had been conducted by Wayne Lusardi, Michigan State Maritime Archaeologist, and C. Patrick Labadie, TBNMS historian. The two collected North Point Reef shipwreck data as part of the Sanctuary's ongoing archaeological investigations to identify unknown cultural resources. Between 2004 and 2005, Lusardi and Labadie visited North Point Reef on multiple occasions to perform five detailed site documentations, record GPS coordinates for additional surface sightings and generate preliminary drawings of remains. The data recorded during these preliminary surveys provided the foundation for the current project's research design and survey parameters.

Due to a change in the study's focus during the course of field work, the project methodology will be broken down according to the individual stages of the project. The original research objective for ECU's September cultural resources inventory of North

Point Reef was to identify the remains of *Congress* among a number of potential candidates. Once identified, a Phase II Pre-Disturbance Recording was planned to document the remains. After the first week of survey work, over 30 sites were identified in addition to the previously recorded site locations, many with multiple features and widespread distributions. Given that none of the sites appeared to be consistent with *Congress'* description, it was determined that the focus of the project be re-directed to accurately recording all extant remains on the reef. As a collection, the shipwreck sites appeared to represent the remains of a ship trap.

From this perspective, the identification of *Congress* became secondary to the historical and archaeological significance of the entire assemblage. Survey work to locate *Congress* continued, but divers were also employed to perform Phase II recordings of additional sites. Due to continued survey efforts, however, the number of sites increased daily. With only three field days left, it was apparent that time and weather constraints would not allow for the full completion of either objective if the standard recording methodology was not altered. As will be explained in further detail, a more expedient field recording method was adopted to ensure the project objectives were completed in the given time frame.

Field Survey

Under the direction of Dr. Nathan Richards from ECU and Wayne Lusardi from MHAL, ECU graduate students conducted a Phase I submerged cultural resources survey of North Point Reef. The field survey was conducted between September 8 and 28, 2005. The operations were supported by various TBNMS staff and supervised by

ECU dive safety officer Mark Kuesenkothen. TBNMS also provided the ECU field crew with two vessels for the survey, a 21 foot NMS Boston Whaler and a 42 foot decommissioned Coast Guard Motor Life Boat. The larger vessel served as the primary dive platform for the majority of the project and the Boston Whaler was used to perform surface survey reconnaissance.

The survey's primary objective was to perform underwater assessments of previously recorded wreck sites along North Point Reef to positively identify the remains of *Congress*. Due to the large number of extant wreck remains, it was determined that the field crew be split into two groups, one tasked with conducting the field survey and the other with site recording. The survey crew consisted of Dr. Richards, Wayne Lusardi and two rotating student positions. Performing the field survey entailed re-locating previously recorded sites using GPS coordinates from Lusardi and Labadie's North Point Reef shipwreck database and identifying any new sites. Using the Boston Whaler, the team worked in rotation with two skin divers in the water and two in the boat. Divers in the water were towed behind the vessel on tow boards in regular transects along North Point Reef.

When sites were encountered, divers attached a numbered buoy to the wreck and recorded a GPS coordinate as well as a preliminary site description. The GPS coordinates for buoyed sites were then cross referenced with existing wreck database entries to determine if the site was a re-location or a new discovery. Initially, photographic documentation was part of the tow board survey, however, the task was later re-assigned to the second group of ECU researchers performing site documentation. Surface surveying continued throughout the ten day project, identifying a total of 55 submerged site locations in a 1.5 x 0.5 mile survey area. Some individual locations were later designated as features within a larger site complex and others as isolated debris. This decreased the total number of North Point Reef shipwreck sites to 32, representing approximately 12 historic vessels.

Site Documentation

The second group of ECU researchers was tasked with performing a Phase II Pre-disturbance site recording of each individual shipwreck site on North Point Reef. According to ECU standards, a Phase II Pre-disturbance recording entails the production of an on-site scaled drawing of extant remains typically supplemented by a photographic record and written field record. To accomplish the task, the second group of ECU researchers was split into two dive teams of two to three students under the supervision of Dive Safety Officer Mark Keusenkothen. Depending on sea conditions, dive crews either used hooka or SCUBA to accomplish underwater work. Both breathing systems allowed divers up to two hours of bottom time per dive.

Dive crews were assigned different site locations each day and worked independently to complete individual site documentations. Standard ECU recording procedures entails establishing a baseline from which offset and triangulation measurements are taken. Using this method, a scaled plan view drawing is produced of the entire site. In order to capture site details, a one inch to two foot scale was used for each site plan. While working underwater, students use measurements to draw the outline of a given site and then work incrementally along a baseline to add in pertinent details like frame dimensions and spacing, exterior and interior planking dimensions, fastener patterns, etc. Divers also record ancillary data not readily identified by a scaled plan view. This type of data includes site orientation and substrate, molded scantling dimensions, unique construction elements, fire blackening and charring or other noteworthy evidence.

A photographic record of each site was also created during site documentation. ECU's Program in Maritime Studies provided a 5.1 Megapixel Olympus 5050 and a Sony 5.0 Megapixel Cybershot for underwater use. Photographs were taken of site overviews and of specific construction features or artifacts. When sea conditions, water turbidity, and technical problems were not issues, students attempted to take overlapping plan view photographs of larger sites that could later be used to produce photo mosaics. It should be noted, however, that underwater photography requires a high level of proficiency in order to produce quality imagery. Given that the project photographers were predominantly taken by students who were just learning to use cameras underwater, the quality of photos varies considerably.

In addition, a number of other problems hindered site documentation and ultimately led to the adoption of a much more expedient site recording method. In the second week of field work, weather and sea conditions worsened to the point where dive days were either shortened or canceled all together. Moreover, complex, overlapping site distributions and large site dimensions compounded the problem, as did drawing scaled renderings underwater during surge conditions. With only one field day left on the project, twenty-four sites still needed to be documented. After considerable deliberation, it was decided that the necessary site data could be recorded for all twenty-four sites by three two-person dive teams if the site documentation process was restructured. Rather than produce a scaled drawing while underwater, dive teams would use a standardized form to make a quick sketch map, record the measurements of the overall site and all diagnostic construction features, and take photographs to augment the field notes. The standardized form also included fields for ancillary site data such as orientation, substrate and water depth. Scaled drawing could then later be re-produced during the data consolidation process. ECU and MHAL archaeologist recorded a total of 32 sites by the project's end.

Data Consolidation

The project's field data consisted of full scaled drawings of individual sites, site recording forms with expedient sketches, digital photographs, and personal field journals. In order to consolidate data, a digital version of the site recording form was generated for each North Point Reef Ship Trap site. Project data from field note books and site recording sheets was transcribed into the individual digital site recording forms. Likewise, scaled site maps and expedient sketches were also converted into digital formats and inserted into the digital site record. The completed digital form standardized the final data format for all sites within the North Point Reef Ship Trap assemblage, regardless of the original field recording method.

As part of the final data processing, it was also necessary to create a single photographic record for all of the project's imagery. While conducting field work, 747 photographs were taken. Over the course of two weeks, separate photograph logs were created daily by each user and for each camera. To mitigate confusion and facilitate future analysis, the original data from field photo logs was transcribed into an Excel table, creating a searchable database. Individual fields for the new photographic record include the original photo number, correlating site number, date the photograph was taken, photo orientation, photo description, and photographer. This enabled researchers to correspond site photographs with site records as well as aided in the production of photo mosaics. The assembly of photo mosaics for the larger, more complex sites at North Point was the final step in post-field data consolidation.

Site Analysis

For better organization, the analysis of North Point Reef Ship Trap took place in two parts. First, in order to provide additional avenues for archaeological analysis, an historical and theoretical framework is outlined to incorporate historical, economic, and sociological considerations for the archaeological manifestation of Great Lakes ship traps. From this construct, the specific systemic context is defined for the regional occurrence of the phenomenon overall. Second, the current archeological evidence gathered from the fall 2005 field project was quantified to determine a set of distinguishing characteristics specific to Great Lakes ship traps. Collectively the two data sets form the foundation for a regional paradigm that can later be used to identify other locations with similar maritime cultural resources.

Both historical and archaeological archival research was conducted using a variety of sources. Historical research on *Congress,* as well as data on other potential vessel candidates for North Point Reef wreck sites and North Point Reef wrecking events was derived from the Labadie Collection, Tongue Collection, and Thunder Bay Life-Saving Station Records in Thunder Bay National Marine Sanctuary Research Collection (TBNMSRC). All three collections served as the primary regional sources. In addition, the Great Lakes Collection at Bowling Green State University, and Joyner Library at East Carolina University provided sources on regional economic, social, and maritime related industries and commerce. Congressional records archived at Joyner Library also proved integral to the overall historical analysis.

Compilation of the historical review required a compendium of primary and secondary sources. This research material included: historical journals and regional annals providing general background and contextual information; Congressional and historic documentation on Great Lakes infrastructure and legislation; historic newspaper accounts of regional commerce and shipping; archival photographs depicting potential salvage methodologies; and autobiographies and biographies of germane individuals.

Similarly, the archaeological analysis was conducted using three types of source material, to include: archaeological site records and Great Lakes ship wreck databases containing comparative data; an analysis of field data collected during the 2005 ECU field investigations of North Point Reef near Thunder Bay, Michigan; and published archaeological sources that put forth conceptual alternatives for archaeological site interpretation according to behavioral dimensions (McCarthy 1983; Schiffer 1987; Duncan 2000, 2004; Gibbs 2006).

Chapter Organization

Working from the assertion that an analysis of North Point Reef Ship Trap would benefit from an understanding of the regional systemic context, an historical framework will be constructed that incorporates broad economic, political and social considerations. As indicated by the introduction, determining the historical circumstances and social conditions at a macro level will aid in the final interpretation of the site formation processes at a micro level. Not only will the historical and social analysis provide an interpretive construct from which to view North Point in a specific archaeological context, it will also provide an avenue for making comparative regional inferences in the final analysis. The presentation of material in each chapter will, therefore, be organized with the concept of macro to micro in mind. To further clarify the sequence of the analysis, a brief overview of subsequent chapters is presented below.

Chapter 2, The Evolution of Great Lakes Commerce, documents the dramatic rise of Great Lakes commerce in the midst of a rapidly expanding nationwide western frontier. The chapter chronicles a 300 year period of Great Lakes commercial activity in order to demonstrate an evolution of exhaustive practices within the five main extractive industries: Fur Trapping; Fishing; Lumber; Agricultural; and Mineral and Ore. Moreover the chapter details how the Lake's rich marine environment provided a strong economic base for the rapid development of industry from the early 1800s and supported over two centuries of ever-increasing settlement, exploitation, and export. Statistical evidence is also introduced to further illustrate how the continued growth of these industries and the routine employment of more efficient extraction methods led to a corresponding rise in intensive shipping practices on the Great Lakes.

In Chapter 3, The Correlation between Intensive Shipping and Salvage, is explored. The chapter focuses on describing the political, economic, and social conditions within the overarching commercial history in order to demonstrate the driving forces behind nineteenth-century shipping practices. From this discussion, the specific circumstances are defined that prompted the initiation of Great Lakes maritime salvage. To support the assertion that intensive shipping brought about widespread commercial salvage, statistical evidence is provided to reveal a progression of related historical events. First, there is a rapid increase of Lakes' waterborne traffic to accommodate the expanding operations of extractive industries. Parallel to this activity, the shipping industry also dramatically increases the size of commercial vessels and implements continuous adaptations aimed at increasing productivity, and thereby profit. In an age of "industrial economy," where cost minimizing practices and profit are emphasized over caution and personal safety, the result is an extremely dangerous climate for mariners. Subsequently, in the mid 1900s, a rise in shipping fatalities occurs. To offset the growing costs and losses from the steady occurrence of waterborne disasters, the necessity for a marine salvage industry arises.

Chapter 4, *Congress*: A Case Study of Great Lake's "Industrial Economy," presents the vessel *Congress'* biography to demonstrate the lifecycle of a vessel during the era of industrial economy. *Congress'* history not only provides a direct link between the systemic and archaeological context, it also supports the assertion that

North Point Reef operated historically as a ship trap. Specifically, the vessel's lifespan illustrates the flexible nature of Great Lakes vessels during the nineteenth and early twentieth centuries. A detailed description of *Congress*' uselife clearly illustrates the intersection between social behavior, technological change and economic necessity. Furthermore, the vessel's construction and adaptation demonstrate the utility of technological transitions in response to commercial demand. The depiction of *Congress'* demise and subsequent salvage, however, is ultimately relevant to reveal a regional trend of reuse and recycling.

Chapter 5, The Development of Salvage in Antiquity, provides a discussion of the importance and prevalence of salvage in early maritime cultures. The industry's technological evolution as well as its longstanding commercial utility is examined through historic accounts to demonstrate its evolution as a cost-reducing business strategy. As maritime commerce increases, a genesis of salvage strategies enables ship owners and insurance agents to mitigate lost revenue from shipwrecks. Essentially, the chapter's chronology of technological developments and commercial characterization provide an integral segue for a discussion on the establishment of a Great Lake salvage industry.

Chapter 6, The Evolution of Great Lakes Maritime Salvage, specifically discusses the necessity and subsequent evolution of commercial salvage in the Great Lakes. Given the high rate of regional maritime disasters, valuable cargos of ore and timber offered sizable profits to parties capable and willing to take the time and risk of retrieval. The preservative qualities of the cold, freshwater environment and the location of most shipwrecks in sheltered near shore areas also made conditions conducive for the recovery of virtually any wrecked vessel. Again, in an age of industrial economy, shipwrecks merely presented an additional avenue for potential revenue if recycled back into the Great Lakes commercial system. Collectively, Chapter 6 intends to demonstrate the multi-faceted, opportunistic nature of salvage and how it operated within the intensive commercial climate outlined in Chapters 3, 4 and 5. The chapter also details specific Great Lakes practices in order to characterize pre and post depositional cultural site formation processes acting upon the archaeological context of North Point Reef Ship Trap.

Chapter 7, North Point Reef: A Great Lakes Ship Trap, presents an analysis of the 2005 North Point Reef archaeological investigations. The chapter delineates the project's specific geologic and historic context to place both the physical location and archaeological remains of North Point Reef Ship Trap in a defined conceptual framework. From this framework, the quantified results are compared with historic variables to determine if archaeological indicators of temporal and behavioral patterns are consistent with the historic record. Ultimately, the North Point Reef site assemblage analysis is an analytical exercise in archeological inference that tests the relevance of using historical data to verify postulates. In addition, the project findings also address the merit of using shipwreck archaeology to determine cultural variables that are not just solely related to the physical remains.

Chapter 8, Conclusions: The Relevance of the Current Ship Trap Research in both an Historic and Archaeological Context, addresses the study's overall contribution to the field of underwater archaeology. The assertion put forward by the current research is that Great Lakes historic shipping practices left a physical mark on the region's landscape in the form of ship traps. Delineating the underlying social, economic and environmental conditions that contributed to the formation of North Point Reef trap allow for a broader application of study findings. The conditional characteristics identified by the current study can be used to identify other regional ship trap locations or similar types of submerged cultural resources. Furthermore, the analysis has the potential to be utilized for future comparative studies to establish a paradigm for ship traps that occur in other coastal environments.

CHAPTER 2

THE EVOLUTION OF GREAT LAKES COMMERCE

To understand the systemic context of Great Lakes ship traps during the nineteenth and early twentieth-century, it is first necessary to demonstrate the economic significance of the region historically. Moreover, the objective of this research is to demonstrate the specific nature of Great Lakes commerce and explain how a mutually reinforcing cycle of intensity drove commercial enterprise region wide. This is accomplished by reviewing each predominant industry's history, to include technological advancements and adaptations that spur on development, as well as external social, economic and political forces. A complete understanding of the particular nuances that each industry brings to the history of Great Lakes commerce is relevant because it demonstrates a pattern of behavior that is conducive for the evolution and subsequent utility of ship traps regionally. Similarly, a discussion of Alpena within the context of Great Lakes commerce will directly link the overarching social and economic system with that of the material remains present at North Point Reef Ship Trap.

Great Lakes Commerce and Industry: An Examination of Intensive Practices

The history of Great Lakes shipping and commerce began almost immediately after French explorers set up camp at the mouth of the St. Lawrence River. In 1615, the Father of New France, Samuel de Champlain, led by friendly natives through a network of inland waterways, "discovered" the coast of Lake Huron (Plumb 1911:7; Hatcher 1944:520). With this brief glimpse, the first era of Anglo-American regional exploration and exploitation was ushered in. Initially, the abundant marine resources of the Lakes' coastal and inland reaches provided a steady supply of goods to French traders and absentee entrepreneurs exclusively. The lucrative business of fur trapping, however, could not be kept quiet for long. Subsequently, the region immediately attracted numerous English settlers who also found the region a haven away from European soil.

From this point over a century passes with relative regional solitude but, in the background, colonial competition brews. The desire for sole possession eventually led to conflict and conflict turned into open warfare. In 1754 the French and Indian War (1754-1763) was declared between the British and the French as an extension of the continental Seven Years' War. The battles were primarily fought to determine control over the fertile Ohio River Valley, but the war also extended to northern Great Lakes territories. Once the war was over, the victorious British, on the eve of industrialization, renewed their focus on the wealth of Lakes' resources. At this time the storehouse of aquatic life and living timber was recognized. Yet, before any significant commercial interest could develop, warfare on a number of fronts interrupted again. Conflict with Native Americans in the 1760s gave way to a full scale rebellion of English colonists in 1776-1781. As a consequence of the American Revolution, advancement toward regional development was delayed for a short while (Plumb 1911:12).

When the former colonies gained independence in 1781, the United States' industrial transformation began. In order to survive, the fledgling country turned its attention toward endeavors that would sustain the economy. For many, the vast northern territories provided a solution for the development of capital. The Great Lakes were close enough in proximity to be accessible from eastern river ways and abundant enough in resources to be profitable for even the smallest enterprise. Therefore, at the turn of the nineteenth-century, settlers, small time entrepreneurs, and industrial giants alike, all pushed deep into the American frontier in an attempt to gain control over the resource rich area (Ashworth 1986:54-55).

At this time, the only obstacles to full scale development were the sheer wilderness of the area, as well as Native American occupation. In order for development to occur an infrastructure had to be created that would provide a reliable supply line for resources to flow between the existing American settlements in the east and the new Northern frontier (Lewis 1976:14-15). Of principal importance was the creation of a reliable transportation network that would ensure a steady supply of basic provisions to settlers as well as necessary materials for construction of town sites and distribution facilities. From the creation of a single frontier base, further settlement and development would continue. In the case of Great Lakes frontier settlements, an early reliance on waterborne transportation evolved. This is the easiest route for necessary goods and supplies because reliable overland passages were not yet in place.

Yet, before any real progress was made toward advancing widespread regional settlement, warfare intervened a third time. This time, however, the War of 1812 (1812-1815) provided a catalyst for further commercial growth on the Lakes rather than a decline (Ashworth 1986:52). This is due, in part, because the nature of the war was predominantly naval. In order to compete with the better funded and more advanced British Royal Navy, the United States had to invest in ship construction. Ship building was integral to the war effort in general, and on the Great Lakes, in particular, because of the maritime setting. Furthermore, after the outset of the war, both sides realized an increase in naval strength by either side would ensure regional victory on the Lakes (Plumb 1911:15). As control over the Lakes region was a primary interest in the conflict and effectively controlled all troop movement, a victory there would aid in the war's overall success. Consequently, the increased maritime activity during the conflict resulted in both the construction of a multitude of vessels and the training of numerous men as sailors (Plumb 1911:16).

The end of the War of 1812, therefore, marks the birth of the Great Lakes merchant marine (Plumb 1911: 16). In addition to the possession of an experienced fleet, the burgeoning Great Lakes also acquired an assortment of ancillary facilities and improved ports of call that previously supported naval activity. With a basic level of infrastructure in place to support new industry and settlement, Great Lakes commercial activity had the capacity to expand rapidly. In only a few decades, the small amount of infrastructure provided by the war effort paved the way for the development of numerous extractive industries. According to the historic literature, the five extractive industries that were predominant are: fur trapping; fishing; lumber; agricultural; and mineral and ore (Barton 1848; Andrews 1852; Mansfield 1899; Plumb 1911; Landon 1944; Hatcher 1944; Ashworth 1986).

Historically, each industry had a tremendous impact on the Lakes region in regards to the natural environment as well as the economy. A pointed investigation of each will demonstrate the exhaustive nature of Great Lakes industry and commerce in the context of broader commercial practices extant during this period of United States history. Furthermore, the chronicle will discuss how rapid growth of industry and commerce also led to a mutually reinforcing, parallel practice of intensive maritime cargo transport. Operating in unison, as extractive industries implement technology to increase productivity, the shipping industry countered with developments that increased the carrying capacity or further streamlined the shipping process. The result is a highly refined system geared toward intensive exploitation and material transport and the ensuing Great Lakes commercial machine grew to such dominance that all other considerations for regional development become secondary.

Fur Trapping

Fur trading between Native American's and French explorers began almost immediately after contact. It was realized early on by both parties that each possessed goods that the other wanted. Copper kettles, tin cups, gun, knives and bright fabrics were among the favorite choices for natives in return for beaver, otter, mink, sable, fox, marten and other animal pelts that held considerable value for explorers when exported to Europe (Hatcher 1944:193). While small scale trade operations existed from the start, it has been asserted that the true scope of fur trading was not realized until 1658 (Ashworth 1986:37). Two young Frenchmen, Pierre-Esprit Radisson and Medard des Groseilliers, set off into the wilderness near Quebec in search of adventure and the fabled "fifth sea" that natives claimed lay deep in the heart of Iroquois country. The claim of a large body of water held considerable promise for early French explorers because it was a common belief that somewhere hidden in the New World was a short cut leading to the rich Asian trade ways. Samuel de Champlain, Etienne Brule, Jean Nicolet, and Rene-Robert Cavalier, better known as Robert de La Salle, all pursued this passage in their lifetime. What Radisson and Groseilliers discovered, however, was not the glory of a northwest passage; rather, it was the capacity for massive fur exploitation. With the help of native guides, the two returned to Quebec leading a convoy of 360 fur laden canoes (Mansfield 1899:76-77; Ashworth 1986:36-38).

In the ensuing years, systematic exploitation of fur resources began. Native American guides and trappers were quickly supplanted by an onslaught of Frenchmen, and later Englishmen, willing to adopt native life ways and live out their lives hunting for profit. Crude native animal traps and techniques soon gave way to more effective European steel traps. As the business expanded from its initial local context, large scale corporations moved in. Monopolies formed under absentee European conglomerates became exclusively designed for export to European markets where the greatest profit could be earned. By 1780, the income from Great Lakes fur exports total 1,000,000 annually (Hatcher 1944:197). At the turn of the century, production had increased so dramatically that 6,000,000 pelts per year were exported, fetching any where from fifteen cents to $500 a piece (Hatcher 1944:197).

At its greatest extent, the industry penetrated nearly 1,000 miles inland and as far west as Oregon and California (Mansfield 1899:75; Ashworth 1986:38). Through such concentrated efforts, however, the plentiful Great Lakes supply of fur bearing animals rapidly declined. By 1830 the heyday of lakes trapping came to a close as other competing interests fast compromised pristine hunting grounds. By the mid 1800s, immigration to the United States, as well as migration within, reached epic proportions and the settlement of fertile land was encouraged by the government in order to bolster the national economy. The frontier had pushed well beyond the Ohio River Valley, the mid-western Plains, and the Western frontier was fast coming to a civilized close.

As fur trapping required a level of isolation for success, the process of settlement directly conflicted with the industry's persistence (Landon 1944:66). Therefore, as European fashions changed, and land sales and timber rights became more lucrative, the Great Lakes reliance on the fur industry became less central to the economy. This does not mean that fur trapping ceased all together. Trapping did persist, however, at this point it became relegated to northern territories that were less likely to become inhabited.

Fishing

As the trapping era came to a close, increased settlement of the Great Lakes necessitates the pursuit of alternative economic activities. One activity that naturally followed settlement of a marine environment was fishing. Fishing within the Great Lakes region existed at a local level since prehistoric times, and upon arrival to the region, fishing was also the first pursuit engaged in by Europeans settlers. In fact, the first French settlement established in North America was a fishing station at Brest in 1520 (Mansfield 1899:579). The outpost was situated along the Labrador coastline in order to exploit the plentiful stock within the straits of Belle Island near the mouth of the Saint Lawrence River.

Commercial level fishing, however, did not begin in the Great Lakes until the more widespread settlement of the region began to occur in the mid to late 1700s.

Among the most popular species were whitefish, sturgeon, bass, pickerel, mackerel, smelt, yellow perch-pike, herring and catfish. From this industry a number of small lake communities developed, paving the way for further settlement and economic activity. The majority of the fishing areas were situated within island straits near bay and river entrances and other near shore areas. Principal fishing communities established within the Lakes included those based along the Saint Mary's River, Sandusky Bay, Port Huron, Thunder Bay, Tawas Bay, Hammond's Bay, and Green Bay. Countless other smaller areas of operation, however, are also known to have existed (Mansfield 1899:572-574; Hatcher 1944:283-289).

As with fur trapping, Euro-American settlers quickly substituted technologically superior tools for the trade as soon as they become available. The single motivation was to maximize daily catches in order to secure greater profits. Therefore, traditional deployment of single-line and cast netting swiftly evolved into the practice of letting out thousands of yards of gill nets. Gill netting dramatically increased the daily catch because of the effective design. A gill net is essentially a long sheet of netting that comes in a variety of mesh sizes, dependent upon the targeted fish size. The sheet was weighted on one lateral margin and then dropped into the water to form a barrier that extends the depth of the water column. Fish swimming into the barrier get caught in the mesh by their gills and can not swim either forward or backward. Once trapped, the netted fish were then reeled onto large spools aboard deck where fishermen weeded through the catch, sorting the fish by species for later sale at the fish house (Hatcher 1944:288-289).

Gill nets are just one of the fishing industry's advancements toward increasing productivity historically. Impounding net styles, intent on catching fish in the traditional fish trap manner also evolved during this time frame. Pound nets, trap nets and fyke nets all catch fish in mass quantity and at greater depths than gill nets which were used in shallow water environments. Likewise, long line or trot line fishing, evolved from traditional single line fishing. This technique involved attaching multiple hooks incrementally along a single longer line. In order to maximize the daily pull, a typical trot line contained upwards of three to four hundred hooks on just a 16 foot length (Hatcher 1944:289). In combination with the advent of steam powered vessels and machinery, the Upper Lakes annual catch soared to 28,000,000 pounds of fish by 1873 (Hatcher 1944:288).

Unfortunately, gill nets and other similar fishing technology proved to be so effective and destructive to the native marine population that the British repealed American fishermen's rights to fish the territorial waters of colonial Canada in 1818 (Andrews 1852:35-36). The legislation was enacted to prevent generalized over fishing and to curtail the popular practice of taking mass catches during spawning season. This sort of activity not only devastated the active species population, but undermined future populations. While this date marks the beginning of Canadian government regulation of destructive fishing practices, the United States government remained passive until 1873. It was not until then that both the state and federal governments recognized regulation was needed to limit the unrestrained practices of the Great Lakes fishing industry. Efforts at fish farming, which began as early as 1748, now also became an important aspect of late nineteenth-century government action to repair the damage that had been done over the mere course of a century (Mansfield 1899:570-575).

Lumber

In 1836 Great Lakes pioneer and explorer, Henry R. Schoolcraft negotiated a treaty with Michigan's Native American population to cede rights over their lands. From this date forward, intensive commercial logging of the area ensued (Landon 1944:110). "Timber barons" and local lumbermen rapidly cut their way westward. Similar to fur trapping and fishing, a careless attitude toward extraction was adopted because the initial assessment of the resource was one of endless supply. The scope of resource is hard to imagine given the landscape left to this day and age; however, period documentation describes the Great Lakes region as composed of three distinct old growth forests. Northern areas around Lake Superior and parts of Lake Huron hosted a boreal forest dominated by coniferous species. To the south, Lake Erie and Lake Michigan were populated by a hardwood forest. The central region, popularly known as the "North Woods," supported a transitional forest that boasted both coniferous softwoods and deciduous hardwoods. It is this middle region where the most destructive lumber practices occurred (Ashworth 1986:68-71).

Timber was one of the most important resources fueling the expansion efforts of the country throughout the eighteenth and nineteenth centuries. In terms of both construction material and as a fuel source, lumber products were almost exclusively the principal choice. In this climate, the decimation of the North Woods was a natural course of action required to facilitate regional settlement. Clearing land of timber served two purposes. Lumbering provided the necessary building material for houses and other structures and it also cleared parcels for agricultural development (Ashworth 1986:69). For centuries, people have adopted this pattern of settlement. Therefore, during an age where the defining characteristics of the area were immigration, migration and extensive development, it is no wonder that rampant exploitation occurred.

This also explains why settlers did not have the immediate foresight to keep from depleting the resource within a matter of decades. The sheer scale and scope of resources witnessed by the tremendous influx of people settling the Great Lakes at this time created a common misperception that there was plenty to go around. When considering the local needs for the resource, this assumption could have been reasonable. However, the harvested wood was not just cut to provide lumber for Great Lakes settlement but also for the throngs moving to the grassy plains of the country's Midwest and for international interests. Consequently, it was businessmen targeting the national and international lumber market who were the true culprits behind the decline of the northern timber country.

During this era the mass extraction of lumber resources was also facilitated by technological advancements and an evolution of harvesting techniques that maximized production. Logging operations rapidly evolved from manual, single saw cutting enterprises to mechanized endeavors that employed a range of tasks designed to get the job done systematically. Nineteenth-century lumber processing typically involved manually clear cutting whole areas and transporting the raw material to a river or stream that would have access to a nearby saw mill. Once waterborne, logs would be floated down either individually or chained together in a group or raft. At the saw mill, steam powered engines drove circular or band saws that could produce thousands of board feet daily.

Infrastructure to support the logging business also grew to accommodate the fast rate of production. Naturally, the first developments toward facilitating the removal of harvested resources were related to streamlining the production process. Consequently, saw mills and port cities grew up along coastlines and river mouths, acting as way stations for cargo vessels and centers of distribution. During this time, many small communities rapidly became prominent cities strictly owning to the boom economy created by the lumber industry. Nowhere was this clearer than in Saginaw Bay, situated on the western coast of Lake Huron. By 1835, Saginaw Bay became one of the principle locations for timber production in the Upper Great Lakes region. It all began with a single mill powered by a recycled steamboat engine that could produce a mere 2,000 board feet per day (Ashworth 1986:71). In a matter of two decades, this single mill turned into dozens that lined the river banks of the Saginaw River. By 1888, when Saginaw hit its peak production rate of 1,497,989,140 board feet, the number of mills was approximately 100 (Mansfield 1899:515-516; Ashworth 1986:71).

In addition, the Great Lakes shipping industry also played a central role in the destruction of Great Lakes regional timber. During the logging boom, there was a great need for the transport of vast amounts of material across the Great Lakes. To keep up with the rapid rate of lumber production and products of other growing industries, the demand for cargo transport fueled an aggressive pursuit of technological advances in ship construction and propulsion systems. Corresponding with the rise of mass production practices in other industries, the streamlining of shipment practices was most significant through the nineteenth and into the early twentieth-century. Vessel forms evolved to maximize cargos, increase speed of transportation and simplify the process of loading and off-loading bulk material. The adoption of steam technology, likewise, revolutionized shipping as vessel engines, propulsion systems and ancillary equipment evolved to meet the Great Lakes shipping industry's growing needs. The cumulative effect was a continuous introduction of innovative shipping strategies intended to increase the efficiency of cargo vessels (Rodgers 2003:23).

During the same time frame, overland railroad networks were also providing access to and from inland areas. Separate, but related, the two industries were complementary, and before long they began acting in concert as well as in competition (Plumb 1911:25). In the 1840s railroads began building and operating steamship companies for passenger transportation and later cargo transport (Morrison 1958:373-374). Like commercial shipping, the proliferation of the railroad industry was entirely fueled by the industry's ability to streamline the transportation of resources. By forming cooperative relationships with steamship companies, the gaps in rail service were filled between main port cities and hinterland towns of the Great Lakes states. The result was a highly effective system for the shipment of cargo and passengers between land and sea.

The reciprocal relationship between railroads and shipping interests, however, was one married by the drive for increased productivity and profit. The mutually avaricious motivation, therefore, also created a significant competition between the two.

Fueling the conflict was the relentless push for more intensive resource extraction and transportation by external industrial influences (Mansfield 1899:530,548). Consequently, increased competition led to each entity decreasing freight charges in order to capture more of the transportation market. The lower freight charges in turn led to a decrease in market profits because the payloads and turnaround times were still the same. Decreased profits prompted both maritime shippers and railroads to implement even more intensive, time saving practices in order to recoup the lost costs (Mansfield 1899:530-536; Plumb 1911:27-28).

The combined measures implemented by all of the industries involved eventually led to the decimation of the region's woodland forest. The end of the timber boom came circa 1920 (Ashworth 1986:68). The practice of intensive commercial shipping, however, persisted and continues to play a part in the subsequent rise of other prominent industries that contributed to the Great Lakes' commercial significance.

Agriculture and Grain

In the context of Great Lakes commerce, agricultural produce, like timber, is one of the first bulk commodities shipped extensively via waterborne transport. Initially grain and other agricultural by-products were predominantly inbound commodities (Mansfield 1899:526). This can be attributed to the large amount of stores and supplies needed to sustain the mass influx of migrants settling the area (Mansfield 1899:526; Barton 1846:14; Plumb 1911:23). In fact, through the mid 1800s furniture was one of the most predominant cargos transported on the Lakes (Barton 1846:16, table 1). Once settlement progressed enough for infrastructure to develop, however, the region's capacity for commercial transport expanded. As a result, eastward bound agricultural trade, particularly in grains, gained tremendous momentum throughout the mid to late nineteenth-century.

At first, agricultural commerce dominated Lower Lakes' maritime shipping. Ohio ports became ready outlets for Midwestern grain shipments bound for the eastern seaboard via the Erie Canal. Opened in 1825, the Erie Canal reduced overland transfer complications between Lakes Erie and Ontario. The construction of canals throughout the Great Lakes area proved to be a significant step toward expanding commerce. Canals allowed bulky and time sensitive cargos, like flour and grain, to be transported faster and more efficiently between the different lake shores. Previous methods of transferring cargo between lakes entailed manually offloading and reloading cargo overland (Mansfield 1899:529). After the Erie Canal, the Welland Canal was constructed in 1829 to circumvent the Niagara escarpment, and a number of other canals or extensions were planned to avoid other navigation impediments between the lakes and the eastern seaboard.

By mid-century, the canal system in the Great Lakes provided seven major commercial passages to the eastern seaboard's international markets (Hatcher 1944:190). The abundance of agricultural products that flowed through the lakes network placed the Great Lakes region, as well as the terminus of this commerce, New York City, in a position of considerable commercial prominence. As the growing territorial interior began to yield higher grain returns, Lakes citizens built the necessary infrastructure to support transportation efforts. Comparable to the rise in sawmills lining Lakes river ways many port towns also supported the erection of grain elevators. Inland regions along Lakes Erie and Michigan were particularly prominent in grain trafficking because of their access to interior resources from the Ohio, Illinois, and Mississippi Rivers.

By the turn of the twentieth-century, agricultural and grain production had grown so rapidly in the United States that it comprised 20% of the entire Lakes trade (Mansfield 1899:526). The first large, eastward bound shipment of grain came from the Lake Michigan area in 1836, an annual total of 3,000 bushels. From this point forward, primarily due to parallel advancements in vessel cargo capacities, grain shipments increased at an exponential rate. A passage from a letter dated July 25, 1846 and written by James L. Barton, the Steamboat Association's Buffalo Agent, to Robert McClelland, Chairman for the United States House of Representatives Committee on Commerce, describes the impact of the grain trade on Lakes commerce:

> Of the immense crops of grain, (except wheat in Ohio) in the States bordering the Lakes, but little of which, not exceeding one third part, was shipped last fall, will, if succeeded by a good crop the coming season, give such a volume of commerce to the Lakes, as has never before been witnessed (Barton 1846:16).

Chicago, by far, possessed the largest grain trade during this period. The first grain elevator was built in Chicago in 1839. To keep up with the incoming grain stores, the city introduced the first steam elevator in 1848 and by 1857 constructed eleven more elevators. This gave the city a combined holding capacity of 4,095,000 bushels; however, by 1897 the city's holding capacity grew to an incredible 32,150,000 bushels of grain (Mansfield 1899:529-530). In terms of commercial transport, in 1840, the annual transfer of grain between Chicago and Buffalo totaled 160,000 bushels. In 1856, along the same route, it was reported that 650,000 bushels of wheat were transported in October and November alone and 650,000 bushels of corn in July (Mansfield 1899:529). By 1860 the total number of bushels transported along the Chicago/Buffalo route was 28,000,000 bushels (Plumb 1911:24). To further illustrate the incredible significance of these numbers, contrasting figures indicate that Chicago's combined agricultural output in 1860 equaled three quarters of the combined 40,496,000 bushel output for seven of the largest European city markets (Mansfield, 1899:529-530).

In order to understand this astounding increase in agricultural production, Great Lakes commerce should be considered within the context of America's commercial development in general. During this period in American history, agriculture entered the industrial revolution, emerging as one of many mass production industries developing nation wide. Throughout the nineteenth-century, the western frontier moved at a dizzying pace toward the Pacific coast. In fact, more new territory was settled between 1870 and 1900 than in the entire previous history of the country. Notwithstanding Kansas, Nebraska, and Nevada's admittance to the union in the 1860s, nine more states were admitted between 1876 and 1907, including: Colorado, North Dakota, South Dakota, Montana, Washington, Idaho, Wyoming, Utah, and Oklahoma (Barry 1973[1996]:53; Roark et al. 2005:644).

As a result, millions of acres were opened up for settlement between the east and west coasts. Encouraged by the government, thousands of Americans pushed west to cultivate the vast amount of land being annexed. In this context, the Homestead Act of 1862 is one of the most significant pieces of legislation in United States history because it essentially turned over 270 million acres of publicly owned lands to private citizens for development. Other similar acts passed during this same time frame by the federal government to encourage private cultivation and development of newly annexed territory were the Timber Culture Act of 1873, the Desert Land Act of 1877, and the 1878 Timber and Stone Act (Barton 1846:22; Roark et al. 2005:644,648).

From this type of legislation and the impact of the 1849 Gold Rush on the American psyche, a sort of "land fever" ensued. A mass migration occurred as waves of citizens move beyond the established eastern cities to lay claim on a federally granted 160 acre parcel of land. By 1890 the United States Census Bureau triumphantly boasts that the western frontier no longer existed, only isolated pockets of open land remain (Roark et al. 2005:663). Subsequent to the push for homesteading activity, farming and agricultural output became central to the American lifestyle. In 1860, farmers comprised 60% of the country's population, producing one third of the nation's wealth. By 1880 the percentage of farmers increased to 80 (Roark et al. 2005:651).

Another consequence of homesteading was that the agriculture production base grows far beyond any typical previous capacity. One determining factor behind this was an industry wide transition to large scale agri-business by the end of the nineteenth-century. Similar to other industries during this era, the rise of agri-business changed the emphasis from subsistence based production or small scale cash cropping to large scale mass production. Supporting statistics for this indicate that of the 2.5 million farms established between 1860 and 1900 only one in five was small scale homesteaders, the rest were large scale profit driven operations. Furthermore, by 1900, while there was a decline in the country's farmer population to about 40%, agricultural products continued to maintain approximately one quarter of the nation's output (Roark et al. 2005:648-652).

Another reason for the dramatic rise in production, as well as the corresponding decline of small scale enterprise, was the advancement of technology. Again, similar to other industries, technological advancements made during the mid-1800s move agriculture away from intensive manual labor and toward task mechanization. The employment of mechanical plows, planters, and threshers allowed for vast amounts of land to be cultivated in less time, with less labor and expense for a large scale operator. The expensive new equipment, however, prevented smaller operations and individual farmers from taking advantage of the more efficient techniques. As a result, commercial farming became more cost effective and traditional small scale agriculture declines while overall production increases. At the same time, while the mass production phase of the logging industry passes within a matter of decades for the Great Lakes shipping industry, agri-business provides a long term commodity base and also gave the United States considerable international influence (Hatcher 1944:278-281; Roark et al. 2005:648-652).

Mineral and Ore

The justification for persistent interest in Great Lakes mining development was the rise of American industrialization in the east. Eastern steel markets required iron ore in mass quantities and at a constant pace in order to compete with markets abroad (Plumb 1911:3; Ashworth 1986:86-88). Prior to 1873, however, the Great Lakes ore trade was not a large scale extractive industry (Plumb 1911:25). French explorers had cultivated interest in copper mining since the early 1700s, but, as with the other Lakes industries, a certain level of infrastructure was necessary for mass exploitation (Mansfield 1899:117; Hatcher 1944:297). Similarly, when iron ore was discovered in 1844 by United States Surveyor William Austin Burt, a decade passed before systematic extraction operations began (Mansfield 1899:554; Hatcher 1944:299-300; Ashworth 1986:81-82; Dappert 2006:8-9).

Regardless of the lack of infrastructure and means for large scale export, discovery of iron veins in Michigan's Upper Peninsula instantly led to a "rush" by thousands of would be prospectors. Similar to the 1849 California gold rush, people came from all the across the nation, as well as other countries, to strike it rich. Unfortunately, the harsh climate and rugged terrain of northern Michigan prevented most from succeeding. For a few well funded entrepreneurs, however, the Great Lakes iron ore industry boom had begun. Continual discovery of more resources kept interest alive and money coming in to finance operations located in the distant, undeveloped region surrounding Lake Superior. In 1845, a 50 foot cliff face of pure iron ore was discovered and another large iron deposit was located south near the Wisconsin-Michigan border in a place called Iron Mountain. Shortly after this, another iron lode was discovered in north-central Minnesota's Mesabi Range. The discovery was the richest to date and over time produced a continuous stream of ore over the course of 80 years, yielding approximately one million tons per week (Ashworth 1986:84-86).

The first shipment of Great Lakes ore, however, started small. Essentially, the first ore loads were trial lots sent east in barrels for testing in 1850 (Mansfield 1899:555). After requests for increased extraction, however, immediate wholesale exploitation was hindered by the ability to transport the material efficiently past the Sault Saint Marie falls. Large scale mining operations were extremely costly and technically complicated given the required processes for extracting resources from the ground. Compounding the difficulty with product transportation problems only increased the likelihood of failure. The greater the distance to profitable markets, the harder it was to justify the expenditure of time and money without a reasonable assurance of success (Ashworth 1986:86-88).

By 1852 national demand for regional ore development prompted planning for a canal to circumvent the 19 foot falls out of Lake Superior. That same year Congress granted 750,000 acres to support construction by private interests. Work commenced in 1853 and was completed two years later, the final product was a 1.5 mile long canal with two 350 foot locks that raised or lowered vessels eight or ten feet respectively (Mansfield 1899:555; Beeson 1919:175; Hatcher 1944:302-305). From this point forward, a flood of Lake Superior ore shipments began. In 1855, the first year the canal was open iron ore shipments totaled 1,400 tons and over $6,000,000 worth of cargo. By 1856, the lock saw an 800% increase in ore shipments as 11,000 tons passed through toward the eastern market (Hatcher 1944:305). In addition, settlement of the area, continued to increase both outward and inward bound traffic through the locks, which in turn increased the further exploitation of additional mining resources.

The onset of the Civil War (1861-1865) also proved to be an impetus for continued mine development on the Great Lakes. Not only did it create a higher demand for Lakes' shipping services, it stimulated greater interest in iron ore production. When Southern forces cut off Union railroad supply lines from western territories along the

Mississippi, the majority of traffic was diverted to the Great Lakes region. This coincided with the Union's growing need for the production of large and small munitions and weaponry, as well as iron sheeting for armor plating. As a result, in 1862, for the first time, capital returns were declared for investors in Great Lakes mining companies. After this, yearly shipments began to increase tenfold over the next decade. The annual iron ore shipment of 124,169 tons in 1862 grew to 1,162,458 tons by 1873 and peaked in 1890 at 2,992,664 tons (Mansfield 1899:555; Hatcher 1944:310).

Other commercial minerals and ores in the Great Lakes included primarily copper, sandstone, limestone, magnetite, hematite, and nickel. Copper mining, as discussed previously, was the original commodity sought after in Lake Superior. It was used extensively in the ocean going maritime industry as sheathing for wooden hulled vessels, an anti-fouling necessity, as well as for a number of other purposes to include munitions manufacturing. Sandstone and limestone were mined commodities historically for construction purposes and are still heavily extracted for this purpose. Limestone, along with magnetite and hematite, was also a mined for use in steel production. The process for making steel involves heating a mixture of crushed iron ore, coke, and limestone to approximately 3,000 degrees Celsius. The heated mixture, having burnt off impurities, could then be manipulated by adding other minerals and metals to increase desirable qualities in the final product (Ashworth 1986:87-92).

Coal was another significant mining resource for the Great Lakes shipping industry. While not primarily native to the Great Lakes region, this major cargo required the same bulk shipping strategies. Originally, coal was an inbound commercial product shipped from Pennsylvania and West Virginia mines for use as a fuel to fire the steam engines of vessels and furnaces in factories and mills. Prior to the depletion of American timber stores, coal supplanted wood as a fuel source due to its ability to sustain higher temperatures for longer durations. As well as being a more efficient fuel source, the mass amounts of coal needed during the industrial era contributed to the drive for further developments in large scale shipping practices. Between 1890 and 1896 alone the total shipment of coal from major Great Lakes ports totaled 49,715,998 tons (Mansfield 1899:547-553).

The combined impact of the Great Lakes mineral and ore extraction industries required an even greater concerted effort toward bulk shipping strategies. While the need for transporting large shipments of timber and grain had paved the way for larger vessels and the improvement of navigation routes, mineral and ore shipments provided an even stronger impetus for the evolution of shipping technology. In addition to larger vessels that could carry bigger payloads, ancillary infrastructure was needed to streamline the loading and off loading process as well. Expanded infrastructure to accommodate the wider and deeper drafted hulls included harbor and port improvements, the installation of pocket docks and mechanical conveyor belts that revolutionized cargo loading and offloading, as well as additional railroad extensions to facilitate inland cargo transfer. All of these improvements led to a highly refined "integrated bulk cargo system" (Rodgers 2003:23).

Throughout the nineteenth-century increased productivity in commercial shipping produced a corresponding rise in mining industry profits. As seen earlier with the fur, fishing, timber, and grain industries, increased profits, in turn, prompted more intensive resource extraction. Heightened production rates were then met with further advancements in efficient resource procurement and shipping technologies. The subsequent self-reinforcing cycle is a defining characteristic of Great Lakes industry and commerce historically.

Alpena in the Context of Great Lakes Commerce

The history and evolution of the port city of Alpena in Thunder Bay directly reflects the stages of early commercial development of the Great Lakes outlined throughout the chapter. The Alpena area was first settled in 1835 after W. F. Cullings set up a fishing camp and erected a light house on Thunder Bay Island, just east of the project area (Boulton 1876:170; Fuller 1939:41). Cullings operations proved successful and other small fishing interests soon followed, with camps being set up on Sugar Island, in between North Point and Thunder Bay Island (Anonymous 1883:193; Fuller 1939:41). In 1836, Jonathan Birch attempted to set up a saw mill, but local tribesmen discouraged the activity (Mansfield 1899:317; Boulton 1876:170). As a result, the area remained relatively untouched by the logging industry until the 1850s.

In November of 1858 the schooner *J. S. Minor* arrived with a ship full of prospective settlers and the little town of Fremont was born. Logging began over that winter to support the basic needs of the newcomers and continued from this point forward. Lumber interests quickly developed and by 1860 the population had grown to 290 people. The following year, as the lumber and fishing industries prospered, the community was renamed Alpena. In 1871 Alpena's first harbor improvements began with channel dredging to increase the depth from thirteen to sixteen feet, thus allowing larger vessels to enter Thunder Bay River to access dozens of sawmills set up along its shores. This event marks the point in time when the small port city transformed into a principle distribution center on the west coast of Lake Huron (Boulton 1876:170; Mansfield 1899:318; Fuller 1939:41).

In 1876 additional government subsidies were authorized for harbor improvements and the construction of Thunder Bay Island Life Saving Station (Mansfield 1899:316-317). Improved harbor infrastructure allowed the city to expand its commercial shipping services as larger, deeper drafted vessels could be accommodated at port. The installation of life saving facilities also served to make the port more attractive to regional commerce. Great Lakes casualty rates were extremely high by the 1870s and ports with life saving services mitigated the costly consequences of shipping disasters. Both human and commercial losses decreased significantly once adequate facilities and procedures were introduced to respond quickly to maritime casualties. Consequent to these improvements, the port town soon rose to a position of regional preeminence.

Despite being much smaller than its southern counterpart, Saginaw Bay, Alpena's harbor celebrated equal success historically. By 1890 Alpena's residential population increased dramatically to 12,139 citizens (Mansfield 1899:318). This is most likely the result of Thunder Bay being just one of two sheltered areas for vessels along the western coastline of Lake Huron (Mansfield 1899:315). Furthermore, in 1889 Alpena was recorded as the Great Lakes largest timber exporter for the year, surpassing the much larger timber port of Saginaw Bay (Ashworth 1986:71).

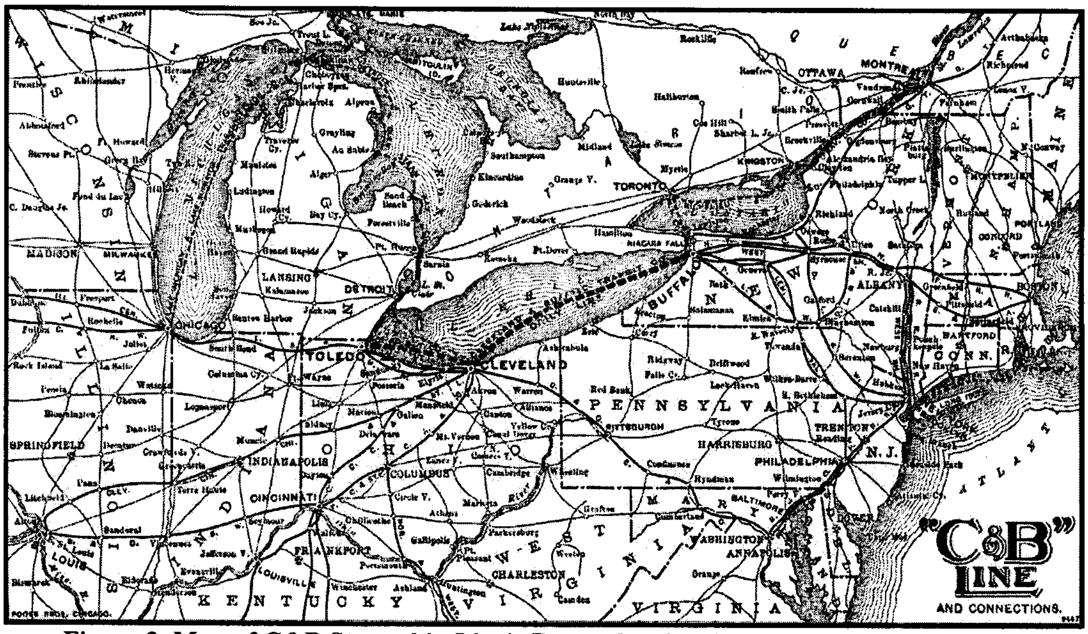


Figure 3. Map of C&B Steamship Line's Route showing Alpena as major port of call (Beeson 1896:352).

Unlike many other logging towns on the Great Lakes, the decline of the timber trade did not bring about the demise of the city. Owning to the significance of the port to regional commerce, the town was somewhat insulated from the boom and bust cycle of a typical lumber town. As an established commercial port that could accommodate bulk carriers, the area transitioned easily during the rise of the next extractive industry. In 1901, the Huron Portland Cement Company began mining limestone on the northwest side of Thunder Bay (NOAA 1999:136-137). Rogers City, home of the world's largest limestone quarry, was also located nearby (NOAA 1999:136-137). Both companies contributed significantly to Alpena's prosperity and enabled the town to persist as a maritime distribution center. Figure 3 depicts a popular steamship line's 1896 Great Lakes service route. The map clearly shows that Alpena is still included as a major port of call well past the heyday of the timber boom.

The characterization of Alpena's commercial history demonstrates the pervasive nature of the era's intensive commercial practices. The same pattern of behavior can be observed throughout the entire microcosm of Great Lakes industrial commerce and shipping. Another such example is the rise of Great Lakes maritime salvage. Within the economic cycle outline above, Chapter 3 continues the discussion on Great Lakes commerce to demonstrate how historic maritime salvage acted as an enabling industry that both reinforced and perpetuated cost effective practices during the nineteenth-century. It should be noted, however, that the exploitive aspects of the commercial system are not unique to the Great Lakes region. As discussed previously, it resulted from broader economic practices extant during this period in American history.

CHAPTER 3

THE CORRELATION BETWEEN INTENSIVE COMMERCIAL SHIPPING AND MARITINME SALVAGE

In order to determine the relationship between historic shipping and maritime salvage it is important to examine the evolution of Great Lakes commercial shipping in the context of nineteenth-century regional development. The objective of the research is to reveal how the underlying political and social motivations driving intensive shipping practices were responsible for the genesis of a regional salvage industry. To accomplish this, Chapter 3 explores the Great Lakes merchant fleet's rapid expansion during the nineteenth-century, as well as commercial vessel adaptation in association with increased productivity. Furthermore, the chapter's examination extends to include a discussion on the lack of federal regulations and financial support for maritime related infrastructure and the corresponding increase in shipping fatalities. It is necessary to have a full understanding of the interdependence between these seemingly distinct aspects of Great Lakes maritime commerce in order to support an assertion that Great Lakes ship traps are a direct consequence of the systemic framework outlined in Chapter 2.

The Great Lakes Commercial Environment

Complete commercial and industrial development of the Great Lakes region was a process that spanned over two centuries (Mansfield 1899:127). This is due primarily to the numerous navigational obstructions that initially barred direct marine passage to the Atlantic Ocean. On the extreme east of the region, various rapids in the St. Lawrence River and seasonal ice hindered outbound traffic to the Atlantic Ocean from Lake

Ontario. Farther west, the Niagara escarpment created the famed monumental falls and cut off access between Lakes Erie and Ontario. This point typically denotes the geographic divide between the Upper Lakes and Lower Lakes. Free passage did exist between Lake Huron and Lake Erie through the St. Clair River into Lake St. Clair and out through the Detroit River. The Straits of Mackinaw which connect Lake Huron with Lake Michigan were notoriously treacherous for mariners historically, but also did not restrict marine passage between the three middle lakes. Lake Superior, the largest body of water in the Great Lakes system, however, was historically cut off from the other Upper Lakes by the Saint Mary River falls (Plumb 1911:6; Hatcher 1944:190).

Given the sheer wilderness of the area and the distinct geological context described above, regional settlement and commercial growth followed the development of maritime infrastructure. Countless streams and rivers provided ready access between the Lakes' open waters and interior reaches, but numerous navigational hindrances made waterborne travel difficult. It was recognized early on that area ports and waterways required a minimum level of improvement to make Lakes passage more commercially practical. Unfortunately, the federal government did not offer financial support for regional development during much of the nineteenth-century. Initial improvements were determined by private fiscal capacity and the availability of technological and engineering advancements in a frontier environment. Accordingly, the earliest Great Lake settlement areas were located in close proximity to established supply lines of east coast settlements (Lewis 1976:14-15). The coastline of Lake Ontario was the first Great Lakes settlement area in the late 1700s and early 1800s. Geographically Lake Ontario already provided an outlet for goods to the eastern seaboard via the St. Lawrence River. Lake Erie was the second in line during these early years of settlement, with development of the remaining Upper Lakes following as supply lines were extended and more profit was generated from the growing commerce of the two Lower Lakes (Mansfield 130-131). Figure 4 below portrays a map of the Great Lakes demonstrating the scope of its commercial sphere.

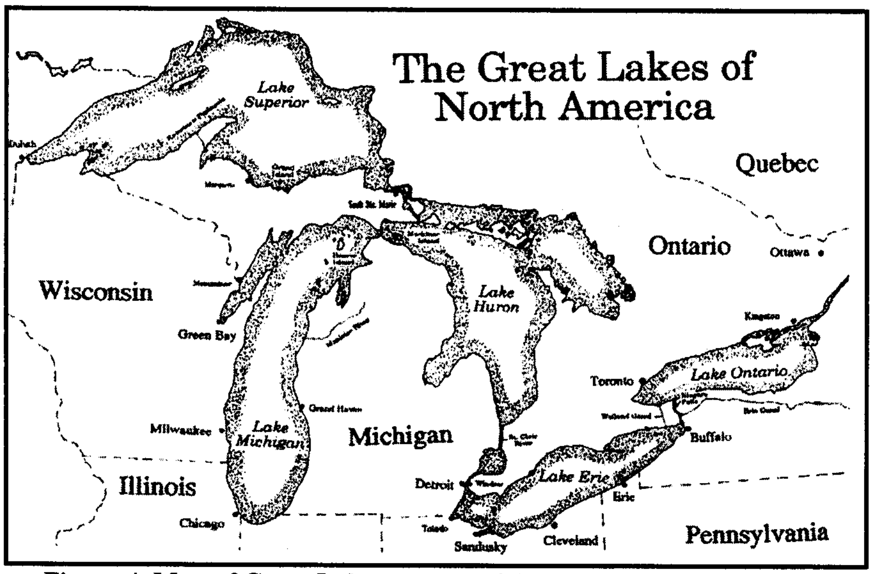


Figure 4. Map of Great Lakes commercial sphere (Rodgers 1996:85).

Commercial Growth and Great Lakes Fleet Expansion

Historically, the dramatic rise of Great Lakes commerce and maritime shipping was unparalleled by any other region in United States history (Andrews 1852:4, 8). This can be attributed to the region's unique maritime context, as well as the social, economic, and environmental circumstances that prompted development. Not only did the convenience and reliability of water borne transportation facilitate the growth of a strong maritime commercial trade, it also assisted in widespread regional settlement. The resource rich environment allowed both large scale businesses and small time entrepreneurs to thrive, as well as provided an economic livelihood for the incoming throngs of people. The tremendous amount of product shipped between Great Lakes ports to international markets also contributed significantly to the wealth of the entire nation. Hence, during a time in American history when economic growth is punctuated by periods of extreme economic distress, Lakes commerce brought an unprecedented level of stability to both the local and national economy.

As early as 1845, it has been estimated that the Great Lakes' commercial trade contributed $81,000,000 to the country's overall wealth (Barton 1846:25). In addition to the year's commercial freight income, the shipping industry also generated considerable proceeds from the growing inter-lakes passenger service. In 1845, the passenger service from Buffalo alone earned an approximated $25,000,000 from 98,736 travelers (Barton 1846:26; Andrews 1852:4). Combined, the 1845 revenue for passenger service and commercial freight transport was estimated as surpassing $100,000,000 (Barton, 1846:25). An 1846 historic study on the importance of Great Lakes maritime trade pointed out that the collective sum in 1845 "nearly equal[ed] the whole Foreign export trade of the Unites States" (Barton, 1846:27).

From this point forward, historic documentation indicates that Great Lakes trade continued to increase at a significant pace. In 1850, just five years later, reported revenue from Lakes commercial freight grew to $311,838,732 (Plumb 1911:24). This is over a 200% increase. It is important to note, however, that the earliest recorded profits are estimates for outbound commercial trade only. A consideration of inter-lake revenue between both American and Canadian ports, as well as accurate statistics detailing the growing passenger trade, would greatly increase the Lakes annual commercial gross. Unfortunately, at this time unregistered trade prevailed and only limited records were available to local and federal assessors gathering statistical data on Great Lakes commerce (Barton 1846:11-12; Andrews 1852:4).

Regardless of the recording accuracy, it is clear that by the mid-nineteenth-century the Great Lakes and the United States were just beginning a long and prosperous relationship. To determine a truthful representation of Great Lakes commercial trade in 1846 the United States House of Representatives' Committee on Commerce ordered an official investigation (Barton 1846). Subsequent Congressional investigations were also conducted in 1851 and 1911 (Andrews 1852; Plumb 1911). This national attention bred further interest in the area, prompting even greater regional settlement and commercial development. The subsequent increase in capital investment and industrial development then brought about a reciprocal demand for more intensive commercial transport. A passage from James L. Barton's 1846 letter to the Committee on Commerce openly confirms the circumstantial cycle of westward migration, regional development and increased production:

> The vast emigration, passing this spring through the extreme length of these Lakes, to purchase and settle the public lands will, annually require an increase in size and number of vessels, to carry off the increasing productions of that fertile section of country, and supply their wants from the sea board (Barton 1846:22).

Statistical evidence also supports the rising number of vessels plying the waterways throughout the nineteenth and into the twentieth-century. In 1810, records indicate that only ten commercial vessels were routinely operating on the Great Lakes. By 1845, however, the number of reported vessels grew to 493 and in the ensuing decades steadily rose. By 1871, an estimated 2,475 vessels were engaged in Lakes commerce and in 1896 the number had risen to a striking 3,036 (Beeson 1896:33-103; Thompson 2000:17).

Maritime Commerce and Transitions in Ship Construction

Developments introduced by the Great Lakes ship construction industry ran parallel to the expansion of commercial ship employment. Historic documentation indicates that during the same time period ship builders began implementing new vessel types designed expressly to foster greater profit in less time. The introduction of innovative vessel technology facilitated both the shipping industry's rapid growth and the cycle of intensive commercial practices extant regionally (Rosenberg and Birdzell 1986; Rodgers 2003). Initially, the most important development in Great Lakes ship construction was the shift from sail to steam propulsion. In 1816 the first Great Lakes steamship *Ontario* was built at Sackett's Harbor in New York and employed the following year in Lake Ontario (Mansfield 1899:588-589; Plumb 1911:18; Carus 1931). The vessel is reported to have had an initial speed of five miles per hour but made regular passenger runs between Ogdensburg to Lewiston until 1832 (Carus 1931).

Regardless of *Ontario's* draw backs, commercial shippers realized the new technology's merit and three years later introduced *Walk-in-the-Water* to Lake Erie's waters (Barton 1846:6; Mansfield 1899:693). *Walk-in-the-Water* was a significant contribution to the Lake's fledgling commerce and is often mistakenly noted as the first

Great Lakes steamship because of the vessel's strong commercial potential (Plumb 1911:17). From this point forward extensive commercial adaptation of steamships began. In 1833, 11 steam vessels were conducting commercial operations on the Lakes (Barton 1846:7; Plumb 1911:20). By the end of the decade, with shipping needs steadily expanding, the number of commercial steamboats operating above Niagara Falls climbed to 48 and in five more years reached 60 (Barton 1846:6-9).

Essentially, the transition from sail to steam power in passenger transportation indicated the industry's growing need for faster and more reliable passenger and package freight transportation in the face of rapidly expanding settlement and trade avenues. Despite the more costly initial investment, steam powered vessels were not dependant upon wind or sea conditions. As this was the primary cause of shipping delays, maritime steam technology greatly decreased transportation times and provided a corresponding increase in rate and number of passages (Barton 1846:9, 11). For an industry focused on generating larger profits, investment in steam technology was evidently more commercially sound than investment in sail, particularly for passenger service. Supporting evidence for this shift in commercial perception can be derived by comparing averaged revenue for Lake Erie steamships with sail powered vessels shortly after the advent of steamships on the Great Lakes. Between the years 1834 and 1841 commercial sailing vessels were estimated to yield a total of $750,000 (Barton 1846:11). In contrast, during that same seven year period, Lake Erie steamships recorded commercial employment in the amount of $226,352,046 (Barton 1846:11).

The statistics for commercial revenue are even more striking when considering the number and tonnage for the differing vessel types in operation at mid-nineteenth-century in contrast to those operating at the century's end. Table 1 depicts the number, vessel type, and combined tonnage employed on the Great Lakes by 1845.

Table 1. 1845 Great Lakes Merchant Vessels (Barton 1846:19)

Vessel Type	Number in Operation	Vessel Tonnage
Steamboats	52	20,500
Propellers	8	2,500
Brigs	50	11,000
Schooners	270	42,000
Totals:	**380**	**76,000**

As illustrated by Table 1, in 1845, steam powered vessels make up only 16% of the Great Lakes merchant fleet, in comparison to 84% sail powered vessels. According to the same statistics, however, steam powered vessels represent 30% of the combined commercial tonnage and sail powered vessels 70%. Moreover, the statistics suggest a considerable commercial advantage for steam powered vessels over sail early on.

In comparison, Table 2, depicting the same data set for 1896, clearly demonstrates a commercial shift from sail to steam as well as proves further a greater commercial capacity for steam vessels (Beeson 1896:33-103). It should be noted that the categories in Table 2 have been simplified to generalized vessel types because commercial vessels have become highly varied by 1896 to accommodate specific shipping niches.

Table 2. 1896 Great Lakes Merchant Vessels (Beeson 1896:33-103)

Vessel Type	Number in Operation	Vessel Tonnage
Steam Vessels	1,908	904,787
Sailing Vessels	1,128	310,775
Totals:	**3,036**	**1,215,562**

As suggested by the totals depicted in Table 2, commercial employment of steam vessels has far surpassed sailing vessels by 1896. According to Table 2, in a scant 50 years, steam vessels now represent 63% of the Great Lakes merchant fleet, in comparison to 37% sail powered vessels. In addition, steam vessels also make up 74% of the combined commercial tonnage and sail powered vessels only 26%. Taken together the tables demonstrate that the introduction of steamships did not lead to an immediate demise of sail powered vessels; rather, the statistics mark a period in time when technological advancements in ship construction intersect and become complimentary with the rise of intensive shipping practices.

Furthermore, while Tables 1 and 2 are primarily intended to demonstrate the shift from sail to steam, the totals for combined tonnage in comparison with total vessel employment suggests that both types of vessels grew in size during this period. Additional historic documentation, likewise, supports a sharp increase in vessel sizes during the nineteenth-century. Congressional records indicate that in 1839 individual vessel sizes operating on the Great Lakes ranged between 150 and 750 tons (Barton 1846:22). By 1846 the average recorded tonnage for newly constructed vessels grew to between 600 and 1,200 tons, and, by the turn of the twentieth-century, up to 4000 tons (Barton 1846:22; Beeson 1896:33-77; Plumb 1911:28). In addition, statistics for combined commercial tonnage not included in Tables 1 and 2 show a similar pattern of intensive commercial shipping. In 1841, overall tonnage on the Lakes was 55,181 (Plumb 1911:24). By 1845, combined tonnage has grown to 76,000 tons and by 1851 to 153,580 tons (Barton 1846:19; Plumb 1911:24). Moreover, it is documented that despite the nation wide economic panic of 1857, commercial tonnage on the Great Lakes expanded to a number "three times as large by 1860" (Plumb 1911:23).

The sharp increase in Great Lakes vessel size and employment throughout the nineteenth and early twentieth centuries clearly illustrates a motivation of increased productivity underlying intensive shipping practices. This historic emphasis on constructing vessels that could carry record capacities is supported unequivocally by *Beeson's Marine Directory's* annual publishing of the "Record of Largest Cargos." First compiled in 1896 for cargos shipped between the years 1890 and 1895, the list was added to annually. The list was organized alphabetically by vessel name and even included the depth of water the shipment was successfully delivered in, thereby accentuating the technological prowess of Great Lakes cargo ship designs. The range of largest cargos recorded in *Beeson's* first record was between 1,250 and 4,356 tons of iron ore and for wheat cargos between 35,000 and 141,000 bushels (Beeson 1896:105-108). The size of these cargos demonstrates the astounding annual transportation capacity that could be achieved by the Great Lakes merchant fleet en masse.

Moreover, the data further suggests that the increase in vessel size directly correlates with the evolution of profitable bulk cargo transport. This inference is based on Rodgers (2003:23) assertion that regional technological developments associated with historic maritime commerce contributed toward an "integrated bulk cargo system." Furthermore, as pointed out in Chapter 2, the extreme rise in commercial production during the nineteenth-century created a relentless demand for more efficient cargo transportation that heightened annually. Taken together, the evidence strongly supports that vernacular ship designs were historically orchestrated to coincide with persistent commercial demands. The development of large capacity cargo vessels was, therefore, an integral component in Rodgers "integrated" system that significantly contributed to the overall commercial objective of perpetuating a cycle intensity that, in turn, yielded higher profit returns.

Subsequent Shipping Fatalities

Unfortunately, the exhaustive nature of intensive commercial practices also produced negative consequences for the shipping industry. Whether due to an increase in vessel number or an increase in vessel size, the enormous amount of maritime activity created an environment conducive to waterborne disaster in just a matter of decades (Andrews 1852:6). The entire system produced a highly competitive atmosphere where shippers and captains wanted to ensure a steady flow of exports and imports to and from the region in order to generate greater profits. This, in turn, lead to subsequent social pressures to maximize profit returns rather than focus on personal safety. Regardless of navigation hazards or inhospitable weather conditions, ship captains were recklessly encouraged to produce quick returns on payloads instead of focusing on safe sailing practices or vessel maintenance (Thompson 2000:138).

On a broad level, un-seaworthy, outdated, and dilapidated craft were regularly employed and over loaded by shipping companies. New steam technologies were also installed and used regardless of the potential risks or without implementing procedures to mitigate the risks. At a more basic level, both sea captains and crew compounded the situation by either ignoring weather conditions or the structural integrity of vessels for a variety of reasons. The end result is that ship captains habitually took unnecessary risks to achieve the goal of a maximum profit return for the shippers and themselves. Consequently, an astounding rate of shipwrecks, groundings, collisions and founderings were of common occurrence for Great Lakes' historic mariners and citizens alike (Thompson 2000:138,341-348).

Table 3 details the Lakes combined shipwrecks and vessel casualties between 1878 and 1897. The Table was extrapolated from a list compiled by E.T. Chamberlain, United States Commissioner of Navigation, and referenced in J.B. Mansfield's 1899 *History of the Great Lakes: with Illustrations.*

Table 3.
Great Lakes Shipwrecks and Casualties between 1878 and 1897 (Mansfield 1899:507)

Year	Total Wrecks	Partial Wrecks	Total Vessel Tonnage Lost	Total Losses of Cargo ($)	Passengers & Crew Affected	Lives Lost
1878	63	200	13,455	300,155	2,380	38
1879	36	172	8,961	147,790	2,280	14
1880	53	288	10,896	455,085	3,389	29
1881	68	286	16,298	447,375	4,109	127
1882	39	282	10,291	265,605	3,137	71
1883	51	244	11,977	124,030	2,681	55
1884	63	260	16,940	470,265	3,244	91
1885	37	202	8,232	211,790	2,411	18
1886	51	169	12,706	148,445	2,153	78
1887	64	275	15,852	371,060	4,219	103
1888	75	244	19,147	418,545	3,388	83
1889	50	214	12,690	189,355	2,808	26
1890	40	258	15,665	263,085	4,449	8
1891	63	274	17,453	243,490	5,163	50
1892	68	299	18,001	544,425	4,051	38
1893	51	274	20,540	445,220	3,728	102
1894	79	255	31,653	482,240	4,234	110
1895	41	224	20,524	401,515	3,913	76
1896	66	292	23,694	443,850	5,410	31
1897	35	194	13,236	195,475	3,988	18
Totals	**1093**	**4906**	**318,211**	**6,568,800**	**71,135**	**1166**

Table 3 indicates that between 1878 and 1897 alone, a total of 5,999 shipwrecks occurred, resulting in the total loss of 1,093 vessels and $6,568,800 in cargo and 1,166 lives lost. This is an astounding amount of devastation in both a commercial and social sense. Moreover, the totals depicted in Table 3 are just a snapshot of the actual reality of Great Lakes disasters historically. Prior to the institution of life saving facilities in 1878, earlier documentation of wrecking events was limited to newspaper accounts and compiled annuals or local knowledge (Plumb 1911:30). Even after the installation of lifesaving stations, many wrecking events remained unrecorded due to the disaster taking place away from lifesaving facilities or port towns. This does not mean that government officials were not aware of the problem's scope in its entirety. Disasters of the day were noteworthy and held considerable power in the public opinion. Yet, the rate of disaster eventually grew to such extremes that it could not be ignored and by mid-century both regional officials and private parties made repeated attempts to obtain federal assistance for programs to mitigate the hazards created by intensive shipping practices.

Federal Reluctance toward Intervention

In 1841, James L. Barton's report to the Committee on Commerce "present(s) a strong claim on the justice of Congress for an equitable expenditure of public revenue for its protection and safety" (Barton 1841:27). Executive documents presented to the United States Senate by Israel D. Andrews in 1852 present an equally dire view of the character of Great Lakes shipping: "It is also proper to state that the embarrassments now existing, will increase in a corresponding degree with the certain and almost incalculable annual increase of this trade and commerce" (Andrews 1852:2). In consideration of the sheer amount of cargo being transported across the lakes, both parties suggested that the government should take an increased interest in order to ensure the persistence of revenue. This was also the position put forward in Ralph G. Plumb's 1911 report to Congress, when the author openly acknowledged that federal recognition of the Great Lakes commercial status began as early as the 1840s and that by mid-century "the time had been reached when Government aid was imperative and it was demanded in no uncertain terms" (Plumb 1911:36).

All three authors further asserted that the shipping industry's casualty rate was compounded by underlying political influences that prohibited government involvement in Great Lakes commerce. From the outset, it was common knowledge that the natural navigation hazards of the Great Lakes necessitated a level of improvement in order to make safe passages and harbor facilities. At both a local and federal level, however, Laissez-faire principles prohibited government involvement in capital investment (Plumb 1911:64-66). This hands-off doctrine was not just accepted by big businessmen of the era, it was also embraced wholeheartedly by citizens in general. As stated by Andrews in 1852:

> It is not suggested that any novel and coercive laws should be adopted, interfering with the free and unrestricted exchange of goods and productions...Free commerce, especially internal commerce, unfettered by restraints...is unquestionably their natural right (Andrews 1852:2).

As a consequence, legislation was stalled repeatedly during the early years of Great Lakes commerce to regulate business practices or provide operational boundaries. Likewise, it also meant that the government did not offer any financial support for the construction of early maritime infrastructure nor provide maintenance and improvement as commerce prospered (Andrews 1852:4-6; Plumb 1911:36, 66).

Government opinion and common perception held that once goods made it to the eastern seaboard, existing facilities in New York or other prominent port cities would efficiently transfer commodities to the international market (Andrews 1852:4-6). Moreover, federal legislators were often financially tied to east coast businesses, creating yet another conflict of interest that provided strong anti-Great Lakes commercial sentiment. Under the guise of Constitutional sanction, the argument was made by many leading politicians that the commerce clause in Section 8 of the United States Constitution prevented government intervention into commercial matters of inland areas (Plumb 1911:36). The argument also contended that the federal intervention rights of Section 8 were intended exclusively as a "salt water instrument" and only pertained to foreign commerce through eastern ports of call (Barton 1846: 29-30; Andrews 1951:6; Plumb 1911:36). In short, at this time, the emphasis of government and big business was on national production and maintaining established profitability, not fostering regional prosperity or domestic quality of life. A statement made in Andrews' 1852 review makes this position abundantly clear: "the public eye has ever steadily been fixed on the foreign commerce of the country as the right arm of national strength" (Andrews 1852:2).

Despite the Lakes industries' considerable fiscal contribution to the country, federal support of Great Lakes enterprise was not established until much later in the century. Consequently, Great Lakes industries were the sole financers for early commercial infrastructure. Furthermore, the lack of federal regulatory legislation created an economic environment where unchecked business practices shaped the development of maritime facilities. At the outset, private investment limited improvements to small scale harbor projects and navigation corridors that were often located near existing ports of call. As time progressed and commerce on the Lakes prospered, the profitability of an area continued to determine the location for improvements (Plumb 1911:36). By mid-century, the existing maritime infrastructure was an inconsistent patchwork of canals, navigation corridors, harbors and facilities.

Since 1787 bills had been passed for the "maintenance of lighthouses, beacons, and public piers, etc." but not with any consistency (Plumb 1911:36). As a general rule of thumb, however, federally sanctioned improvements were either relegated to "refuge harbors" or those that were made to ports generating significant national revenue from international commerce. In this light, the first large federal appropriation for maritime related infrastructure was made to fund the Erie Canal's construction in 1812. An overland canal system was seen as integral to the nation's economic livelihood because it provided direct access for trade shipments between east coast cities and inland settlements. Upon its completion in 1825, French-Canadian markets and the St. Lawrence River also lost the advantage of being the Great Lakes' exclusive shipping outlet to the Atlantic Ocean's international trade routes (Plumb 1911:36; Mansfield 1899:220).

In 1826 another large scale federal award was given for regional development. While significantly smaller than the Erie Canal's construction award, the 152,504 dollar subsidy for harbor improvements was particularly significant because it was part of an itemized bill that identified specific locations for development. It also signified an attempt by the government to systemically address the growing problem of unimproved harbors and ports in the Great Lakes. The 1826 allocation was influenced by President Andrew Jackson and set precedence for federal support of inland regions that lasted until 1838. During that period, almost $9,000,000 were allocated to nationwide harbor development. The decision to extend greater federal support, however, was not collectively agreed upon by Washington politicians. Throughout most of the nineteenth-century the argument continued that the federal government should not be responsible for infrastructure not directly tied to foreign commerce (Plumb 1911:36).

The dispute was further compounded by the soaring demand for federal money despite the seemingly large sums being handed out. At this time, the nation was rapidly expanding its western borders. The expansion was so fast that historic assessments observed "…State and Local activities could never develop the roads, the canals, the rivers, and the lakes of the new regions west of the Alleghenies." As a consequence, severe competition existed between the established states and newly annexed states and territories. Due to the rivalry, it was decided in 1843 to split federal bills proposing state subsidies between an eastern and western state divide. This position greatly favored east coast states that already had established ties with international trade markets and put western states and territories at a disadvantage. Accordingly, political proponents from frontier states lobbied hard to set a precedence that maritime components of inland regions were extensions of the "salt water" oceans and thereby, integral to international trade markets. To lend credence to the claim of national significance, advocates called the Mississippi River an "arm of the sea" and nicknamed the Great Lakes "Inland Seas" (Plumb 1911:36-37).

By 1847 the call for government intervention had grown so large that a "Great Chicago Harbor Convention" was held. Attendees came together to support the public declaration:

> That the power to protect and facilitate commerce by opening harbors and rivers must reside either in the State or Federal Government, is apparent. It is obvious that the detached efforts of the separate States or of individuals, to create and maintain harbors and remove obstructions from the great channels of communications, are and ever must be, inadequate…(Plumb 1911:37).

From this convention, a unanimous political platform arose that focused on "a national (harbor) system" as the only solution. The underlying assertion was that "every improvement was a link in the great chain that benefited the whole country."

Regardless of the relentless movement for increased public support of maritime development there was a considerable lag time before any federal efforts were made to address the situation. Between 1845 and 1852 no bills were passed supporting harbor or river improvement in the Great Lakes. This was despite an 1841 federal survey finding that recognized numerous Great Lakes harbors in need of maintenance and improvement and concurring reports submitted in 1846 and 1852. Some small allocations were made in 1852 and 1854, but it really wasn't until the Civil War that the federal emphasis on maritime infrastructure was renewed. Conceding the Lakes' vital strategic importance for minerals and agriculture, emergency funds were awarded in 1864 for the amount of $250,000, and a steady stream of annual bills continued to pass after the war between 1866 and 1882 (Plumb 1911:37-38, 40).

The action signaled an effort by the federal government to provide some type of regular funding. In 1884 a specific Committee on Rivers and Harbors was created in conjunction with the River and Harbors Act (Plumb 1911:38). Prior to this all congressional investigations and subsidy planning went through the House Committee on Commerce. The Act was tasked with "making appropriations for the construction, repair, and preservation of certain works on harbors and for other purposes." Areas of concern covered by the act involved nationwide surveys, navigation regulation, and wreck removal. To get around the problem of limiting work based on annual funding, a continuing contract was adopted with private contractors (Plumb 1911:39). Once a long term project was authorized, work could be performed incrementally as funding arose, rather than limit the contract to smaller, patchwork projects.

Just when it appeared the battle with fickle federal legislators had been won, congressional support began to slacken from 1882 onward. Instead of annual bill introduction, legislation to provide support for maritime related infrastructure was reduced to biennial allocations and in 1896 congressional support was completely withdrawn for three years. In 1900, the passing of an emergency bill signaled a small resurgence of federal recognition, but only two more bills supporting harbor maintenance resulted by 1905. At the time of the 1911 Congressional study, it was estimated that $425,000,000 had been spent on river and harbor improvements by the federal government. Of that sum, approximately $90,000,000 had been expended for improvements of Great Lakes ports. This equates to just 21% of the entire federal disbursement despite the government's acknowledgment that Great Lakes commercial activity warranted greater support (Plumb 1911:37-38).

Further analysis of Plumb's 1911 study strongly confirms the previously discussed political biases at work during the nineteenth-century and explains the federal government's perpetual reluctance to support maritime infrastructure. Table 4, below, provides a chronology of Great Lakes federal port subsidies between 1807 and 1910 to include the number of ports being supported and the combined subsidy each lake received overall. Grouping the ports according to an annual range demonstrates a timeline for the initiation of support for each lake as well as peak support periods, and clearly illustrates which regions elicited the greatest federal favor.

Table 4.
Chronology of Federal Support Extended to Great Lakes Ports

	1807-1810	**1811-1830**	**1831-1850**	**1851-1870**	**1871-1890**	**1891-1910**	**Total # of Subsidized Ports by Lake**	**Total Federal Expenditure by Lake**
Lake Ontario	0	4	1	3	0	1	**9**	**$5,367,732**
Lake Erie	1	10	4	3	6	0	**24**	**$42,535,662**
Lake Huron	0	0	0	1	5	0	**6**	**$3,510,107**
Lake Michigan	0	0	6	16	10	2	**34**	**$23,513,992**
Lake Superior	0	0	4	0	4	1	**9**	**$10,120,593**
Total # of Ports	**1**	**14**	**15**	**23**	**25**	**4**	**82**	**$85,048,086**

Assertions made previously in the chapter suggest that there were powerful political forces acting against the timely adoption of systematic developments for Great Lakes maritime infrastructure. The statistics depicted in Table 4 illustrate that an obvious bias existed in favor of Great Lakes regions that were in closest proximity to established east coast cities that provided access to international markets. An expanded version of Table 4 is presented in Appendix A also provides strong supporting evidence. Table 4 (expanded) includes a full listing of federal support for all Great Lakes ports between 1807 and 1910. The chronology includes notations on specific improvements and commercial significance, as well as detailed federal expenditures for each Great Lakes port.

Ports on Lake Erie were the earliest to receive federal support for harbor improvement and comprised 29% of the total number of federally supported Great Lakes ports, as well as received 50% of the total amount allocated. The Erie Canal at Buffalo is most likely the reason for the early preeminence of Lake Erie's commercial position, however, its geographic position near the resource rich inland settlement areas also gave it particular advantage over Lake Ontario. While, Lake Ontario ports were the second earliest to receive federal support for harbor improvement, these ports comprised only 11% of the total number of federally supported Great Lakes ports, and just 6% of the total amount allocated. Despite the Lake's ready outlet to the Atlantic Ocean, it was a more advantageous to transfer goods coming into Lake Erie from western Lakes' regions overland to east coast markets. The distance for overland transport was much shorter and less time consuming than an overland transfer around Niagara Falls and a continued maritime journey up through the mouth of the Saint Lawrence River. Furthermore, it behooved the federal government and American businessmen to keep the entire commercial process contained within the boundaries of the country.

Upper Lake Michigan and Lake Superior ports were the next to receive federal support for harbor improvements. Lake Michigan ports comprised 42% of the total number of federally supported Great Lakes ports, as well as 28% of the total grant amount allocated. Federally supported Lake Superior ports comprised 11% of total number and received 12% of the total allocated amount. Given the region's expanding frontier trade network it seems that federal development for Lake Huron ports should have directly followed Lake Eire and Ontario, however, it is likely that shorter overland transfers were, again, more cost effective. Other significant factors explaining Lake Huron's apparent alienation include the existence of only two naturally sheltered harbors along the entire western shoreline and the brighter promise for development of Lakes Michigan and Superior's mineral deposits. Lake Huron's low-grade commercial potential, therefore, made it the last to receive federal support for harbor improvement. Federally supported ports in Lake Huron only comprised 7% of total number, and, overall, only received 4% of the total amount of federal allocations.

Table 5 expands further on the idea that some Great Lakes regions were given preference over others based on commercial profitability first and geographic proximity to established trade networks second. Generated by data from Table 4, the statistics in Table 5 demonstrate that even specific ports within Great Lakes regions were extended federal preference based on their commercial importance. This is significant because it shows that overriding financial motivations were characteristic of the era's political milieu as well as private business and that both acted equally as reinforcing agents in the region's commercial cycle of intensity. By comparing the total federal expenditures for the Great Lakes overall (see Table 4) with the total federal expenditure in Table 5 it shows that 70% of all nineteenth-century federal funding for harbor improvement went to these 20 ports. A review of each port's commercial significance reinforces the assertion that each Lake received expenditures based primarily on this consideration.

Table 5.
Five Largest Federal Harbor Expenditures for Each Great Lake

Lake	Port	Year Federal Support Began	Commercial Significance	Expenditures by 1911 ($)
Lake Ontario	Oswego	1827	General commerce/site of Oswego Canal that connects to Erie Canal	**2,419,919**
	Charlotte (Genesee)	1828	General commerce/lake outlet for the City of Rochester	**833,610**
	Great Soda Bay	1829	Coal port	**577,485**
	Ogdensburg	1852	General commerce/eastern extremity of Great Lakes commerce at mouth of St. Lawrence River shipbuilders	**517,006**
	Little Soda Bay	1852	Coal port	**500,462**
Lake Erie	Detroit	1874	Shipbuilding/general commerce	**11,369,500**
	Cleveland	1807	Refuge harbor/Leading Lake Erie ore port	**7,224,666**
	Buffalo	1812	General commerce/entrance to Erie Canal near Welland Canal	**6,000,000**
	Black Rock	1829	General commerce/second in importance to Buffalo	**4,752,420**
	Toledo	1866	Coal port	**2,790,810**
Lake Huron	Harbor Beach	1871	Refuge harbor	**2,026,357**
	Saginaw River	1866	Lumber port serving four cities	**1,018,750**
	Cheboygan	1852	Entrance to Straits of Mackinaw, timber interests.	**198,500**
	Port Huron & Black River	1872	Coal, gravel and pulp wood port	**147,500**
	Alpena	1876	Lumber and forest products port, limestone	**60,000**
Lake Michigan	Chicago	1833	General commerce/Leading Lake Michigan port	**2,828,941**
	Milwaukee	1844	General commerce/ Wisconsin's leading port	**2,375,678**

Table 6 continued				
Lake	**Port**	**Year Federal Support Began**	**Commercial Significance**	**Expenditures by 1911 ($)**
	Michigan City	1832	General commerce/Chicago excursionist retreat	**1,750,000**
	Calumet (South Chicago)	1870	Lake Michigan's leading iron and corn port. The deepwater capacity accommodated bulk cargo vessels allowing it to surpass Chicago for these two commodities.	**1,600,000**
	Grand Haven	1852	General commerce and passenger port	**1,534,943**
Lake Superior	Duluth	1867	General commerce/Leading Lakes port in agriculture, lumber and ore	**5,606,524**
	Portage Lake Ship Canal	1865	General commerce/vessel passages routinely exceed 1,000,000 per three month period and 1905 record annual freight tonnage 3,413,445.	**1,669,594**
	Marquette	1867	One of Lake Superior's leading ore ports and refuge harbor	**892,588**
	Ontonagon	1867	Ore port	**423,528**
	Agate Bay (Two Harbors)	1886	Ore port	**258,786**
Total Federal Expenditure				**59,377,567**

Throughout the nineteenth-century other significant advancements were made toward federal intervention in a regulatory capacity. Similar to the institution of federal funding for harbor improvements, legislated commercial regulations were an afterthought as well as the product of heavy lobbying by local parties. The lag time for the introduction of such laws, again, can be explained by the underlying forces dictating the political, commercial and social atmosphere during this period in American history. As cited previously, Israel Andrews (1852:2) denied suggestion of "any novel and coercive laws" being adopted, despite his overall assessment that something should be done to remedy the "embarrassing" circumstances extant in the Great Lakes. While this confirms how strong Laissez-faire principles became in the nineteenth-century, it also suggests that perceptions were changing in the face of contrary evidence.

Table 7. Chronology of Maritime Related Federal Agencies (Records of the Bureau of Marine Inspection and Navigation 1774-1973)

Administrative Agency	Maritime Service	Initiation year	Termination or year of reorganization
Department of the Treasury	Lighthouse Service	1792	1852; re-designated Lighthouse Board
	Revenue Marine Division	1843; 1871	1849; 1894; re-designated Revenue Cutter Service
	Lighthouse Board	1852	1903; department transferred to the Department of Commerce and Labor
	Steamboat Inspection Service	1852	1903; department transferred to the Department of Commerce and Labor
	Life Saving Service	1871	1915; combined with Revenue Cutter Service and reorganized as U.S. Coast Guard
	Bureau of Navigation	1884	1903; department transferred to the Department of Commerce and Labor
	Revenue Cutter Service	1894	1915; combined with Life Saving Service and reorganized as U.S. Coast Guard
	Bureau of Customs	1942	1966
Department of Commerce and Labor	Lighthouse Board	1903	1910; re-designated Bureau of Lighthouses
	Steamboat Inspection Service	1903	1913; department transferred to Department of Commerce
	Bureau of Navigation	1903	1913; department transferred to Department of Commerce
	Bureau of Lighthouses	1910	1913; department transferred to Department of Commerce
Department of Commerce	Bureau of Lighthouses	1913	1939; department transferred to United States Coast Guard
	Steamboat Inspection Service	1913	1932; combined with Bureau of Navigation and re-designated Bureau of Navigation and Steamboat Inspection
	Bureau of Navigation	1913	1932; combined with the Steamboat Inspection Service and re-designated Bureau of Navigation and Steamboat Inspection
	Bureau of Navigation and Steamboat Inspection	1932	1936; re-designated Bureau of Marine Inspection and Navigation
	Bureau of Marine Inspection and Navigation	1936	1942; duties for vessel inspection, navigation and merchant seamen transferred to U.S. Coast Guard

By mid-century, with disaster statistics growing annually, the government began to take action. Table 6, preceding, provides a chronology of federal regulatory agencies that were instituted to dictate numerous aspects of maritime affairs (Records of the Bureau of Marine Inspection and Navigation 1774-1973). The chronology of agency initiation clearly demonstrates the government's intention to correct the problems associated with maritime commerce, regardless of any commercial and political opposition. The numerous shifts and reorganizations that occur also indicate that the government was not apathetic toward the issue of maritime regulation; rather it was actively trying to refine the administrative process to make it more effective.

As indicated by Table 6, the Steamboat Inspection Service was formally established within the Department of the Treasury on August 30, 1852, in conjunction with The Steamboat Act of 1852 (10 Stat.61). While the requirement for vessel inspection had been federally mandated since July 7, 1838, inspections were initially performed by appointed district court officials. These local agents often had conflicting interests that eventually led to early inspection services being ineffective or fraudulent. This was combated by the protocols outlined in the 1852 Steamboat Act. The act instituted an overarching Board of Supervising Inspectors and in 1871 a Supervising Inspector General was also instituted (16 Stat. 458). The Board of Supervising Inspectors was made up of nine presidential appointees, each responsible for the administration of steamboat inspection regulations within a given geographic district. Local inspectors were then appointed by a regional commission consisting of the district's supervising inspector, district customs collector, and the U.S. district court judge. The tasks assigned to local inspectors included issuing personal licenses and classifications for steam vessels, hull, boiler, and other equipment inspection, as well as marine casualty investigation (Records of the Bureau of Marine Inspection and Navigation 1852, 1871).

In addition, the Bureau of Navigation was established by act of July 5, 1884 to take in hand the growing problems associated with maritime navigation (23 Stat. 118). As with vessel inspection, navigation laws were also in existence prior to the Bureau of Navigation being formalized. As early as 1790 acts were passed giving district court judges authority to submit fine and penalty recommendations for navigation transgressions to the Secretary of the Treasury (1 Stat. 122; 1 Stat. 506). By the act of July 28, 1866 (14 Stat. 331), the Bureau of Statistics was also established to collect navigation statistics, assign numbers to merchant vessels, and publish the annual list of American merchant vessels. A Navigation Division within the Treasury Department was also established by 1870 in order to more effectively administer fines and enforce penalties dealing with maritime offenses (Records of the Bureau of Marine Inspection and Navigation 1866, 1870, 1884).

The Bureau of Navigation, therefore, was implemented to oversee all of the different administrative factions involving navigation laws, except those relating to vessel inspection, lighthouses, lifesaving and revenue collection. The Bureau was comprised of agents from the Bureau of Statistics, the Internal Revenue and Navigation Divisions of the Treasury Department, as well as general shipping commissioners appointed by the Secretary of the Treasury. The consolidated tasks assigned to the Bureau included keeping track of vessel documentation, enrollment and registry, licenses, and builders' certificates, as well as bills of sale, conveyances, mortgages, records of admeasurement and inspection, tonnage statistics, bonds, certificates of ownership, owner's and masters' oaths, master carpenter certificates, shipping articles, logbooks, crew lists, whalemen's shipping papers, mutual release (discharge) books, merchant seaman certification and registers of services performed by shipping commissioners (Records of the Bureau of Marine Inspection and Navigation 1884).

By act of June 30, 1932 (47 Stat. 415) the Bureau of Navigation and Steamboat Inspection Service were combined to create the Bureau of Navigation and Steamboat Inspection. Under the Department of the Treasury, the new agency was tasked to:

> …enforce laws relating to the construction, safety, operation, equipment, inspection, and documentation of merchant vessels. Investigate marine casualties. Enforce navigation laws. Collect tonnage taxes and other navigational feed. Examined, certified, and licensed merchant vessel personnel (Records of the Bureau of Marine Inspection and Navigation 1932).

In 1936, the agency was reorganized and renamed the Bureau of Marine Inspection and Navigation by the act of May 27, 1936 (49 Stat. 1380), showing that refinement of regulatory efforts continued to be an ongoing process despite the decline in marine casualties after the turn of the twentieth-century (Records of the Bureau of Marine Inspection and Navigation 1936).

Salvage as a Necessary Measure

Regardless of the inherent complications involved in regional development, an early reliance on waterborne transport led to the rise of a prominent shipping industry on the Lakes. Operating under the era's profit driven mindset, the shipping industry fast became an extremely powerful entity that had the ability to shape the region's economic, political, and environmental character. Following the lead of other commercial industries, Lakes shippers adopted increasingly intensive practices throughout the nineteenth and into the twentieth-century. This pervasive mentality, that emphasized high investment returns rather than reliable infrastructure or safe operating procedures, in turn, created an environment that promoted a high maritime disaster rate. This was compounded by the lack of reliable infrastructure and the lag time for government regulation of shipping practices, as well as the installation of shoreline navigation aids such as lighthouses, navigation buoys, and life saving stations (Thompson 2000:331, 350).

To mitigate the high rate of maritime disaster, several private entities published coastal piloting guides routinely to aid in Lakes navigation and highlight hazardous areas within accepted navigation corridors (Thompson 1859; Barnet 1867; Boulton 1876; Scott 1886). Weather prediction services were another private response that arose during this time frame, as was the practice of maritime salvage. The advent of routine salvage on the Great Lakes signaled that commercial shippers were fully aware of the unsafe circumstances, but chose to utilize the dangerous climate to their advantage. Similar to inexpensive warning devices such as coastal piloting guides and weather services, salvage provided a more cost-effective alternative to implementing more conservative shipping practices. Not only did salvage combat the soaring revenue losses from high traffic shipwrecks, groundings, collisions, and founderings, but the practice allowed for machinery and ship part recycling. The potential for recovering lost product without sacrificing the rate of profitable shipments directly catered to the era's commercial business climate.

As a consequence, the development of maritime salvage quickly became an integral aspect of the shipping industry and, at the same time, supported the cycle of intensive commercial practices extant on the Great Lakes. Previously, maritime salvage's traditional role was one of opportunism, however, as a need for cargo and vessel recovery increased, so did a need for reliable salvage operations. Over the course of the nineteenth-century, maritime salvage was viewed in the Great Lakes as a particularly effective, site specific, counter measure to maritime disaster. It did not require the sanction of federal or local authority, nor was it contrary to political or big business interests. In fact, the practice was complementary because the inherent efficiency of recycling expensive vessel components introduced an additional avenue of commercial exploitation. Whole vessels, intact ship parts, and retrieved cargo all held the potential for future revenue if successfully recycled back into the commercial service of the Great Lakes shipping industry. This directly suited the industry's growing inclination toward industrial economy. Small scale salvage companies did not require large capital expenditures but still possessed the potential to retrieve considerable amounts of submerged cargo and vessel parts. At the most basic level, all an interested party would need was a tug equipped with a wrecking crane or the ability to hire one.

Essentially, the routine salvage of cargo and wrecked vessels both reinforced the exploitive nature of Great Lakes shipping industry as well as reflected the necessary industrial economy practiced by all of the region's historic industries. Furthermore, the

Great Lakes high disaster rate ensured a strong market for nineteenth and early twentieth-century salvage companies to prosper. As will be discussed in greater detail in Chapter 6, the success of salvage in Great Lakes commercial shipping was due primarily to the unique environmental context of the region. Shallow water hazards along coastal shipping routes in near-shore areas and river ways served to heighten the potential for disaster as well as facilitate access to inundated craft or vessels in peril. With that said, it is also important to understand that the political, commercial and social circumstances outlined in both Chapters 2 and 3 were ultimately responsible for creating the circumstances that routinely placed shippers and mariners in a physical environment conducive for disaster.

CHAPTER 4

CONGRESS: A CASE STUDY OF GREAT LAKE'S "INDUSTRIAL ECONOMY"

The biography of the passenger/package freight propeller *Congress* clearly demonstrates the exploitive nature of the Great Lakes shipping industry during the defined period of intensive commerce. The vessel's history characterizes the regional emphasis on vessel adaptation, salvage, and recycling during the nineteenth and early twentieth-century. The circumstances of the ship's demise are significant to the current study as *Congress* wrecked at North Point Reef, near Alpena, Michigan. The location of the disaster was subsequent to the reef's function as a ship trap, which will be discussed in greater detail in Chapter 7.

Congress' History

Built in 1861 and lost in 1868, *Congress* had a short, but notable, career. From Great Lakes passenger/freight propeller, turned Civil War prisoner transport and Fenian warship, this wooden steamer eventually became the first oil burning vessel to traverse the inland seas (*Detroit Free Press* 1868). In 1868, just months before its demise, documentation suggests that the *Congress'* boiler was outfitted with an oil fired apparatus to demonstrate the power and efficiency of a new petroleum based fuel. At a time when the Great Lakes shipping industry was still transitioning from wood fuel to coal for greater efficiency, the move appears quite revolutionary. Moreover, the vessel's alteration and life history clearly demonstrate the era's industrial economy and the need for salvage, rather than an evolution of technological innovation.

Congress was constructed in 1861 by prominent Cleveland ship builders Peck and Masters. Peck and Masters are best known for their innovative vessel design of the *R. J. Hackett* in 1869. In the design of *R. J. Hackett*, the pilothouse was moved forward for an unobstructed view and the engine room and crew cabins moved aft to allow for greater cargo room at the mid section of the ship (Mansfield 1899). The utility in design translated into a more efficient process for loading and unloading (Mills 2002:4). As a result, the shipping of bulk freight on the Great Lakes was transformed and the vessel became a prototype for bulk carriers which persists today (Rodgers 2003). Similarly, the company's adoption of towing consorts to increase shipment capacity had an equally important impact on the shipping industry in the late nineteenth-century. While *Congress* was not one of Peck and Masters unique vessels, the conservative construction elements demonstrate the same emphasis of utility and fiscal economy extant within the larger macrocosm of Great Lakes shipping.

Originally named *Detroit*, Peck and Masters built the package/package freight propeller for J. T. Whiting and Company to be employed on the Great Lakes. It was a single masted, propeller driven, wooden steamer with a 139 foot length, 25 foot beam, 11 foot depth of hold and 398 tons burden (*United States Certificate of Enrollment* 1861). In the 1860s propeller technology was still evolving from the earliest form of a bladed wheel to the more contemporary three blade fan design. Numerous advantages, however, facilitated its rapid adoption on the Great Lakes. With the introduction of the first propeller driven steamer *Vandalia* in 1841, the narrow locks and canals of the upper Great Lakes became accessible to steam powered vessels (Rodgers 2003:34). Previously, the wider beam and deeper draft of paddle wheel steamers had restricted operations to the open waters of the lakes (Gardiner and Greenhill 1993:71). With the removal of the paddle wheels, propeller driven vessels had a reduced beam and a larger capacity to transport passengers and cargo.

The *Vandalia* was immediately embraced by shippers and its design became the early prototype for Great Lakes propeller steamers (Gardiner and Greenhill 1993:71). With upper lakes access, lower lakes shipping merchants were able to effectively compete as overland transfer costs became virtually obsolete. The earliest innovations in ship propulsion and vessel design, therefore, reflect the same commercial philosophy as the later design for bulk carriers and consort shipping methods. Both examples clearly illustrate a drive to find the most cost-effective transportation practices where the main objective was to increase the productivity of shipments and, ultimately, increase the shipper and supplier's profit. The dual purpose nature of the passenger/package freight propeller fulfilled this role in the shipping industry; however, the advantageous vessel design also offered benefit to a wider commercial audience.

During the same time frame, a network of railroads was in development throughout the inland territories of the Great Lakes. Like the shipping industry, the growth of railroads was dependant upon the ability to streamline the process of transportation. Separate, but complementary, the two industries began to cooperatively organize service with the advent of the passenger/package freight propeller. Therefore, in the second half of the nineteenth-century, vessels like *Congress* provided a direct link to extensions of the area's rail lines (*Buffalo Commercial Advertiser* 1868c). These lines, in turn, facilitated the transportation of both people and goods to and from the inland areas of Wisconsin, Northern Illinois, Minnesota and the Upper Missouri River.

In 1857 an economic panic gripped the United States that slowed the flow of western migration as well as the construction of new vessels (Mansfield 1899:678,680). Somehow, despite the economic downturn, the versatile Great Lakes passenger freight operations persisted (Gardiner and Greenhill 1993:71). With this in mind, the smaller size and corollary tonnage of *Congress* and other vessels of the same type is likely a reflection of the era's financial climate. While the average vessel size at this time was typically much larger, it was not uncommon for ship builders to construct smaller ships that could be more universally employed within the entire shipping industry, including seaboard service (Mansfield 1899:439; Coble 1997:72). The use of propeller propulsion and a smaller size enabled *Congress* to fit through the Welland Canal between Lakes Erie and Ontario and access open passage to the Atlantic through the St. Lawrence River.

Additional supporting evidence for the economy of scale and construction costs is the documented installation of recycled machinery from the wrecked propeller *M.B. Spaulding* (see Appendix B). It is likely that the higher construction costs for a propeller driven vessel (Gardiner and Greenhill 1993:71) were somewhat mitigated by the cost saving efforts of using recycled machinery. Furthermore, the smaller size and versatile design of a cargo and passenger carrier allowed the new owners to compete in a broader market that encompassed both upper and lower lakes trade.

In terms of utility and vessel adaptation, *Congress* operated in the waters of the Great Lakes for the majority of its career. Like scores of other Great Lakes vessels, however, it was pressed into Union service during the Civil War (*Chicago Times* 1861; *Detroit Free Press* 1868; *Wheeler, Matthews & Warren Ship List* 1864). Similar to the practices of the cash-strapped Confederate Navy, the Union Navy routinely employed modified vessel, to augment their new purpose built warships and ancillary vessels. This practice is, again, true to the nature of commercial shipping and reveals an industry grounded in the economy of time and money. In addition, the abundance of commercial vessels and seamen working in the Great Lakes and inland tributaries were already suited to coastal and inland navigation. As was the case in many previous wars, the region served as a ready source for Union recruitment (Mansfield 1899:689-696).

From 1864 to 1866 *Congress* was used as a prisoner transport between Charleston, South Carolina and New York (*Buffalo Daily Courier* 1866a, 1866b). It was at this time that modifications were made to the structure of the ship and the name was changed from *Detroit* to *Congress* (Certificate of Enrollment 1865; *Lytle-Holdcamper Ship List* 1868). The vessel was given copper hull sheathing, a second deck and two additional masts for seaboard service. After the war, *Congress* was purchased by a Buffalo businessman and placed back into general service in the Great Lakes. Yet, before it could be employed, newspaper accounts indicate the vessel was detained in Quebec as an insurgent war vessel during the attempted Fenian Brotherhood invasion of Canada (*Buffalo Daily Courier* 1866b). The owner objected to any knowledge of Fenian involvement and the vessel was returned to Buffalo later that year for employment as a carrier with the Belle City Propeller Line. *Congress*, along with three other vessels, were put into the general passenger and cargo service between Buffalo, New York and Racine, Wisconsin (*Buffalo Daily Courier* 1866a, 1866b). The new propeller line formed a direct supply line with an extension of the Western Union Railroad (WURR) located at Racine. (*Buffalo Commercial Advertiser* 1868c).

Steam Technology and Oil Fuel

In 1868 an exposition was arranged to demonstrate the benefit of a new steamship fuel. For the demonstration *Congress'* boilers were modified to burn oil rather than coal or wood. Although no documentation survives regarding the modification process, research indicates the conversion would have been fairly simple. A tank of oil would have likely been placed on the deck of the ship with a connecting pipe running down along the housing of the smoke stack and tied into the boiler's furnace. In the furnace, ignited oil would then create hot gasses that travel through the combustion chamber and up through the boiler tubes to produce the steam that powered the engine. Though *Congress'* exhibition runs were conducted for only one week, the demonstration foreshadowed the impact that oil fuel would have on the shipping industry for decades to come. Its nearly complete adoption by 1914, as both cargo and a fuel source, had become central to the shipping industry as well as everyday life (Coble 1997:29).

A newspaper article on the event insightfully captures the potential significance of the new fuel:

> *CONGRESS* made another trial trip yesterday. The fire created in the furnace was greater than ever before witnessed, while at the same time was under perfect control and entirely free from any danger of explosion. Here then we have a fuel arrangement for steamships revolutionized; no wooding or coaling at way ports nor the necessity of men to handle the same, and a saving of half of the running expenses. Ere long it cannot fail to become universal on our northern lakes as on the oceans (*Detroit Free Press* 1868).

As stated previously, the timing of *Congress'* conversion to an oil fired steamer is a significant aspect of the vessel's history. In 1868 the transition from wood to coal had not been fully accepted on the Great Lakes, much less the adoption of a relatively new, petroleum based oil fuel. Both coal and oil burned hotter and longer than wood, resulting in less fuel expenditure and faster speeds. A secondary benefit to oil fuel was the mitigation of hot ash emitted from smoke stacks that were a common cause of fatal ship fires. However, despite the economic benefit of alternative fuels, the ready availability and abundant source of wood regionally discouraged shippers from implementing the change until well into the twentieth-century.

A persistence of retrograde technology, despite the existence of a more efficient or less costly technology, is a common phenomenon historically. By way of explanation, it has been suggested that the adoption of a new invention is often tied to ancillary factors that exist outside of the scope of utility for the innovation alone. Often times there are social, economic, political, religious, and environmental factors that prohibit adoption (Mokyr 1990:10). Competitive influences against implementation can even include the most basic considerations, such as a social desire to enact a change or the relative proximity to materials and/or infrastructure (Mokyr 1990:283-284).

The adoption and persistence of certain technologies is the culminating argument made by the author. When examining the history of technology, long term trends in increasing efficiency and complexity can be discerned that are parallel to the biologically applied theory of natural selection (Mokyr 1990:283). Mokyr argues that the perseverance of a given technology is also based on selective qualities. That is, a series of discriminating social factors determine its successfulness. These include: the availability of the resource; the quality of tools to produce product effectively; the dissemination of the process, and ultimately the utility in society. These stages are demonstrated in any given life span of a successful technology.

In addition, these two simple considerations are probable factors that contribute to longevity of wood burning steamers on the Great Lakes. Eventually, however, the astounding amount of wood needed for vessel operation, coupled with the rapid depletion of the northern forests, would necessitate the adoption of an alternative fuel source. A typical vessel engaged in shipping on the Great Lakes required between 133 cords of wood per trip which translates to about 5,000 cords of wood seasonally (Mansfield 1899:400). With this in mind, further consideration of *Congress'* exhibition marketing is another useful tool for examining broader motivations extant within the established Great Lakes shipping industry.

The overt appeal to other economic benefits for the application of oil fuel revolved around ship design and shipping practices. As the newspaper account of *Congress'* exhibition states, vessels using oil fuel would no longer have to carry bulky wood or coal stores. The large bulkheads that previously held fuel stores could then be used to augment the cargo carrying capacity of the ship. An impact on work load, time expenditure and crew size would also result. Without the loading and unloading of fuel stores, additional men and time would not be needed during the initiation and duration of a trip. Therefore, while the exhibition of the new fuel source may appear speculative in nature, it actually conforms to the regional philosophy of adopting any measure necessary to streamline the shipping process. However, going back to the idea that social perceptions work against the adoption of technology, the explicit promotion of benefit would not mask the more covert, negative consequences to the industry that implementation of the new fuel would clearly bring. Specific concerns would include the subsequent impact on the Great Lakes labor force. Similarly, a broader impact would be dealt to the community at large, as the coaling and wooding way-ports along the Great Lakes shipping routes would become obsolete. The long term impacts would be the alteration of shipping routes as well as the redistribution of revenue that would have formerly been generated in these small ports. At the time of *Congress'* exhibition, the significance of this change would not have been overlooked by the population or the shipping industry.

Congress' Wreck: A Continuation of Commercial Re-Use

On October 26, 1868, *Congress* wrecked on North Point Reef on the north shore of Thunder Bay in Lake Huron, Michigan. The vessel left Buffalo on Thursday, October 22, loaded with a cargo of salt, apples, railroad iron and staves. The ship first ran aground on Black River Reef south of Thunder Bay on October 25. Heavy seas were the reported cause for the vessel being 12 miles off course. It remained stuck on the reef for 12 hours before being lightered off and resuming its course toward Chicago. The ship made a stop at nearby Alpena harbor to pick up more cargo and left the next day. Three miles west of Thunder Bay Light, *Congress* ran aground again on North Point Reef. This time the ship immediately began to take on water and was abandoned by the crew.

Shortly afterwards, the vessel caught fire and the upper works burned to the waterline (*Buffalo Commercial Advertiser* 1868c; *Chicago Tribune* 1868; *Toledo Blade* 1868).

While it is likely the majority of the cargo was salvaged at the time of the event, newspaper accounts indicate that the engines and machinery were not salvaged until seven years later. The recovery of *Congress'* engine was performed by the wrecking tug *Monitor. Monitor* also recovered the engine from the *Detriot* during the same expedition (*Globe* 1875, see full account in Appendix D). It should also be noted that in 1868, the year *Congress* sank, shipping losses were the highest in almost two decades. Reported shipwrecks in 1868 totaled more than 60 during the shipping season with 331 corresponding deaths (Mansfield 1899:706). This was almost a 200% increase from the previous year's death toll of 120 (Mansfield 1899:706).

Congress' lifespan illustrates the broader social, technological and economic trends that were extant in the Great Lakes region during the shipping heyday of the nineteenth and twentieth centuries. The characterization provides a more dynamic understanding as to how the concepts of Great Lakes "industrial economy" and "vessel adaptation" functioned on a day to day basis, at both a micro and macro level. *Congress'* entire uselife demonstrates the concept of industrial economy. The ship's construction was expressly designed to effectively compete within the era's commercial environment. The initial use of recycled parts from the *M.B. Spaulding* shipwreck, the vessel's repeated commercial adapted, and its final demise after repeated groundings all fit within the previously introduced paradigm for Great Lakes commercial intensity. The relevance of presenting the material within the broader context of these social and economic trends is to provide an alternative perspective from which the archaeological record can be better interpreted during the North Point Ship Trap site assemblage analysis presented in Chapter 5. Moreover, both the wrecking process and final salvage of *Congress'* cargo, boilers, and engine demonstrate the utility and prevalence of the Great Lakes salvage industry which will be discussed further in Chapter 4.

CHAPTER 5

THE DEVELOPMENT OF MARITIME SALVAGE IN ANTIQUITY

To complete the analysis of Great Lakes maritime commercial development, it is necessary to examine the evolution of maritime salvage as a commercial industry. To do this, Chapter 5 first intends to demonstrate the practice's historic prevalence and commercial function in antiquity. Specific attention will be paid to the deliberate application of technological advancements in both salvage methods as well as diving technology. The discussion is intended to dispel the common perception that historic maritime salvage was an opportunistic practice. Rather, the research suggests that salvage evolved over time as a business strategy that maximized investment returns by mitigating unpredictable revenue losses. From this technological and economic construct, Chapter 6 will follow with a detailed discussion of salvage practices specific to the Great Lakes region.

Accounts of Salvage in History

Historic documentation of maritime salvage dates to the fifth-century B.C. (Young 1963:29; Marx 1967:17). The Greek historian Herodotus reported two accounts circa 460 B.C. The first incident involved a Magnesian man named Ameinocles who recovered "a large number of gold and silver drinking-cups…and Persian treasure-chests containing more gold, beyond counting" from the wreckage of Xerxes' naval fleet during the first Persian War (Herodotus 1954[460 B.C.]:434). The description indicates the type of salvage was a case of on-shore recovery. The man collected articles that washed ashore after a violent storm. These items reportedly came from over 400 hundred Persian warships lost during the same event. The second account is the story of an accomplished Greek diver, Scyllis. Herodotus states that the diver was forcibly employed by Xerxes to recover treasure from the same sunken war ships (Herodotus 1954 [460 B.C.]:453). When the man finally escaped capture, he cut the anchor lines for Xerxes' remaining fleet vessels. In the ensuing chaos, Scyllis was reported to have swam completely submerged for a distance of nine miles to join nearby Greek forces. Despite the distinct nature of each salvage type, the two accounts illustrate a range of utility for maritime salvage in antiquity.

Many similar examples of maritime salvage are found later in the historic record. Accounts are recorded for numerous cultural and geographic settings indicating that the practice was common to all coastal regions throughout the ages. The prevalence of historic salvage is also substantiated by the early existence of salvage laws. In 900 B.C. *Lex Rhodia,* or Rhodian common law of the sea, specifically outlined codes to govern claims on shipwreck property. *Lex Rhodia* was written by magistrates from the Greek island of Rhodes. At this time, Rhodes served as the Mediterranean's trading center and their laws were universally recognized. Article XLV of *Lex Rhodia* rewarded one-fifth the property value of shipwreck articles to the person who performed the service. Article XLVII further mandated that the recovery of gold, silver, or any other material from a submerged shipwreck entitled the bearer either one-third or one-half of the item's value. The respective amount was determined by the recovery depth. When objects were found washed ashore, or in water less than three feet deep, the possessor was rewarded onetenth the value. In addition, Rhodian law outlawed shipwreck looting. If looters were apprehended, the culprits had to pay a restitution fee four times the value of the objects taken (Shepard 1961:27-28; Young 1963:30).

While Rhodian salvage laws were primarily enacted to reward the growing body of professional free divers who recovered vast amounts of sunken treasure at great personal risk, the measure to punish unsanctioned recovery practices suggests that a more opportunistic side of salvage also existed. Additional historic accounts also support another, more sinister, side to maritime salvage. Early Romans recorded the routine killing of shipwreck victims in order to plunder their belongings; and, sixteenth-century English legends detail how "wreckers" intentionally lured ships to their demise to steal a vessel's cargo (Shepard 1961:27, 35). As maritime trade grew steadily through time, these persistent, unscrupulous behaviors warranted that salvage laws exist to ensure a legal recourse for shipwreck owners, victims, and salvagers. The Rhodian laws of the sea, therefore, became the baseline for admiralty laws at a local, national, and international level. The original codes were adapted throughout the years by individual nations, but, typically all reserved the measure to award persons who risked bodily harm to recover shipwreck goods. In addition, ownership rights to unclaimed shipwreck property were granted to the government where the shipwreck occurred (Shepard 1961:28; Young 1963:30; Wiswall 1970:17).

By the early seventeenth-century maritime trade expanded into a worldwide enterprise. Set against the backdrop of mercantilism and colonial expansion, tremendous amounts of cargo were shipped across the oceans annually. Due to the increase in maritime traffic, a corresponding increase of shipwreck disasters occurred. Maritime commerce required a large initial expenditure of capital, therefore, it was advantageous for vessel owners and insurance companies to foster measures that protected their investment. Numerous environmental factors, however, often played into wrecking events. This meant that improving vessel technology and harbor infrastructure did not completely protect investments from marine disasters. As a consequence, shipwreck recovery practices were actively pursued to mitigate the amount of revenue lost from marine disaster.

Initial recovery practices were fairly unsophisticated but offered sizable rewards. The earliest recorded salvagers were Mediterranean free divers that were paid to recover objects or material from sunken vessels (Young 1963:30-31; Marx 1967:17). Free divers descended into the depths with a rope tied around their waist and weighted down with heavy stones. Once the desired object was recovered, the diver released the stones and was hoisted back up to the surface with the treasure in hand. This system was limiting, however, as most divers could only hold their breath an average of three minutes (Meier 1943:21). Another similar technique for retrieving goods off the seafloor was buoying valuable cargo before it was jettisoned from a vessel in distress (Shepard 1961:37). Once the immediate peril passed or disaster occurred, the buoyed freight could easily be re-located and the pre-attached rope provided an immediate means of recovery. Later in the historic record, material still contained within the cargo hold of a sunken ship was recovered with grapples or long handled tongs (Meier 1943:25). These tools were used to open hatches and extract objects from the surface. Scoops and buckets at the end of long rods were also routinely employed if the desired cargo was a bulk commodity like coal or grain (Meier 1943; 28). Surface deployed devices were somewhat unwieldy, however, and free divers were still often necessary to perform initial underwater reconnaissance or ensure the proper placement of equipment or ropes.

While these early salvage methods were relatively effective, they were not very efficient in recovering large amounts of material in a short amount of time. In cases of unforeseen disaster or shipwrecks located in high energy environments, both of these considerations were of the highest importance to salvagers. In antiquity, extensive cargo recovery was extremely unlikely if a shipwreck was exposed to active surf, especially when grounded against a rocky substrate. Inclement weather conditions also compounded the likelihood for failure. In these instances, salvage efforts had to be swift and well-organized to be successful. Many times, however, shipwrecks were not the result of calamitous events, giving the captain and crew time to react in a calculated manner. A vessel taking on water could still be sailed to a shallower or protected area prior to complete inundation. If accomplished, the likelihood for cargo recovery was high. The placement of a wreck in a more hospitable area, away from secondary degrading factors like excessive surf and wind action, was imperative for comprehensive salvage operations.

Salvage Follows Advances in Diving

Significant advances in diving technology had to occur for the salvage industry to progress beyond a rudimentary stage. As with salvage, diving technology evolved as a consequence of increased worldwide trade. By the mid-sixteenth-century divers were an integral component of maritime commerce. At this time, divers were not just necessary for salvage operations but were essential in performing vessel maintenance and repairs below the water line. A good example of the important role diving played during this era is the regular use of native divers by Spanish treasure fleets. To ensure safe passage between the Caribbean and Spain, Spanish ships traveled in convoys or *flotas*. Each vessel within the *flota* carried one or more native diver on board to make sure that the vessel remained sea worthy. As vessels were habitually overloading and repairs were frequently necessary while at dock and en route. Sailing ships at this time, however, were at the mercy of the Atlantic Ocean's currents and wind cycles. This meant that individual vessels could not delay the progress of an entire convoy while repairs were conducted, nor did individual ships want to risk loosing the convoy's protection by lagging behind. Services, therefore, had to be accomplished while vessels maintained a consistent sailing speed. In the event of a sinking, divers from convoy ships were used collectively to recover the treasure (Marx 1967:26).

Despite their rigorous nature, these early diving services were performed without using a supplemental air source from the surface (Meier 1943:21; Young 1963:29). Tasks were accomplished in multiple descents using highly developed breathing techniques to extend bottom times. As maritime traffic increased, however, the need for longer bottom times also resulted. Expanding on technology developed in antiquity, Renaissance era inventors sought to develop diving systems that could provide both protection and an auxiliary air supply. It was at this time that the forerunner to both the modern day diving helmet and diving bell was invented. Based on a design described by

Greek philosopher Aristotle in the fourth century, the first functional diving bell was invented and successfully used on July 15, 1535 (Young 1963:34; Marx 1967:33; Muckelroy 1978). Guglielmo de Lorena used his diving bell/helmet to salvage treasure from two Roman ships that sank in Lake Nemi, just south of Rome, Italy in 40 A.D. The bell shaped apparatus was partially suspended from the surface and rested on the diver's shoulders. It was large enough to contain the upper half of the body and provided enough air for a diver to stay submerged for an hour. A clear glass window was placed at the front of the bell to allow the diver to see ahead and the open bottom allowed the diver to reach out from underneath the rim to retrieve any objects.

Almost a century prior to this, however, noted artist and inventor Leonardo da Vinci conceived a much less cumbersome diving helmet. The helmet was made of leather with an attached tube for breathing air from the surface (Young 1963:32; Marx 1967:29). At this time, da Vinci also drew sketches for a self-contained diving suit that included air reservoirs to provide an artificial air supply underwater (Young 1963:33). Da Vinci's "snorkel" tube attached to the leather helmet was also another concept derived from the historic record. Roman naturalist Pliny the Elder recorded the first description of a primitive snorkel in 77 A.D. (Young 1963:31; Marx 1967:17). Pliny's account details that divers engaged in covert military operations stayed concealed by drawing air through tubes that were attached to surface floats. Pliny likened the form and function of the device to that of an elephant's trunk (Young 1963:31).

Other historic accounts also relate snorkel-like devices to military operations. Historians have postulated that divers carrying out secret missions in antiquity used some type of hollow shaft to stay concealed (Young 1963:29, 32; Marx 1967:17). Even the proclaimed father of history, Herodotus doubted his own contemporary account of Scyllis swimming nine miles completely submerged and unassisted (Herodotus 1954[460]:453). The most likely conclusion is that ancient divers used the rigid, hollow shaft from a reed. The first official report of the practice was recorded by Roman Emperor Flavius Mauricius Tiberius Augustus during his Balkan campaigns. In the late fifth century A.D. Emperor Mauricius cited that Slavic peasants "…when suddenly attacked, dive under water and, lying on their backs on the bottom, breathe through a long reed. They thus escape destruction…" (Young 1963:32).

Even da Vinci's diving inventions were the product of military pursuits. Da Vinci's first diving helmet with an attached snorkel was commissioned by the Venetian government (Young 1963:32; Marx 1967:29). After expanding the initial concept into a full diving suit with self contained air chambers, however, da Vinci refused to publish the full details. The inventor asserted that if his invention fell into the wrong hands it would be used for ill purposes (Young 1963: 33; Marx 1967:29-30). Despite his efforts to thwart the production of an effective breathing apparatus, a strong desire for such a device existed. As a result, over the next two centuries many inventors proposed designs for similar and expanded technology, accomplishing various degrees of success. An evolution of diving technology since da Vinci's first design is shown below in Figure 5.

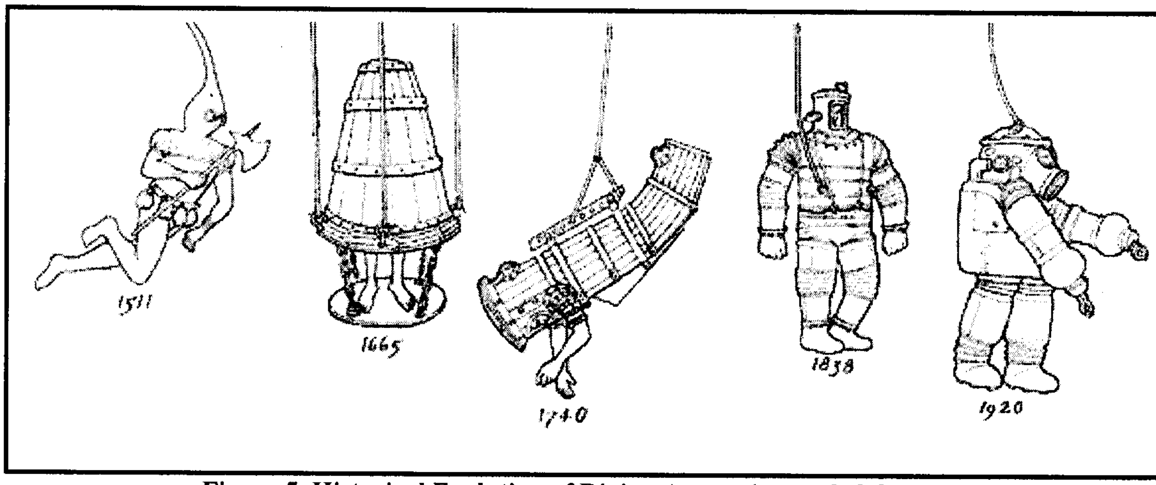


Figure 5. Historical Evolution of Diving Armor (www.thehds.com).

Inventors in the sixteenth and seventeenth centuries sought to find effective diving systems that not only provided surface air but also facilitated underwater work. As early as 1690 Edmond Halley, of Halley's Comet repute, invented a functional diving bell that provided the prototype for modern day diving bells (Young 1963:41; Marx 1967:33). Less than three decades later, John Lethbridge designed and successfully used the first "armored diving dress" in 1714 (Young 1963:41). Both inventions catered to the growing need and increasing complexity of underwater work. The often extensive nature of ship repairs warranted an increase in the amount of time divers spent underwater and rapidly expanding salvage operations also demanded that greater depths be achieved by divers. Figure 6 depicts a patented seventeenth-century system for providing divers a safe working environment below the water line and supplemental air from hoses run down from the deck.

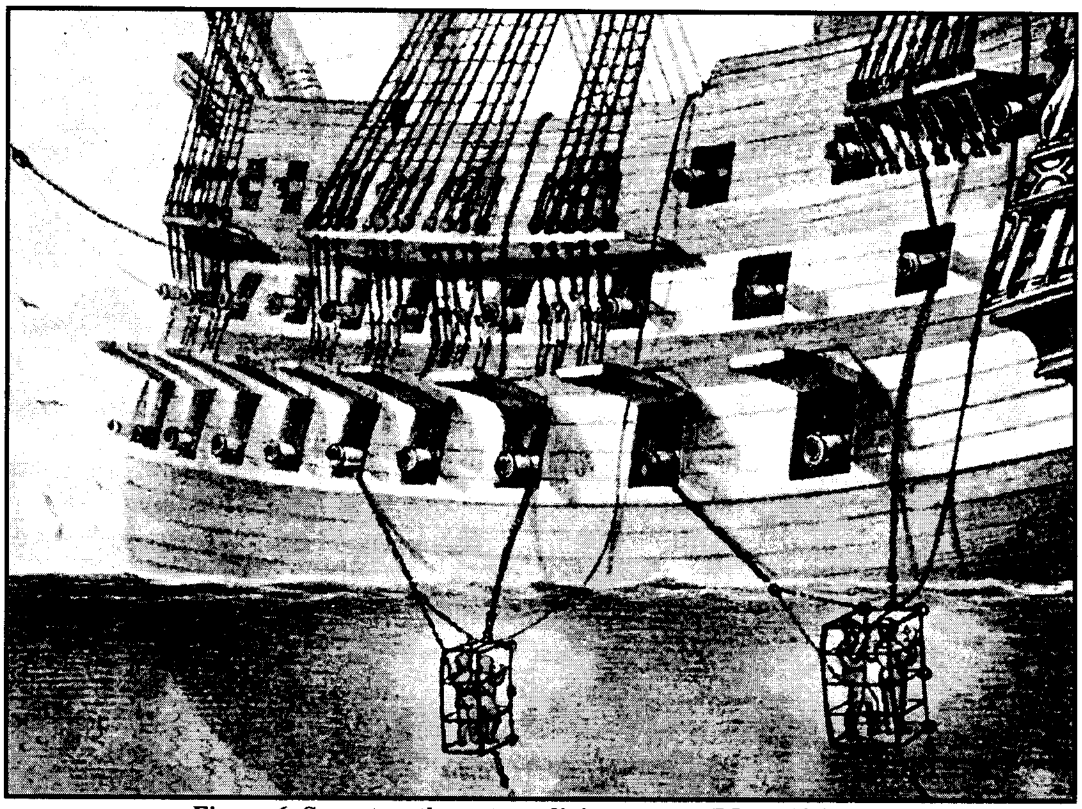


Figure 6. Seventeenth-century diving system (Marx 1967:27).

Early on, however, it was recognized that divers needed a protective barrier to withstand longer hours and deeper environments. A 1744 eyewitness account details the type of diving dress worn and the affect water pressure had on divers engaging in salvage off the Isle of White, England:

> I went there in order to go to the Needles to see the curious manner of diving which they lately began in order to raise what they could of the wreck of a man-of-war which was lately cast away. They are let down in a machine made of leather, strengthened at the knees and shoulders and, if I mistake not, on the head with brass. There are two leather tubes to it- one for air to go down and to speak by, the other to pump up the air....Sometimes, as it is imagined, when they have gone too far down, they have bled at the nose and eyes (Young 1963:36).

After similar occurrences persisted, advances in technology emerged to counteract the detrimental affects of water pressure. In 1829, with 18 years of practical experience in open diving dress technology, Augustus Siebe introduced the first functional closed system diving dress. While, other closed systems had been proposed, Siebe's was the first to be able to overcome the affects of pressure at moderate depths and for sustained periods of time. Siebe's suit was comprised of a copper helmet with an attached rubber suit sized large enough for a diver to wear multiple layers of clothes for warmth. The suit was supplied by a forced-air pump which provided an air supply and equalized the water pressure exerted on the diver. Once Siebe's sealed diving dress was introduced, the salvage industry prospered and diving technology rapidly progressed. In just a matter of decades, additional technological advances in diving suits and air pumps enabled divers to work at much deeper depths and dramatically extended dive times (Young 1963:38-39; Marx 1967:58). Figure 7 below depicts a diver in closed dress with tenders ready to man the air pumps for a descent to work on a wreck below the surface.

Figure 7. Depicts a nineteenth-century diver descending on a wreck site. Tenders in the dive boat wait patiently to take turns at the air pump (Young 1963:65).

Historic Salvage Practices

From about 1830 onward, remarkable salvage accounts fill the historic annals. The salvage industry was a prosperous and legitimate enterprise world wide. In contrast to the harsh, opportunistic nature that is often attributed to maritime salvage, the historic record clearly illustrates that the industry systematically evolved. Through the deliberate application of technological innovation, salvage methods were refined by trial and error over the course of nearly three centuries. The intention was to find an efficient recovery method for lifting an entire vessel from the seafloor. Ideas for this kind of comprehensive recovery began very early. The image in Figure 8 depicts William Tracey's 1782 salvage proposal for the king's flagship *Royal George.*

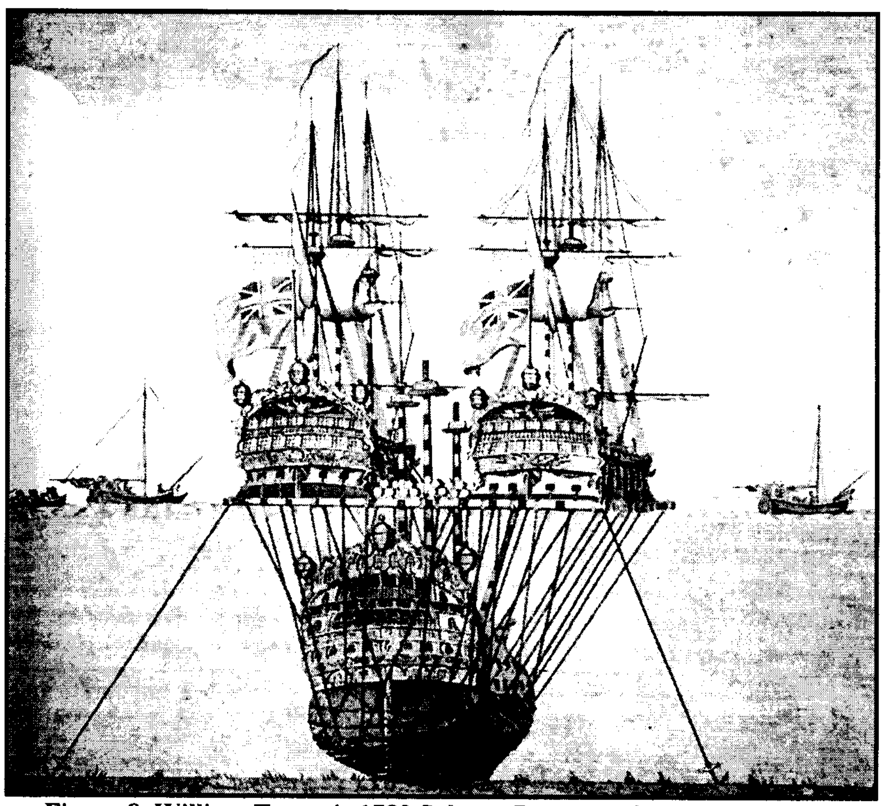


Figure 8. William Tracey's 1782 Salvage Proposal (Shepard 1961:29).

Tracey's salvage process entailed running ropes underneath the vessel to create a rope sling that would then be used to float the vessel into shallower water as the tide rose. The sling was to be assembled underwater by divers. As the tide rose, the wreck would pull free of the bottom and the salvagers would take up the slack to keep the vessel suspended above the surface. While the method was sound in theory, it was declined at the time of its proposal. Unfortunately for Tracey, diving technology had not progressed enough. The *Royal George* rested in 90 feet of water and divers simply could not withstand the water pressure using open dive suits. Regardless of the initial failure, the proposed method provided direction for modern salvagers when diving technology did evolve. With the invention of closed diving armor, the process soon became the principal method used in salvage operations. Historic salvage accounts indicate the "sling" method was common by the mid nineteenth-century. Within a decade of Seibe's closed diving armor being introduced, freelance salvers in both Europe and North America put Tracey's system to practice (Young 1963:36-37).

While the more rudimentary forms of salvage still persisted, the sling method was used by professionals whose goal was to comprehensively recover an entirely submerged vessel. As depicted by Tracey's 1782 image, two ships were anchored at low tide above a sunken vessel. A diver was dispatched from the surface, descended to the wreck and ran rope lines underneath the sunken vessel at cross angles, effectively creating a cradle. Once in place, the ropes for the cradle were secured to the deck of both surface ships in accordance with their position over the wreck. At the same time, an anchor line was also set in shallower water, away from recovery operations and closer to shore. At high tide the surface ships attached to the wreck rose with the incoming water, and in doing so, lifted the wreck free from the bottom. The salvagers then used the anchor line that had been previously set to tow the entire ensemble in toward shore. Towing halted when the submerged wreck grounded again in the shallower water. The sling ropes were tightened to take up the slack created by the lifting process and then the whole process was repeated again at the next low tide. The procedure was very labor intensive and time consuming, but it also was very effective. Based on an average six foot rise in tide, which yielded approximately two to three feet of lift, a wreck sunk in 30 feet of water could be recovered in approximately six days (Meier 1943:35-36).

Expanding on the principles of the sling method, historic salvagers quickly developed a similar "pontoon" method. Two pontoons were affixed to a work barge that was anchored over a shipwreck. The pontoons were constructed with a series of air-tight bulk heads that allowed salvage operators to control the amount of the pontoon's buoyancy. Once in place, the pontoons were sunk about five feet below the water line and divers affixed the rope lines from the sling that ran down and beneath the wreck. At low tide, the pontoons were sunk even further in the water column, as close to the wreck as could be achieved. A forced air pump was then set up on the deck of the surface ship or working platform and used to pump air into the different compartments of the bulk headed pontoon. When enough water was displaced by air, the pontoons became buoyant, lifting the wreck free of the bottom; and as high tide came in the wreck rose even further in the water column. From this point forward, the same procedure for the sling method was followed. The rope lines between each piece were tightened to take up the slack and secure the new suspended position of the wreck. The entire ensemble was towed toward shore until the wreck grounded in shallow water. The pontoons were then flooded again at the next low tide and the entire process repeated until the vessel was recovered (Meier 1943:36-37; *Monitor* 1892). Figure 9 portrays the use of standard salvage pontoons during the recovery of a submarine. As pictured, the pontoons are floating on the surface after raising the vessel from the seafloor. The submarine is still attached to the pontoons, hanging suspended beneath the surface awaiting a tow to shore.

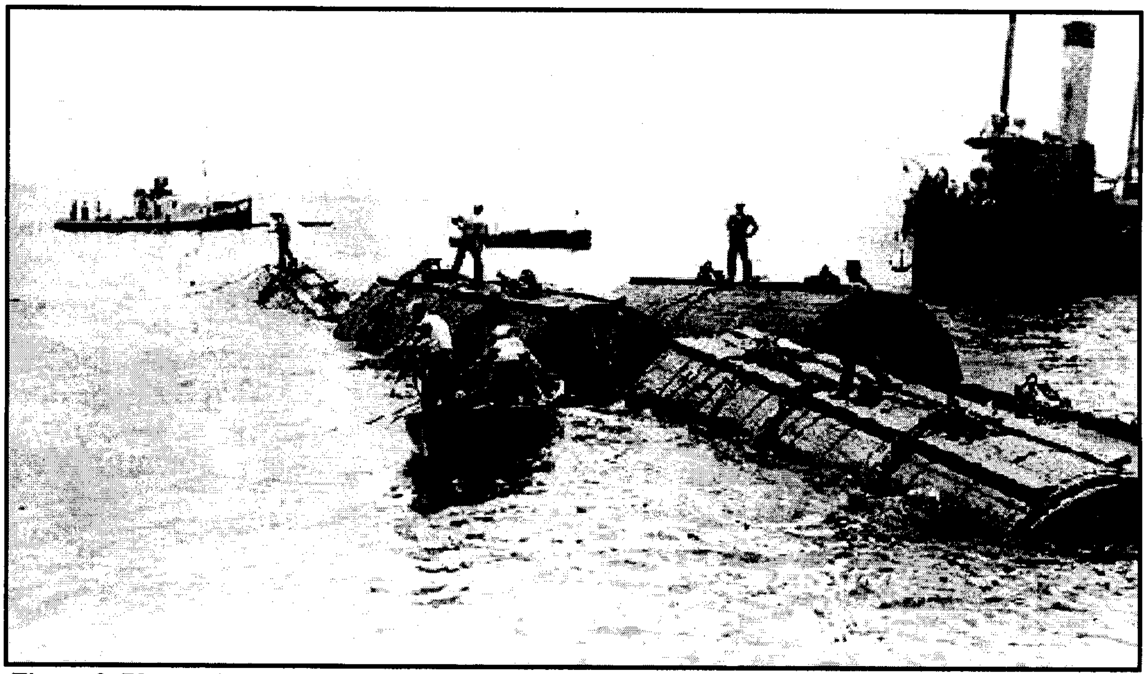


Figure 9. Photo taken of typical salvage pontoons, March 25, 1915, during the recovery of USS F-4 (www.rddesigns.com).

Adoption of the pontoon method greatly expedited the process for raising an intact vessel. It was estimated to cut recovery time in half (Meier 1943:37). With the advent of steam technology, however, the pontoon method became even more time efficient, as did other salvage methods (Young 1932:61). Steam technology not only expanded the towing capacity of salvage vessels, but steam driven air and water pumps dramatically increased the rate at which water could be displaced or siphoned. In addition, the introduction of steam cranes provided a secondary lifting capability that served to expedite the salvage process. Steam cranes and tugs were particularly important in situations where the wreck site was not inundated (Young 1963:52). A majority of shipwrecks resulted from groundings or collisions with shallow water obstacles such as reefs and rock outcrops. This often left the vessel intact above the water line.

Salvage methods for vessels not completely submerged were relatively standardized early on. The typical procedure for refloating a partially submerged vessel was to repair any fractures or holes and pump out the water inside the hull (Perry 1907; Young 1932:149; Brady 1960:1-3; Young 1963:50). To do this, divers were used to first assess hull damage and then perform necessary repairs. After accurate measurements were taken, a diver conferred with the wreckmaster who was in charge of the salvage ship (Meier 1943:109; Young 1963:55). The two determined the best remedy for the individual job site, taking into consideration the available materials and equipment, as well as the vessel design and location of damage. The repairs usually involved constructing expedient "patches" to seal ruptures. Patches were assembled either underwater or at the surface and then lowered down to a diver for placement.

Initially, the most common patch types were made of canvas and wood (Young 1932:149; Meier 1943:108, 110). Canvas was a relatively waterproof material that was easily manipulated. Stretched over wood frames or placing a sheet behind a wooden patch, canvas provided a barrier that enabled salvers to make the hull water-tight again.

The patches were purposely made slightly oversized and specially fitted to the hull by divers working underwater. To complete the process, repair sites were sealed with a bonding agent like oakum, pine tar, or cement (Meier 1943:110; Doner 1958:118; Young 1963:50). There are even accounts of horse manure being used to plug small gaps (Doner 1958:108). Salvage patches for vessels with iron and steel hulls were still made of wood, but metal plating was also adopted past the turn of the century (Young 1932:149). Patches of either material type had to be bolted through the metal hull in order to be secured properly. In order to ensure a patch fit securely the ragged edges along metal hull fractures had to be trimmed prior to final installation. Figures 10 and 11 depict both a trimmed vessel fracture and a wooden repair patch bolted to the iron hulled vessel.

Figure 10. Photograph of typical hull fracture (Young 1932:83).

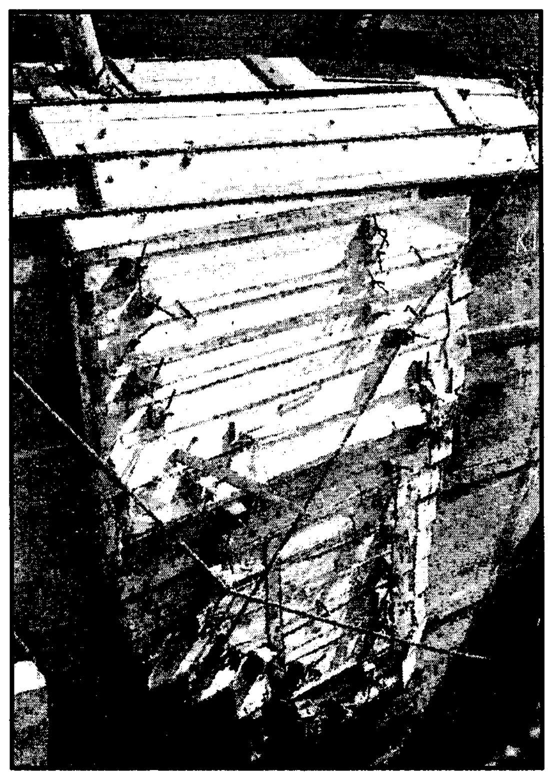


Figure 11. Photograph of "standard patch" used to repair hull breaches during salvage operations (Young 932:83).

Even a little buoyancy could be used by salvagers to recover a vessel. To augment a damaged vessel's buoyancy, salvagers attached air filled pontoons to the wreck or simply tethered the ship between recovery boats. When the vessel was stabilized at the surface it was towed inshore to a dry dock where proper repairs could be made. During the voyage water pumps installed on the deck of the ship kept the hull from becoming inundated with water. The final destination for a recovered vessel could be nearby, or a considerable distance away. Initially, delivery to a far away destination increased the likelihood for a mishap to occur while in transit. As the methods were refined and as technology evolved, however, the process became more and more reliable (Perry 1907; Young 1932, 1968; Meier 1943; Doner 1958; Brady 1960).

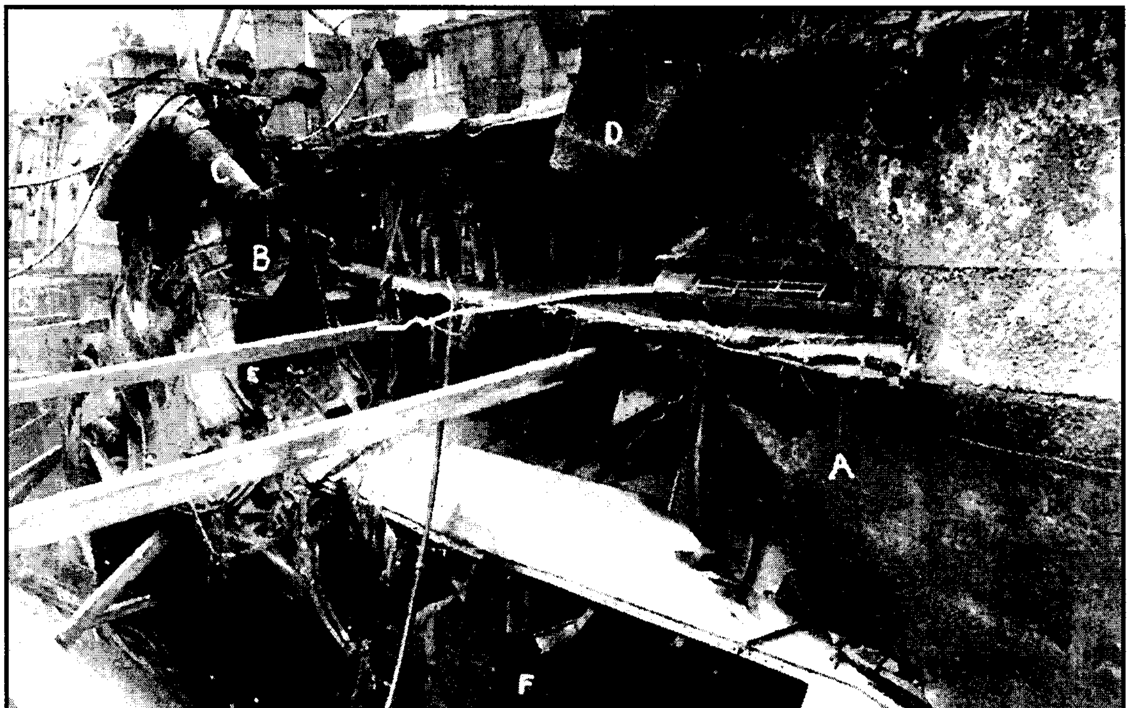


Figure 12. Photograph of the H.M.S. *Gladiator* in dry dock after the vessel's recovery, circa 1915 (Young 1932:102).

As depicted in Figure 12, salvage methods became so reliable that even an extensively damaged vessel could be recovered and brought back to shore for repair and re-employment. Over the course of the nineteenth-century, this became increasingly important as shipping casualties rose on the Great Lakes. As will be explored in Chapter 6, relentless industry demands pushed shippers and boat captains to ignore the mounting perils associated with intensive shipping practices. Intensive shipping practices ensured a steady stream of goods was delivered to outlying markets, thereby, contributing to the prosperity of both the individual and the region overall. Ships were seen as the most valuable commercial commodity on the Great Lakes. The productivity of a commercial vessel was directly tied to the ship's capacity to make repeat deliveries. The introduction of commercial salvage on the Great Lakes, therefore, was undeniably a cost effective business strategy aimed at maximizing profits.

CHAPTER 6

THE EVOLUTION OF GREAT LAKES SALVAGE

In this chapter, the utility of maritime salvage as a cost reducing business practice will be examined in the context of Great Lakes maritime commerce. In particular, the study intends to demonstrate how the region's emphasis on industrial economy prompted the development of a specialized salvage industry. It will also examine the relationship between the social and economic circumstances previously outlined in relation to the region's unique physical environment. Finally, a regional synthesis of typical salvage practices will be presented. Taken as a whole, the content of this chapter will provide a categorical link between the systemic context and the archaeological context of the North Point Reef Ship Trap assemblage discussed in Chapter 7.

The Institution of Great Lakes Commercial Salvage

Due to the high rate of maritime disaster, salvage was particularly lucrative on the Great Lakes during the nineteenth-century. The Life Saving Service shipwreck statistics tabulated in Table 3 provide direct evidence for the industry's prosperity. The combined number of shipwrecks and vessel casualties between 1878 and 1897 represent a total of 5,999 waterborne disasters. In addition, the total amount of cargo lost during that same 19 year time span amounted to $6,568,800. While this may seem like a large sum, the amount pales in comparison to the potential losses that could have accrued without the intervention of salvage. Between 1878 and 1897, the number of shipwrecks that resulted in a total loss was 1,093. The other 4,906 casualties, or partial shipwrecks, were incidents of disaster where the vessels were not totally lost. In other words, the number of vessel casualties represents the number of vessel disasters where a total loss was avoided through successful recovery efforts, or salvage.

Using the statistics for lost cargo and the numbers of total vessel losses and vessel casualties, the amount of potentially salvaged cargo can be derived from the following formula.

$$\frac{\textbf{Total Cargo Losses (\$)}}{\textbf{Total Wrecks}} \left(\textbf{Partial Wrecks} \right) = \textbf{Total Averted Cargo Losses}$$

Assuming that the $6,568,800.00 of cargo was irretrievable as a result of 1,093 total vessel losses, then an average dollar amount of $6009.88 can be assigned to each total shipwreck. When the averaged figure for cargo loss per shipwreck is then multiplied with the total number of vessel casualties or recovered shipwrecks (4,906), the dollar amount of potentially averted cargo losses equals $29,484,476.48. A tabulated version of the calculations is depicted below:

Table 8. Totals for Great Lakes Maritime Losses between 1878 and 1897

Total Wrecks	Partial Wrecks	Losses of Cargo ($)	Total Averted Cargo Losses (hypothetical)
1,093	4,906	6,568,800.00	29,484,476.48

The estimated dollar amount of averted cargo losses can also be viewed as an estimated amount for potentially salvaged cargo. This assumption can be made because the definition of a partial wreck is a vessel that was not designated a total loss. This means that a partial wreck is a maritime casualty that was saved from total destruction. In other words, it is a shipwreck that was recovered or salvaged.

While, the proposed figures are grounded in statistical data derived from historic period records, there is room for error due to the inconsistent recording practices that are known to have existed during this time frame (Barton 1846:11-12; Andrews 1852:4). It is possible that the category listing totals for annual losses to cargo represent losses from both total wrecks and partial wrecks. It was often the practice to jettison cargo when lightering a grounded, but fairly undamaged, hull off an underwater obstruction. There are also multiple accounts of cargo being jettisoned or simply lost overboard during the initial disaster stages or wetted and therefore destroyed without any damage to the vessel itself. In addition, given the effectiveness of salvage practices and its widespread use on the Great Lakes, it is highly likely that a total wreck may have had its cargo salvaged despite the vessel's irretrievable condition.

If this is the case, and the figure for the total amount of lost cargo includes losses from both categories of shipwrecks, as well as omits the amounts for salvaged cargo from total wrecks, then the estimates will be skewed. The error, however, indicates that there is a high probability that the speculative amount of $29,484.476.48 is an underestimate as the inclusion of averted cargo losses or omission of potentially recovered cargo would only increase the total amount of cargo that was salvaged. Regardless of the statistical accuracy, just based on the number of partial shipwrecks (4,906), it is clear that the potential for salvage was very high throughout the recorded period.

Consequently, a professional salvage industry developed relatively early in the Great Lakes. Previously cited statistics indicate that from about 1830 onward the rate of maritime traffic began to increase exponentially, as did the rate of shipwreck and casualty. Despite the lack of formal documentation, the risks associated with Great Lakes commerce had grown to such extremes that two federal investigations were commissioned by 1851. Both reviews cite that the government should intervene for the "protection and safety" of the public and if ignored "the embarrassments now existing, will increase in a corresponding degree with the certain and almost incalculable annual increase of this trade and commerce" (Andrews 1852:2; Barton 1841:27). A significant amount of time passed, however, before the government provided the necessary remedial measures.

The lag in time resulted from both the prevailing Laissez-Faire mentality that prohibited government involvement and the conjectured political and commercial bias that was discussed in Chapter 2. This prejudice clearly favored federal support for established east coast cities, rather than frontier territories. Further direct evidence substantiating the speculation is the 1878 establishment of the Life Saving Service on the Great Lakes. As noted in Table 6 the Life Saving Service was initially established in 1871, but funding for Great Lakes service stations did not come about until seven years later. East coast ports in New Jersey and New York had been receiving federal support for "surf boats, rockets, carronades and necessary apparatus for the better preservation of life and property from shipwrecks…" since 1848 (Stonehouse 1994:8). Local support for rescuing and recovering shipwrecks in the Great Lakes, therefore, evolved out of necessity.

The earliest form of Great Lakes maritime rescue and salvage were expedient measures taken by other ships operating nearby or by vessels dispatched from the nearest port. Prior to advancements in communication technology, a call for help was only reported if an eyewitness was present and had the capacity to spread the word to a nearby port. As commerce on the Lakes intensified and as shipwrecks occurred more frequently within near shore shipping lanes, shore line observer reports began to reduce the rescue response time. In addition, to cope with the growing number of rescue requests, systematic salvage efforts also evolved. Commercial mariners began to exclusively devote their efforts toward ship and cargo recovery. The business offered sizable profits to any company willing to take the time and risk of retrieval. At the most basic level, the only equipment an early salvager needed was a vessel equipped with a steam winch and a water pump (Doner 1958:16).

As maritime shipping prospered and the rate of disaster grew, the Great Lakes salvage industry thrived. As illustrated by the shipping statistics presented in Chapter 2, merchant ships and their cargos were extremely costly investments. The reward for a successful recovery, therefore, was equally significant. Depending on the size and complexity, service payments rapidly grew in the tens of thousands of dollars by the turn of the twentieth-century. The preservative qualities of the Great Lakes cold, fresh water environment also benefited the salvage industry, as did the more sheltered condition of many shipwrecks. Both of these environmental aspects mitigated the time dependent scale of degradation typical to saltwater wrecks. Erosion from continuous wave and surf action, variable temperatures, high water salinity levels and microbial activity were all damaging agents for a shipwreck. As these considerations were predominantly absent from Great Lakes' waters, regional salvage operations could be postponed indefinitely.

Without time as a deciding factor, Great Lakes salvage operations were often planned with the most optimal weather or tidal conditions in mind. There are many reports of salvage operations taking up to two years or more to complete, as well as operations that commenced years after the shipwreck occurred (Doner 1958:118,124,132; *Around the Lakes* 1894; *Buffalo Commercial Advertiser* 1844a, 1844b; *Chicago Inter-Ocean* 1892; *Detroit Free Press* 1874; *Globe* 1875; *Monitor* 1892; *Picton Free Press* 1870a, 1870b; *Toledo Blade* 1870a, 1870b, 1870c, 1870d; also see Appendix D).

Given the preservation of wreck sites and the abundance of shipping disasters, maritime salvage operations fast became an integral component of regional maritime commerce. The salvage industry's role within Great Lakes commerce was extremely flexible and worked expressly to foster profit and reduce the shipping costs. The type of salvage services available were broken down into three main categories to include: the recovery of cargo only; the recovery of an entire vessel; and, the selective recovery of ship parts, appliances or machinery (Ronca 2006:30). The level of recovery and the types of services attempted were entirely dependent upon the extent of damage, the physical location of the shipwreck, and the cost of operations. If a ship owner could not afford the cost of recovery, the recovery operation initially appeared too complicated, or took longer than anticipated, initial efforts toward salvage were abandoned and a vessel owner had the option of selling secondary salvage rights to the highest bidder (Doner 1958).

The sale of shipwrecks was quite common on the Great Lakes throughout the nineteenth and early twentieth-century (Beeson 1919; Doner 1958). Salvage companies and other third parties routinely purchased shipwrecks after the original owners decided not to pursue recovery efforts. Given the importance of shipping in the region, a commercial vessel was the most valuable commodity during this time frame. Vessels of the era were extremely costly investments and not considered disposable commodities to be abandoned once damaged. Moreover, Great Lakes vessels were frequently converted to serve in other aspects of shipping after a vessel was removed from general cargo service. A ship in any condition, therefore, held the potential for future revenue if retrieved and recycled back into commercial service on the Great Lakes. Regional entrepreneurs waited for the opportunity to purchase damaged vessels or inundated cargo at discounted prices.

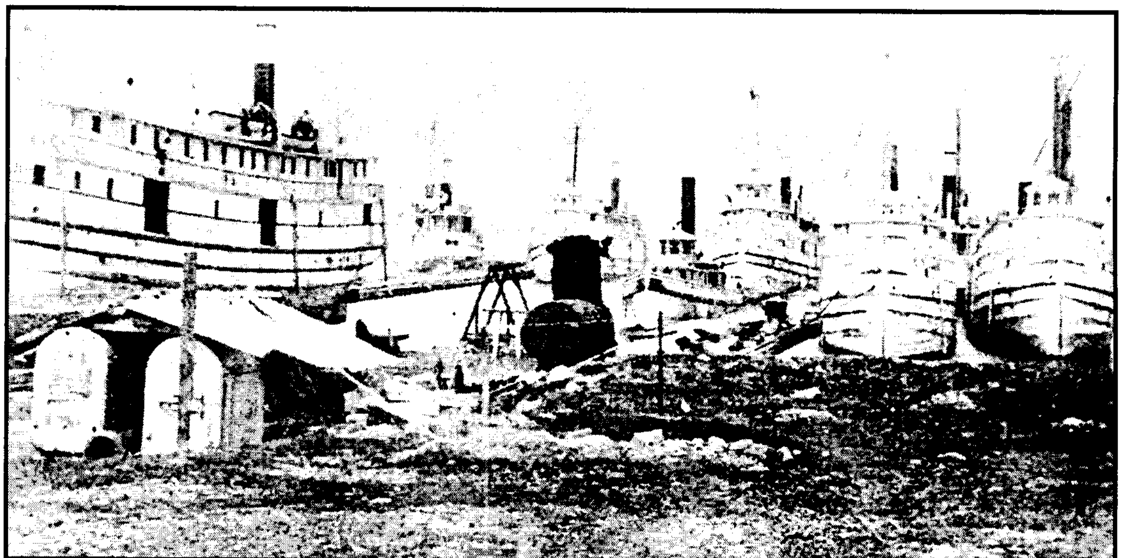


Figure 13. Photograph of salvaged boilers at Ogdensburg, New York ship yard, circa 1880 (Courtesy Labadie Collection, TBNMSRC).

A recovered vessel could be repaired for a much smaller amount than the construction costs for an entirely new vessel. It was even common for newly constructed vessels to contain salvaged machinery or ship parts, thus reducing the initial investment for ship builders and owners. Attesting to the practice's prevalence, is depiction in

Figure 13 of salvaged boilers awaiting installation at a Great Lakes shipyard. Further evidence for the practice is presented in Appendix B. Appendix B contains a reprinted list of *Lakes Vessels with Second Hand Engines* provided by Great Lakes historian C. Patrick Labadie. The list contains 215 Great Lakes vessels with recycled engines. Salvaged cargos of ore, grain, timber, and merchandise were, likewise, known to retain their commercial value. In short, during this time frame lost cargos and wrecked vessels were not considered total losses unless retrieval was absolutely impossible.

Great Lakes Salvage Methods

The continual refinement of salvage technology and methods made Great Lakes salvage operations highly reliable by the turn of the twentieth-century. With the advent of steam technology on the Lakes circa 1840, salvage companies were given a power source that enabled the industry to rapidly evolve in the region (*Detroit Daily Advertiser* 1842). Both diving and vessel technology benefited from the introduction of steam power. Air pumps gained the necessary force to deliver compressed air to divers at greater depths. Steam propelled vessels and deck machinery, likewise provided greater towing and lifting capacities for vessels in distress. Steam tugs were the first vessels to be adapted for recovery operations. Tugs were purpose-built vessels designed to pull or push other vessels through canals and rivers, as well as maneuver larger ships into mooring positions at major harbors. Given their design and towing capacity, it appears that early Great Lakes tug lines provided the first organized salvage services. Tugs were hired to pull stranded ships off underwater obstructions or tow disabled vessels into port.

By 1919 there were 596 tug lines operating on the Great Lakes that could provide "wrecking" services when called upon (Beeson 1919:71-81). Wrecking tugs were equipped with a crane lift and had a large enough hold to stow salvaged cargo. One of the most common salvage operations was lightering a stranded ship off of an underwater obstruction. Many vessels grounded on reefs, rock shoals, and sand bars while in transit or coming into port. Despite piloting guides, these incidences occurred frequently. A number of uncharted obstructions existed in near shore areas close to or within navigation routes; navigation errors were also common, especially if pilots relied on dead reckoning; and, unpredictable weather conditions often created hazardous sea conditions or reduced visibility. In cases where a vessel's hull was undamaged, a wrecking tug simply attached a line to the ship and pulled it free of the obstacle. If a vessel was loaded with freight and exceeded the wrecker's pulling capacity, the cargo had to be removed before the shipwreck could be successfully lightered (Meier 1943; Doner 1958).

Straightforward salvage jobs, however, had the potential to turn into more complex operations at any moment (Young 1932; Meier 1943; Doner 1958; Brady 1960). Variable sea conditions always exist in a maritime environment and historically the Great Lakes were notorious for dramatic changes in weather (Mansfield 1899:578; Garriott 1896:122). The location of a wreck site was also a determining factor, as was a vessel's size and structural integrity. Either variable dictated the type of wrecking equipment and the level of salvage possible. Open water sites were exposed to heavy sea conditions during times of inclement weather. Excessive wave action undermined a wreck's intact structure and the ability for wrecking crews to stay moored to the site. Heavy seas also complicated lifting procedures. Rolling waves caused undue stress on cables and increased the potential for lines to break. Other location factors included the depth of a wreck and level of submersion, as well as potential hull ruptures during the salvage process.

In addition, larger vessels required more complex levering strategies. Multiple wrecking vessels operated in concert to provide the maximum lift and towing capacity possible (Meier 1943; Doner: 1958). Sometimes a wrecking tug worked in conjunction with a derrick or lighter, as well as lifting or stabilizing equipment rigged from the shore or ice flats. Historic derricks were essentially floating barges outfitted with one or more steam cranes. Lighters were similar barge like vessels equipped with crane power, but also possessed a hold for storing salvaged cargo.

Figure 14. Photograph of the *Reliant*, a Great Lakes lighter constructed in 1907 (Courtesy Historical Collections of the Great Lakes, Bowling Green State University).

Figures 14 above and 15 below depict an early twentieth-century Great Lakes derrick and lighter used for vessel recovery. Both images are of evolved forms of the vessel type that were constructed in the early twentieth-century. Either vessel type could perform recovery projects separately or in conjunction with a wrecking tug. Most early forms of these vessel types, however, did not possess any means of independent propulsion. Shipwrecks recovered by a lighter or derrick still required the services of a tug for final transport to shore. As the demand for salvage increased and the industry evolved some lighters were equipped with an independent propulsion system for greater utility.

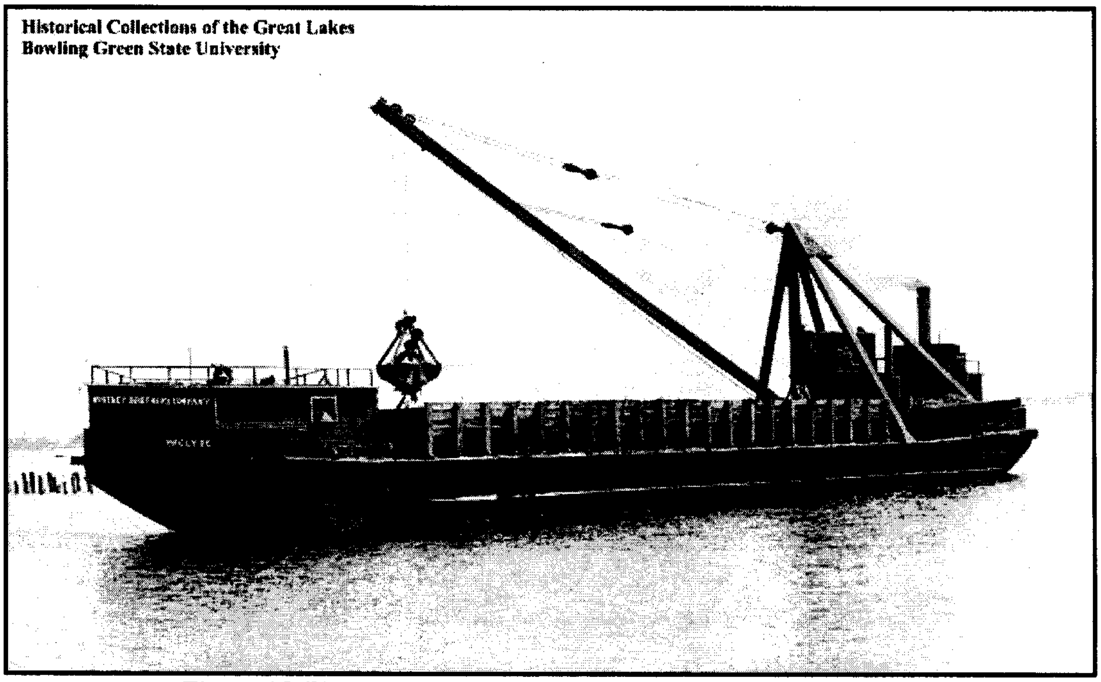


Figure 15. Photograph of Great Lakes barge constructed in 1922 (Courtesy Historical Collections of the Great Lakes, Bowling Green State University).

As salvage operations were responses to unpredictable disasters, wrecking tugs had to be entirely self contained mobile units ready to respond at a moments notice. Salvage crews also had to be prepared for any kind of recovery situation. The typical gear carried by many nineteenth-century wreckers included a crane with an attached clamshell digger to remove bulk cargo like grain, coal and ore. Various water pump sizes were likewise carried on board to remove water from cargo holds and other areas within the ship, as were sand dredges used to extract accumulated sediment. Timber saws were even common aboard salvage tugs. Large saws were used to cut away damaged pieces or remove ship sections for a partial vessel recovery. Smaller timber saws were used to construct wood patches or expedient bulkheads that were installed to block off sections of the wreck. In addition, salvage tugs equipped for more complex jobs carried air pumps and diving gear (Young 1932, 1963; Meier 1943; Doner 1958; Brady 1960).

Salvage crews were predominantly made up of a handful of skilled technicians including divers, crane operators and captains. The remainder of the crew was typically hired on a short term, project by project basis. The less technical aspects of the job could be handled by these inexperienced workers. Many times salvage operations were collaborative efforts between the wrecked vessel and the salvage company. Crewmen stranded with the wrecked vessels were often employed by the wrecking company for the duration of the recovery operation. To conduct a successful recovery operation, the wreckmaster and divers needed detailed knowledge of a ship's design and interior layout. The intimate knowledge provided by a shipwreck's crewmembers was, therefore, of great importance (Young 1932; Doner 1958).

Salvagers wanted to respond as fast as possible to ensure the success of operations, but, even more importantly, to secure the job contract. Numerous salvage companies existed on the lakes and competition was high. The contest between companies, however, was beneficial to the industry overall. Friendly rivalries between companies often resulted in consultation and collaboration during particularly difficult projects (Doner 1958). Similar to other industries in the era, competition also prompted more effective salvage techniques and advanced diving and submarine technology (Young 1932; Doner 1958). Advertisements from the era clearly demonstrate the desire for companies to depict their salvage services as the most technologically advanced or modern, as well as efficient. The advertisement depicted in Figure 16 is from *Beeson's Marine Directory* (1919) and provides a detailed account of The Great Lakes Towing Company's premier wrecker *Favorite's* on board facilities and salvage capability. Similarly, the other ads depicted in Figure 16, also use the same kind of advertising tactics to portray Great Lakes commerce as cutting edge and central to both the nation's prosperity and well being.

It should also be noted that additional important evidence is contained in the last advertisement that directly relates to the overall characterization of the Great Lakes industrial economy. Entitled "Work During Winter," the ad details the extreme commercial demands during the shipping seasons of 1919 and the shipping industries subsequent response. Not only were all available vessels "worked and overworked as never before," but even vessels previously "laid up" were repaired and returned to service. This commitment to intensive commerce is also reiterated by other ads for maritime services in the same issue of *Beeson's Marine Directory*.

152 BEESON'S MARINE DIRECTORY

NEW WRECKING VESSEL IS VERY FULLY EQUIPPED

The Tug Favorite One of the Most Complete Wrecking Craft in the World

The new wrecking steamer Favorite, built at the yard of the Great Lakes Towing Co., to replace the wrecker of that name which was taken over by the United States navy late in 1917, was completed and ready for business at the opening of navigation. The Favorite, which is said to be one of the most complete salvage ships afloat, will be stationed at St. Ignace. Capt. Alex. Cunning, wrecking master for the Great Lakes Towing Co., will bring the new boat out, and James Callahan, who was chief engineer of the old Favorite, will have charge of her machinery.

The Favorite is 173 feet long, forty feet beam and sixteen feet molded depth. Her draft of water in ordinary trim is seven feet six inches forward, twelve feet six inches aft, and with water ballast she can be trimmed to an even keel of nine feet six inches. She is equipped with a thirty-five-ton crane of the locomotive type without trucks, which is located above the pilot house. The crane is equipped with a three-ton ore bucket. She has a dynamo for furnishing lights for the crane and boom for night work.

The boat has a patent steam windlass and patent anchors of 4,000 pounds each, and 2,000 feet of one and three-fourth inch stud link anchor chain, with two mooring engines with wire mooring lines located on the bow deck, and a steam capstan on the after deck, with towing machine with 1,200 feet of two and one-fourth inch wire towing cable, also located on the stern deck. There is also a five-ton crane of the stiff legged type located on the after end of the house for serving the machine shop. The steering gear is of the Great Lakes Towing Co.'s design, cylinders 6-16x6 in. stroke.

Her propelling engine is of the fore and aft compound type, cylinders 25x50x36 inch stroke, with independent condenser pump. Steam is furnished by three boilers. Each boiler has two Morrison corrugated furnaces of 48-inch internal diameter, and 154 boiler tubes 3 1-2 inches in diameter. Each boiler has a separate smoke stack all contained in one casing, which is 8 feet in diameter.

Her machine shop and blacksmith shop are located between decks in the stern, aft of the engine room, where her light plant is located. The light plant is divided into four units. Each unit to be run separately as wanted. She also has a large two-stage air compressor and storage tank for furnishing air for pneumatic drills and divers. She also carries oxy-acetylene tanks and burners and portable arc electric welding machine.

The machine shop tools consist of Acme power bolt and pipe cutting machine, cutting up to 4-inch pipe or 2 1-2-inch bolts. One engine lathe, 18-inch swing, 8-inch bed, power shaper of 24-inch stroke, drill press, emery wheel, power hack saw and power circular saw mill for sawing lumber.

Living quarters for the crew are all on the main deck, with running water in every room. She is equipped with an artificial ice machine and refrigerator and power water purifier with capacity enough to furnish all the water required by the crew for all purposes. The steamer is equipped with wireless telegraph and long distance phone.

The wrecking outfit consists of a full equipment of steam pumps and their fittings, ranging in size from 4-inch suction to 16-inch diameter. Thirty hydraulic jacks of 100 tons capacity each, with hutchicks and all their fittings. Two portable air compressors and full fitout of ship chandlers stores. Three sets of diving outfits and submarine electric lights.

LAKES DISTRICT IN FIRST PLACE IN SHIPBUILDING

Led All Sections in Number of Vessels Built During War

Washington, D. C., May 3.—First honors in the building of ships during the war was awarded today by the shipping board to the ninth or Great Lakes district. Held by canal restrictions to a lighter type of vessel than was built on the seaboard, the district did not produce so many net tons as other sections, but outstripped all other districts in the number of ships. In one year it put into service 125 more vessels than were delivered from all American yards in the year before the United States entered the war.

At the outbreak of war Great Lakes yards, which had developed a highly efficient type of cargo carrier, were at work on 100 bottoms for foreign account. All were requisitioned by the shipping board and the first ship turned over to the board under its war program was the Limoges, a 2,930 ton freighter, built at Toledo. Twenty-seven ships were finished and put to sea before the canals froze in 1917.

Work During Winter

While winter gripped the lakes new work was continued and the existing fleet, even old boats which had been laid up, were overhauled. Summer saw every available craft worked and overworked as never before, keeping the stream of grain, iron ore, coal, and manufactures moving toward the east for shipment to the men in Europe. At the opening of navigation twenty ships slipped from the ways and work was carried forward at increased speed. In November a total of twenty-eight ships—nearly one a day—was put into service by Great Lakes yards.

The total for 1918 was 163 new freight carriers, all of them steel except one. The smallest yard on the lakes, having only three ways, delivered thirteen ships and finished a fourteenth only a little late for delivery before the ice closed navigation. Between the end of November and the end

Figure 16. Advertisements in *Beeson's Marine Directory* for the 1919 shipping season (Beeson 1919:152).

Figures 17 through 19 below show the evolution of the *Favorite* wrecking tugs over the course of six decades of service to demonstrate the evolution in salvage vessel technology that occurred over the course of the nineteenth and early twentieth centuries.

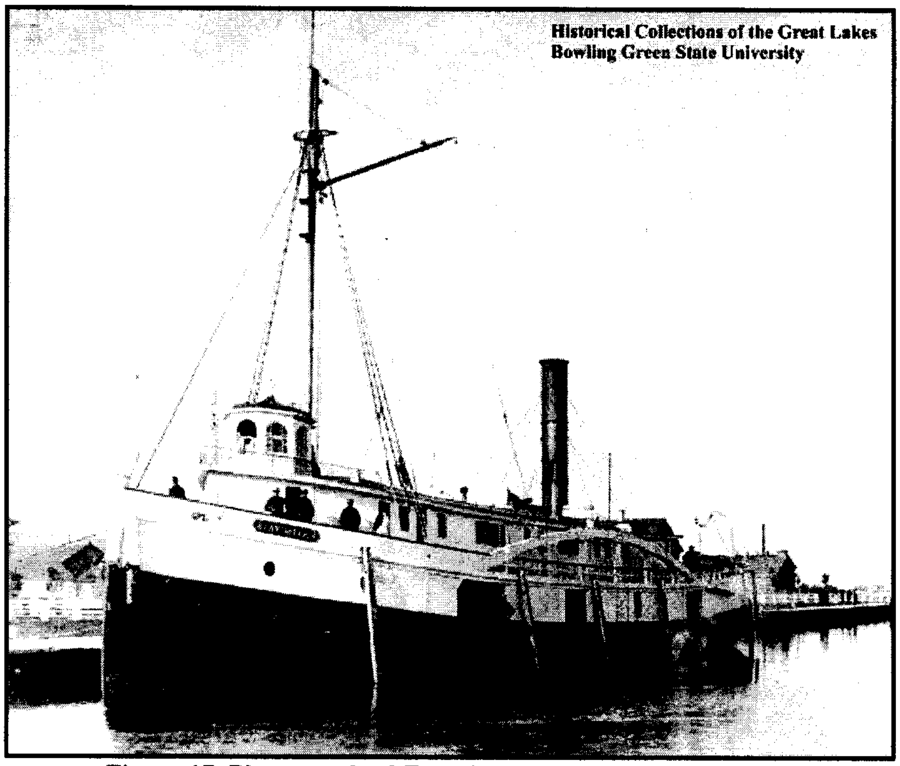


Figure 17. Photograph of *Favorite* wrecker constructed 1864
(Courtesy Historical Collections of the Great Lakes, Bowling Green State University).

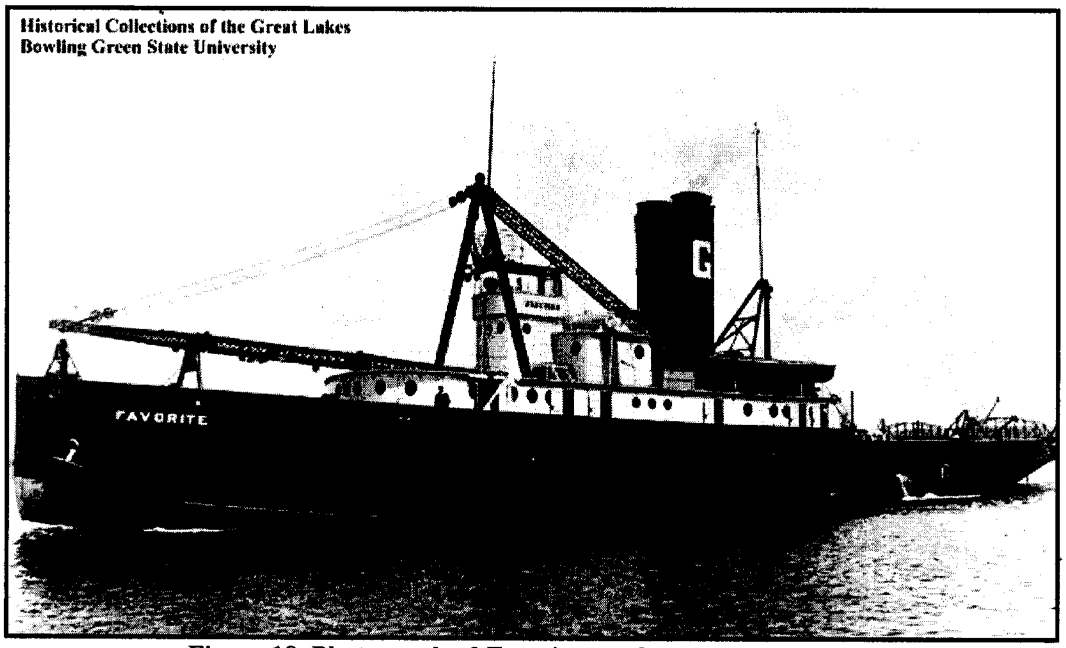


Figure 18. Photograph of *Favorite* wrecker constructed 1907
(Courtesy Historical Collections of the Great Lakes, Bowling Green State University).

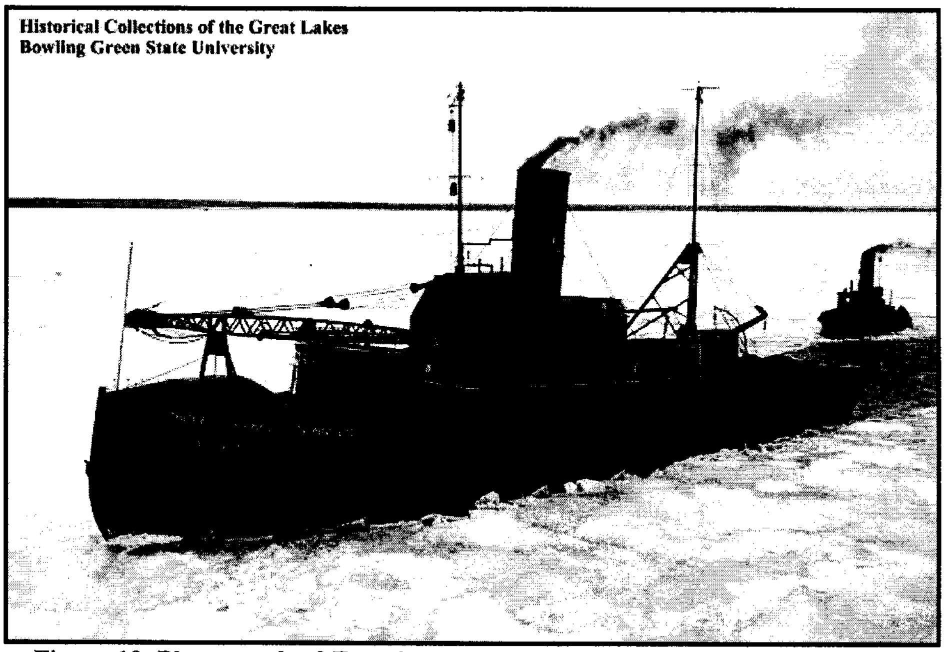


Figure 19. Photograph of *Favorite* wrecker constructed 1919, as described by *Beeson's Marine Directory* advertisement (Courtesy Historical Collections of the Great Lakes, Bowling Green State University).

Figure 20 is another such characterization of the era's acceptance and perpetuation of intensive commercial practices in other maritime related industries.

Figure 20. *Beeson's Marine Directory* advertisement for vessel repair services (Beeson 1919:85).

Tom Reid and Peter Falcon: A Case Study of Great Lakes Salvage Pioneers

While all tug lines provided basic salvage services, not all specialized in comprehensive recovery operations. Comprehensive services included the full retrieval of cargo from inundated wrecks; the full recovery of an extensively damaged vessel, whether partially submerged, capsized, or foundered in deep water; and partial reclamation where ship parts, machinery, fixtures and fitting were salvaged. As said before, each of the services could be pursued exclusively or in conjunction with one another. Salvagers who pursued contracts for this kind of work needed to have experienced divers and crewmen at their disposal and reliable wrecking equipment. Of the small handful of specialized salvagers on the Great Lakes, two individuals earned particular acclaim due to their innovative salvage methods. Tom Reid and Peter Falcon each owned salvage companies that operated on the Great Lakes from the second half of the nineteenth-century into the early twentieth-century.

Reid Wrecking and Towing Company

Tom Reid's self named Reid Wrecking and Towing Company was a business inherited from his father. The company was originally based out of Alpena, Michigan where Reid was born. During the 1870s lumber boom, the business was primarily employed in transporting log rafts across the lakes. In 1876 the company began taking on small local salvage jobs. From the time Tom was old enough to accompany his father he began working with his father's rafting crews and eventually took over the business with his younger brother. Under their direction the company expanded the business to provide salvage services throughout the Great Lakes (Doner 1958:9-13).

Reid's company was capable of handling all types of recovery and often undertook jobs after purchasing the salvage rights for a shipwreck. Recovered vessels purchased by the company were either sold back into commercial service or retained and converted into wreckers, lighters or barges. During his lifetime, Tom Reid personally directed the recovery efforts for countless shipwrecks, and even used his expertise to raise a derailed sunken locomotive (Doner 1958:258). The typical method employed by Reid was the patch and pump method augmented by the use of pontoons, bulkheads, and cofferdams depending on the particulars of the wreck site. The use of pontoons to enhance buoyancy was an industry standard Tom learned from his father, however, recovery through "bulkheading" and "cofferdaming" were techniques he refined throughout his career (Doner 1958:13, 36, 38, 61, 112).

During the nineteenth-century and into the early twentieth, pontoons remained a practical method for raising vessels. As discussed previously, the pontoon method was refined in an ocean setting and was most effective when employed in conjunction with high and low tide. Since tidal fluctuations are almost non-existent in the Great Lakes, the method relied solely on repeated deployment of pontoons and crane power to suspend the wreck once it broke the surface. When a wreck breached the surface, water pumps would be set up on deck and the holds pumped out. In order for the pumps to work effectively the wreck also had to have patches installed while the wreck still rested on the lake floor. Without the benefit of the tide the process was very time consuming, especially if the wreck was in deep water (Perry 1907; Meier 1943; Doner 1958).

To expedite the process, the Reid Company began constructing bulkheads within a partially submerged wreck to effectively cut off damaged parts of a vessel from intact ones. Backed by canvas, the bulkheads created a water-tight chamber that could be pumped dry. This method enabled a wreck to become buoyant without having to patch every fracture. Wrecking cranes and pontoons were frequently used in conjunction with this method to help stabilize a wreck during the process. Once accomplished the partially buoyant wreck could be towed to shore by a wrecker. If the wreck's steam engines and deck machinery could be started they were also utilized during the final stages of recovery. Many of the wrecks Reid's company recovered helped propel the entire salvage entourage back to port (Doner 1958:23, 152, 194, 160-162).

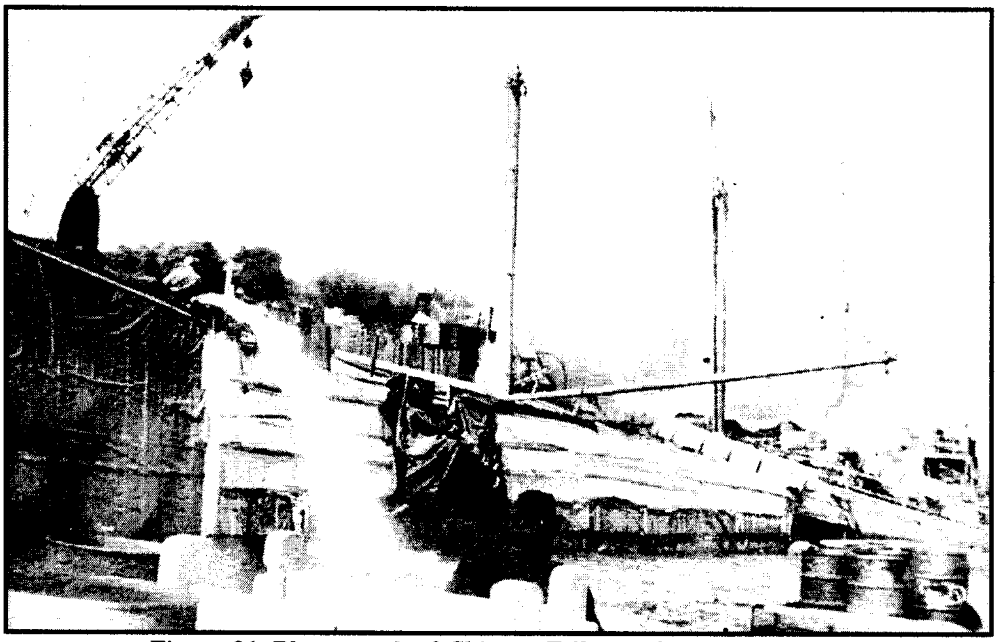


Figure 21. Photograph of *Chicago Tribune* after recovery and with exterior bulkheads and canvas still in place (Doner 1958).

Later this method was expanded into a method that utilized cofferdams on completely submerged wrecks. By the end of the nineteenth-century cofferdams were already in use to construct bridges and other large-scale submerged infrastructure. The process entailed constructing a water tight compartment around the wreck that was tall enough to breach the surface of the water. When the cofferdam was secured to the lake or seafloor, the water was pumped out and then workers could descend to work safely in a dry environment. Using the same principles, Reid had divers measure the length and width of an intact section of a submerged shipwreck. A wooden structure was then built according to the measurements and with an added depth dimension equal to that of the submerged wreck (Doner 1958:112, 124, 137, 148, 284).

While the cofferdam was being constructed at the surface, divers installed bulkheads underwater to circumvent any extensive damage. Patches were also installed over any hull fractures that would potentially undermine the cofferdam. When the structure was completed, canvas was attached to the exterior and the entire assembly was floated over the wreck, weighted and sunk. Divers fastened the cofferdam to the shipwreck's deck and pumps installed at the surface siphoned out the water. The canvas, bulkheads and patches all created a watertight seal allowing the wreck to gain buoyancy as each compartment was drained. Eventually the whole contraption floated to the surface. Cranes were also used to expedite the process and stabilize the wreck at the surface. Again, once accomplished, the entire assemblage could be towed to shore (Perry 1907; Meier 1943; Doner 1958). As depicted in Figure 22 below, cofferdams were typically left in place until the wreck was safely delivered to a dry dock. Figure 23 and 24 also depict recovery operations using the cofferdam method.

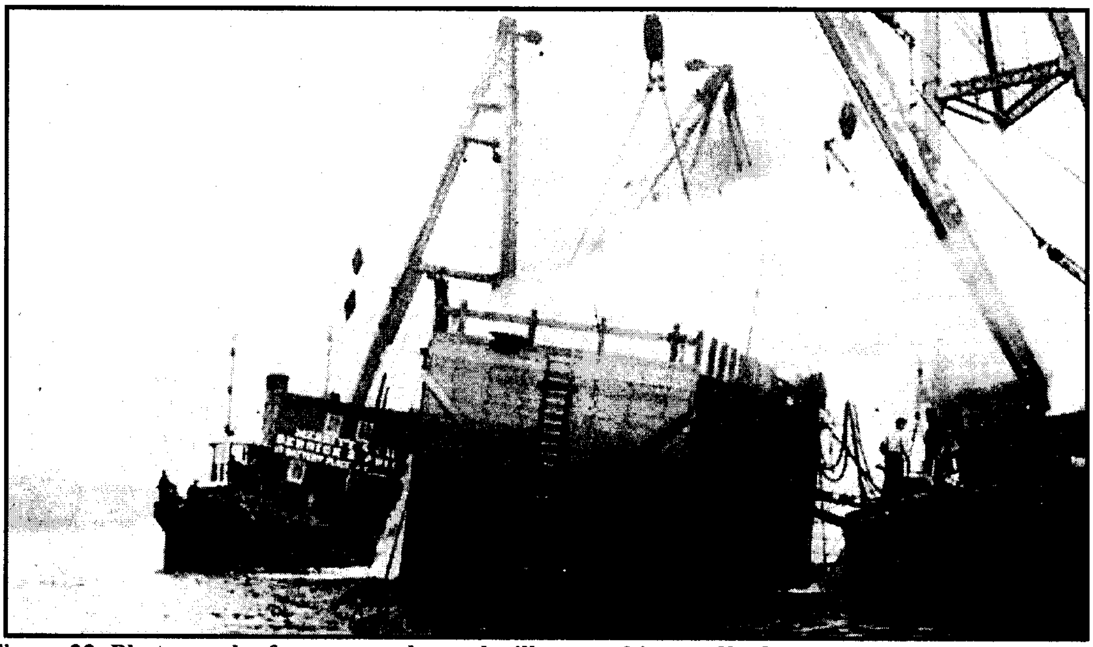


Figure 22. Photograph of a recovered vessel still encased in a cofferdam and awaiting tow to shore (Meier 1943:224).

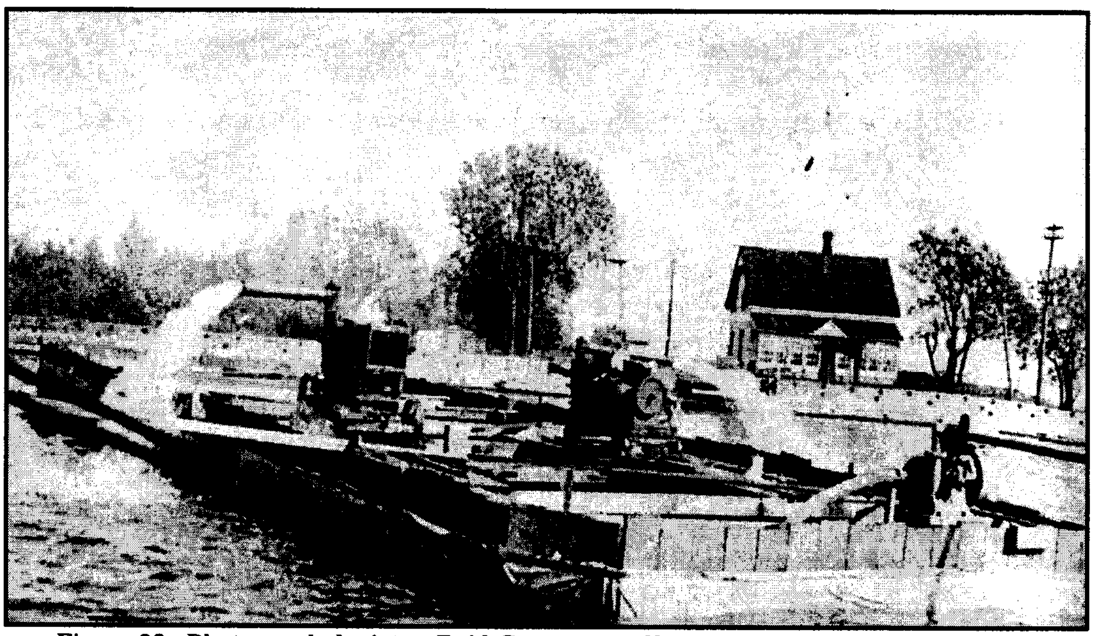


Figure 23. Photograph depicts a Reid Company cofferdam operation in progress on a scow sunk in Soulanges Canal, Canada (Doner 1958).

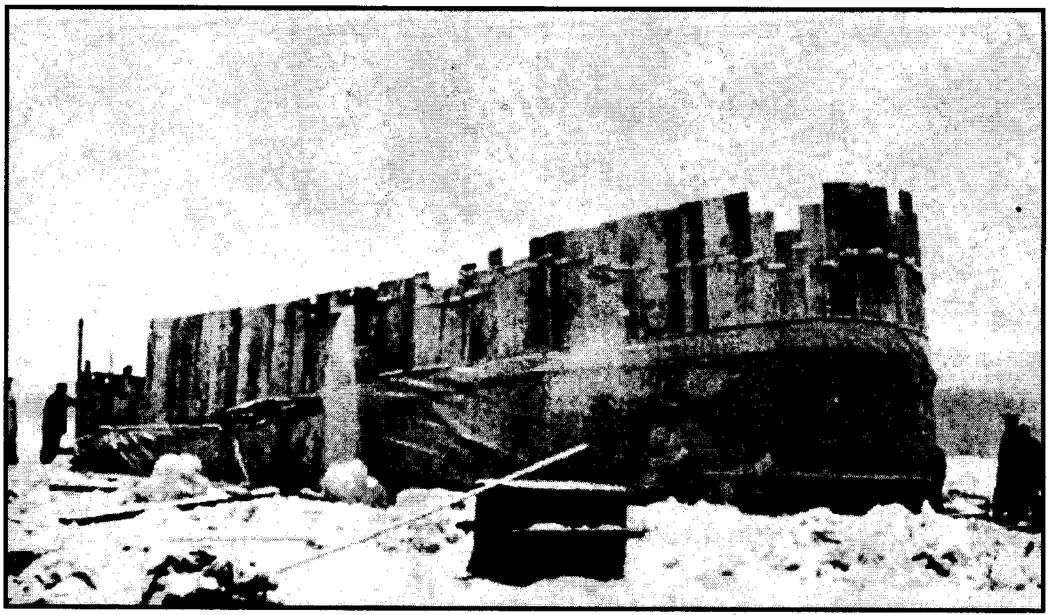


Figure 24. Photograph depicts a Reid Company cofferdam project in process near Calumet, Ottawa River, Canada (Doner 1953).

Both Reid's cofferdam and bulkhead method were extremely effective. Reid not only used his bulkhead method to salvage vessels, but also to cut ships into sections and deliver them through the narrow Welland Canal. To do this a vessel would be stripped entirely of its machinery and cut straight down the center at midships. A bulkhead was installed to create a watertight half and one side was filled with water. The weight of the water allowed the boat-half to roll up on its edge, thereby making it narrow enough to fit through a canal. Each half was then escorted separately through the canal locks by tugs that also carried the dismantled machinery. To complete the process, the ship halves were delivered to a shipbuilder and reassembled for the purchaser (Doner 1958:160-162).

Cofferdamming was equally successful for the Reid Company. The method could be employed on both shallow and deep water wreck sites. A good example of the company's proficiency in this method is the recovery of *Saxona*. In 1913, the *Saxona* collided with the *Pentecost Mitchell* and the two sank in 60 feet of water just outside the Sault Saint Marie locks on the St. Mary's River. Given the location of the wrecks in a high traffic area, salvage operations were pursued immediately. The Reid Company was called in to make the initial site assessment. Originally the insurance company wanted the two vessels raised in tandem as they were interlocked on the lakefloor. Tom Reid and his master diver Louis Meyers disagreed. As a consequence the contract went to another company. Not discouraged by the turn of events, Reid offered the insurance company $75,000 for the *Saxona* wreck, both vessel and cargo (Doner 1958:135-136).

Upon acceptance of bid, the Reid Company set out to recover the remains at the same time as a rival wrecking company began the salvage of the *Pentecost Mitchell.* Immediately Meyers had two cofferdams constructed, both 150 feet long and the width of the vessel, as well as 25 feet high. While the cofferdams were under construction, Meyers set to work underwater, clearing out the coal cargo from the damaged bow section. When completed a bulkhead was installed to seal off the damaged section. At this point, the cofferdams were completed, floated over the wreck one at a time, sunk, and bolted to the *Saxona's* deck. Stacked on top of each other and affixed to the height of the *Saxona's* freeboard, the two cofferdams provided a water tight barrier that extended above the surface. In 40 days the wreck was completely raised, with the remainder of the coal cargo intact inside the vessel (Doner 137-138).

In the meantime, the wreck of the *Pentecost Mitchell* remained on the bottom in worse condition than before salvage operations began. The competing salvage company relied on a method that entailed installing steel compartments over each individual hatch.

While this method is not completely outlined, it appears the salvagers intended to pump compressed air into the individual compartments, thus creating enough pockets of buoyancy to raise the ship. Unfortunately, the water pressure on the deck between the hatches was not considered and this ultimately caused the deck to collapse in these areas. While partial recovery operations continued on the *Pentecost Mitchell*, the Reid Company brought *Saxona* into port and sold the ship for a profit of $45,000 (Doner 137-138).

Tom Reid was particularly effective at utilizing all aspects of the intensive commercial environment to his advantage. By purchasing the salvage rights for shipwrecks, performing the salvage work, and brokering the final sale of the recovered vessel and its contents, he combined all aspects of maritime commerce into a single purchase price. This type of vertical integration was a typical business model throughout the nineteenth-century. Reid's application of the intensive business strategy demonstrates how pervasive the ideas of industrial economy were at all levels of the maritime commercial market.

Falcon Marine Company

Peter Falcon began his career on the east coast performing open ocean salvage. Like Tom Reid, Falcon became acquainted with the life of seaman early. At the age of 13 he signed on as a cabin boy and by the age of 36 took up submarine diving and salvage. Falcon's first salvage job was conducted in 1858 on a vessel that lay in 18 feet of water almost completely buried by mud, sand and sea kelp. The vessel was the 74 gun ship *Count DeEstang* which had sank just outside of Boston Harbor during the

Revolutionary War. The friends succeeded in recovering wood from the shipwreck and a number of artifacts (Feltner 1981:1).

Encouraged by the profit made from the job, Falcon began to pursue salvage work full time. Almost immediately the salvager began experimenting with various methods to raise a shipwreck from the seafloor intact. In 1861 Falcon succeeded in raising the *Grotto*, a vessel sunk in Vineyard Sound located on the west side of Martha's Vineyard. Attempts to raise the vessel failed earlier that year. Falcon had been employed as a diver on the job and had suggested an alternative salvage method. Subsequent to his dismissal from the abandoned project, the insurance underwriters contacted Falcon to hire him for a second attempt. Using a self-designed "cask method," the salvager raised the ship and its cargo of pipe clay in 35 days (Feltner 1981:1).

The method entailed stacking water filled casks in regular tiers, all arranged with the bung hole out. After 400 water filled casks were stacked inside the *Grotto's* hull, compressed air was pumped into the casks. Hoses running from the surface air pumps were placed loosely in the bung holes so that the displaced water could readily escape. In addition, the loose fitting hoses allowed enough room for the expanding air to escape as the casks became buoyant and the wreck ascended to the surface. With this system, patches did not even need to be installed to repair damaged hull areas. The cask's provided an independent means of buoyancy that was powerful enough to raise the vessel to the surface. In contrast to the $14,000 cost of the first attempt, the entire cost of Falcon's work did not exceed $8,000 and his personal fee for the recovery was a mere $15 a day. When informed by the insurance company clerk that he would have easily received twice the amount for his services, Falcon decided to patent his method (Feltner 1981:1). Figure 25 below depicts the 1863 patent sketch:

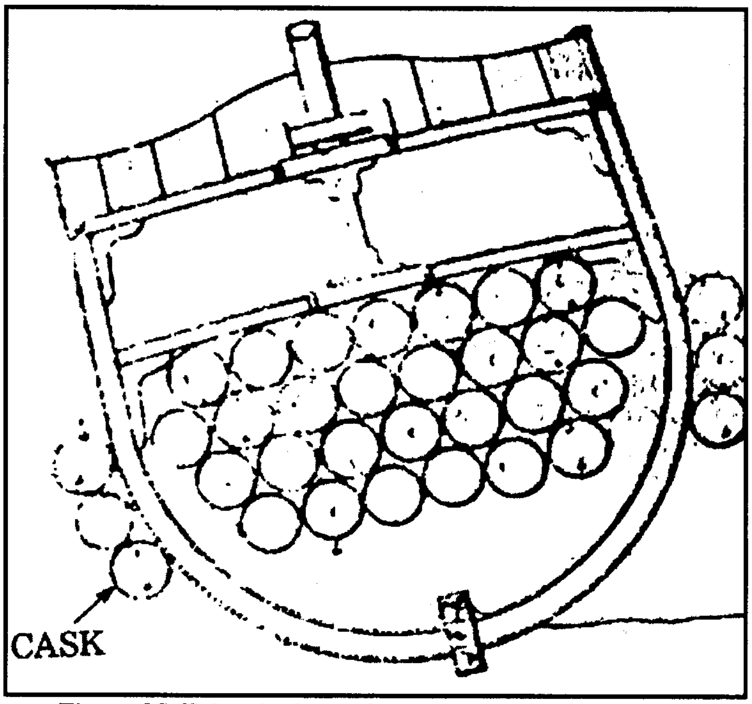


Figure 25. Falcon's sketch for his cask recovery method U.S. Patent Number 37438, January 20, 1863 (Feltner 1981:1).

Bolstered by the success, Falcon continued to pursue his new career enthusiastically. After assisting in the recovery of the famous steamer *Great Eastern* he was employed by the United States Navy during the Civil War, but also continued his salvage work along the east coast. Confronted by an increase of salvage jobs that required the removal of bulk cargo, he introduced another process to the salvage industry. In 1865, Falcon and his new partner George W. Fuller patented a conveyor type apparatus that facilitated the removal of bulk cargo from the hold of a submerged wreck. The system was first tried on the wreck *Lucinda Bayliss* which contained 400 tons of coal. Fuller and Falcon invented the conveyor system after realizing the scope of work and calculating the total recovery time for divers to manually shovel the coal into buckets that would then need to be individually hoisted to the surface. Instead, the two men rigged up a series of pulleys and ropes with numerous attached buckets. As illustrated in Figure 26 below, the buckets attached to the ropes were carried down to the wreck empty, pulled through the hold of the vessel by divers who ensured the buckets were filled with coal, and then the buckets were lifted back to the surface, dumped, and redeployed. The method proved very effective when tested, yielding between 50 to 100 tons per day (Feltner 1981:5).

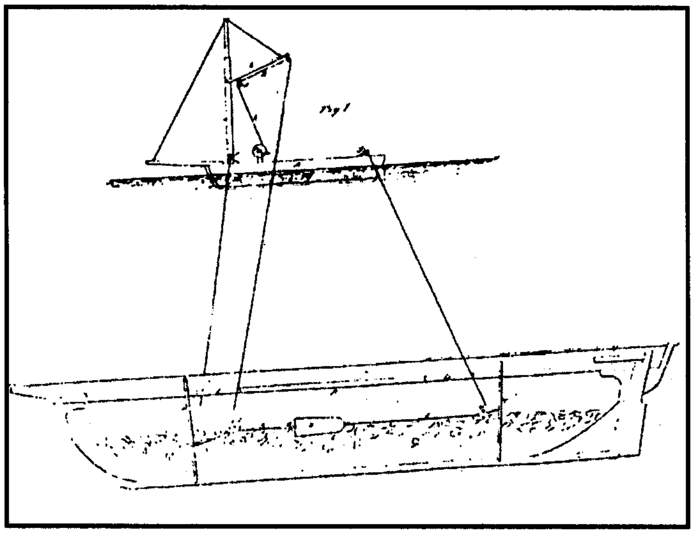


Figure 26. Falcon and Fuller's sketch for bulk cargo retrieval system, U.S. Patent Number 49026 (Feltner 1981:5).

Fuller and Falcon also introduced another patented salvage method in the same year. The technique was a simple process used to overcome the difficulties in raising a ship that was adhered to the sea floor by mud. Figure 27, following, depicts the patent sketch for an apparatus that merely consisted of a hose attached to an air pump at the surface. The hose was inserted in a hole drilled through the wreck's hull. Air pumped beneath the vessel created a pocket that would undermine the suction of the mud. From this point forward, routine salvage operations could be carried out unhindered by the sea floor's composition (Feltner 1981:5).

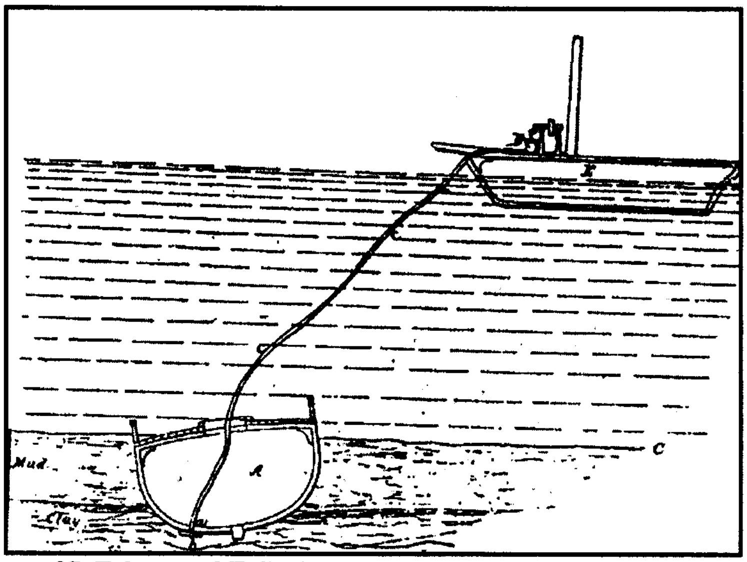


Figure 27. Falcon and Fuller's sketch for salvage device that mitigated seafloor suction, U.S. Patent Number 49342 (Feltner 1981:5).

Falcon's cask method was extremely efficient and highly cost effective. As the salvager took on larger wrecks and more complex jobs, his profits soared and his reputation for deep water work grew. With an eye for increasing his profit margin even further, the salvager moved his base of operations to the Great Lakes. In 1866, Falcon settled his family in Chicago, Illinois and immediately began salvaging various wreck sites throughout Lake Michigan. The first Great Lakes wreck that he raised was the *Ocean Wave.* The vessel lay in 113 feet of water and the job cost Falcon his health. While diving on the wreck he suffered a case of the bends but continued diving until the job was finished. The event, however, did not go unnoticed. Falcon took a break from salvage work for three years. During that time he took shallow underwater work as a diver on a bridge construction project in the Mississippi River (*Picton Free Press* 1870a,1870b; *Toledo Blade* 1870a,1870b,1870c,1870d; *Detroit Advertiser and Tribune* 1871; *Around the Lakes* 1894; Feltner 1981:5).

Upon returning to shipwreck salvage, he again pursued the recovery of deep water wrecks. In 1868 he raised several shipwrecks within the Straits of Mackinaw. From this point forward, his status as a salvager became legendary on the Upper Lakes. His most celebrated recovery operation was the 1871 raising of the *Oliver Cromwell.* The vessel sank in 1857 after colliding with another ship. The wreck lay in 113 feet of water just off Mackinac Island. The close proximity of salvage operations to the shore line is the main reason for its prominence. Observers gathered along the beach daily to watch the project progress over the course of 60 days. On the final day, the crowd witnessed the spectacular finale as the vessel breached the surface and was floated proudly to shore. An article in the *Detroit Advertiser and Tribune* recorded the event in detail, capturing the drama that Great Lakes salvage held for the public:

> Captain Falcon of the wrecking schooner *G. Barber*, as has already been announced, has succeeded in raising and recovering the Canadian propeller *Oliver Cromwell*, which was sunk 14 years ago. Captain Edward A. Blanchard of the prop *Islander* of Mackinac was present when the *Cromwell* was raised, has very politely furnished us with most of the following particulars. At 10 a.m. August 25, Captain Falcon went down to the wreck in 18 fathoms of water, clad in submarine armor, and remained down about 15 minutes. After coming up, he remained out a few minutes and refreshed himself with a short smoke when he again returned and remained down about an hour and a half, and then came up and announced that the vessel was gradually rising and that she was at that time two feet from the bottom of her bed and would be at the surface in about four minutes. As proof all were directed to look at the buoys, one over each end of the prop, which had to this time been standing vertically, held down by taunt ropes fastened to the wreck. The buoys were tilting more and more from their erect position, and soon were lying flat on the water. Soon murmuring, bubbling

> sounds were heard and the troubled waters over the boat were being lifted above the surface of the placid lake. The waters about the rising mass were lifted higher and higher and were deeply tinged with mud and sediment. Numbers of dead and stunned fish were continually popping up on the surface and small water spouts were shooting out in all directions. When the general mass of troubled waters over the vessel was about four feet higher than the surface, and bubbling and spouting like a seething cauldron, out shot the huge monster, first the stern and then the bow, as if by magic from below, and gaily she floated upon the now placid seas at 12:50 p.m. (*Detroit Advertiser and Tribune* 1871).

Peter Falcon finally ended his salvaging career on the Great Lakes in 1891. As a final farewell to the industry he undertook the raising of the *Kasota*, a 240 foot steamer with a 2,300 ton cargo of iron ore. The wreck lay in shallow water within a busy navigation corridor of the Detroit River. Due to a fast moving current, the job was quite risky. Regardless, at the age of 69, Falcon succeeded in raising the wreck after an entire year of operations. From this point forward, the Falcon Marine Company changed its focus to underwater contracts supporting public works (Feltner 1981:5, 12). Figure 28 below is a picture of the *Kasota* after the vessel was recovered.

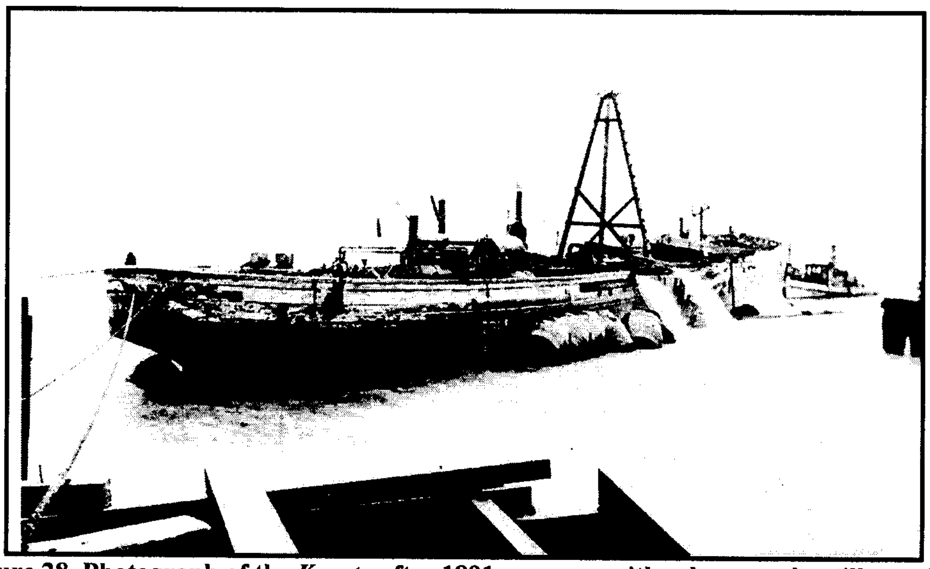


Figure 28. Photograph of the *Kasota* after 1891 recovery with salvage casks still attached (Labadie Collection, TBNMSRC).

In conclusion, Falcon and Reid's careers demonstrate how the salvage industry functioned as a cost reducing business strategy within Great Lakes maritime commerce. The highly effective salvage methods employed by both the Reid Wrecking and Towing Company and Falcon Marine Company were expressly designed to mitigate losses and maximize investment returns. The companies' recovery methods were born from principles and practices refined over the course of three centuries. In addition, the region's unique social, economic, and environmental circumstances, as well as the progression of technology, collectively perpetuated the trade's success throughout the nineteenth and early twentieth centuries. It is interesting to note that the evolution of the Great Lakes salvage industry is similar to the development of the region's other extractive industries. The relentless push for more effective practices was fueled by technological adaptation and increased profits that perpetuated a cycle of intensive commercial exploitation. In short, the development of the salvage industry is, again, a clear reflection of the broader economic practices developing during this period in American history.

CHAPTER 7

NORTH POINT REEF: A GREAT LAKES SHIP TRAP

In the fall of 2005, archaeologists from East Carolina University's (ECU) Program in Maritime Studies conducted a survey of submerged cultural resources along North Point Reef in Lake Huron's Thunder Bay, near Alpena, Michigan. Despite a change in the project's original research objectives, the North Point Reef survey resulted in the identification of 55 site locations. Of the 55 locations, 31 were determined by archaeologists to be wrecks or large sections of associated wreckage, and 13 as isolated artifacts. Over the course of the ten day field project, ECU archaeologists were only able to document 37 of the site and isolate locations. A complete summary table of remains for North Point Reef sites and isolates numbered NP0001 to NP0045 is located in Appendix C, as well as individual site records that include a description of the extant remains, a field sketch or scaled drawing of remains, and an attached photographic record. For larger complex sites, a photomosaic is also included.

Figure 29, following, depicts the locations of all submerged cultural resources encountered during the September 2006 project to include those not recorded by ECU. As noted in the introduction, there are still many unassessed areas on the reef and it is highly likely that additional surveys will yield many more site locations. In addition, locations for sites NP0031 and NP0045 are not included on the following survey map. While both sites were documented at a Phase II Pre-disturbance level by ECU archaeologists, GPS coordinates were not taken. Fortunately, the scaled drawings of the remains can be used to definitively re-locate the sites at a later date.

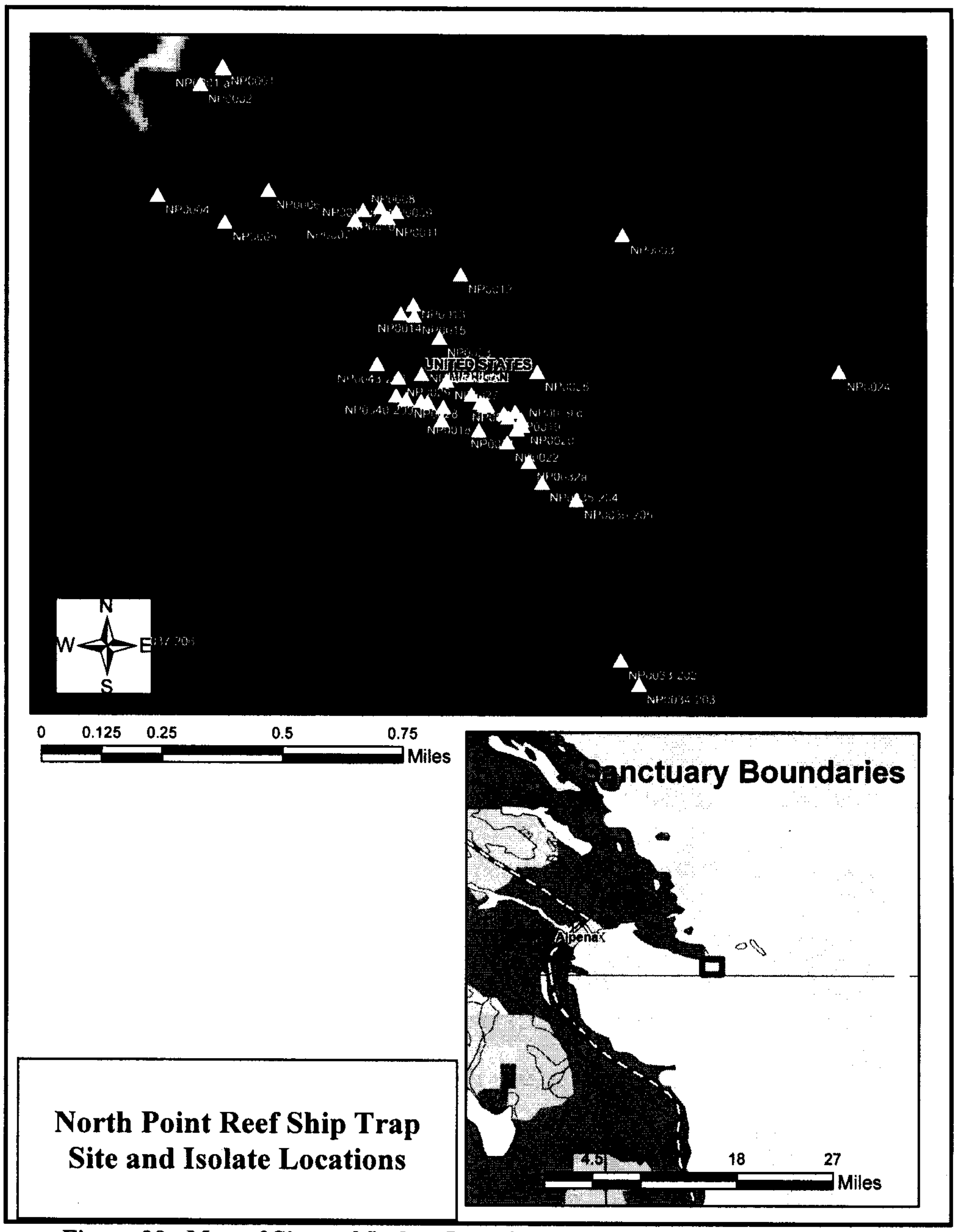


Figure 29. Map of Site and Isolate Locations at North Point Reef Ship Trap.

As stated previously, the sites at North Point Reef ranged in size from isolated cargo remnants to large complex site distributions with multiple vessel components and associated debris fields. A preliminary assessment of the vessel remains indicated that the shipwreck sites were the result of multiple wrecking events that occurred over the span of many years. Upon making this assessment, the principle question that followed was: what environmental or social circumstances were responsible for the large accumulation of shipwreck debris at this particular location? Continuing along this line of reasoning, secondary questions of concern were: can the badly fragmented vessel remains be related to a specific time frame or cultural system?; what were the specific conditions that created an environment conducive for disaster at this location?; and, ultimately, what types of specific maritime activity does the site assemblage reflect?

Individually, each shipwreck site at North Point Reef represents a maritime casualty and, accordingly, should contain information about the unique circumstances of the particular wreck event. Given the dynamic natural environment of the site location and the fragmentary state of vessel remains, however, it was determined that a pointed investigation into individual vessel identities would be difficult. To date, only six of the 32 site locations have been correlated with specific wreck events and assigned vessel identities (see Appendix C). This is because historic documentation for many North Point Reef marine casualties only provide a generalized account of shipwreck locations. Compounding the problem is the close proximity of wrecks that have occurred through time. The complex overlay of debris makes it hard to distinguish between individual site boundaries as well as ongoing site formation processes continually act upon the extant remains, erasing important archaeological evidence that would prove vessel identity.

Due to these constraints, reconstructing the particulars of each wreck site without confirmed vessel identities seemed impractical. A collective approach was, therefore, adopted that focused on identifying site formation processes that affected the archaeological context of the site and temporal and behavioral indicators reflected by the type, quantity and material composition of shipwreck remains. Once identified, each archaeological variable was correlated with previous archaeological findings or known historic behaviors associated with the area's use. In this way, the site's specific archaeological characteristics are examined for universals in order to gain a broader understanding of both North Point Reef Ship Trap remains and ship traps as a site type.

North Point Reef Ship Trap Site Formation Processes

Identifying specific site formation processes that affect shipwrecks has been the focus of continuous research since Keith Muckelroy's (1978) pioneering work on extractive filtering and scrambling devices. Previous studies indicate that shipwreck remains deposited in shallow water environments like North Point Reef tend to experience both extreme environmental conditions and subsequent cultural interference that, in turn, degrade the archaeological context of the site and erode the integrity of individual material remains (Muckelroy 1978:165-169; Murphy 1990:13-15; Stewart 1999:582; Ward et al. 1999: 564-565; O'Shea 2002:214, 222, 224; Wheeler 2002:1155). A similar characterization of site formation processes for terrestrial sites has further delineated the types of site formation processes acting upon sites in an archaeological context as either non-cultural transforms (n-transforms) and cultural transforms (c-transforms) (Schiffer 1987:7-8, 22-23). Using these diagnostic categories, the current analysis will begin with a consideration of site formation processes that affect the composition and deposition of archaeological remains at North Point Reef Ship Trap. Once the specific n-transforms and c-transforms have been identified then the analysis will move toward characterizing the extant remains according to temporal indicators and identifiable social behaviors predominantly related to maritime navigation and salvage.

N-transforms

Due to the deleterious affect that a dynamic nearshore environment can have on archaeological remains, a consideration of n-transforms is particularly important to an analysis of North Point Reef Ship Trap. To understand the range of n-transforms acting upon North Point Reef an overview of wrecking processes will first be presented. It has been found that the specific circumstances of a wreck event will determine the type and amount of shipwreck remains deposited on-site. Previous archaeological studies on regional shipwreck sites indicate that total shipwrecks occurring during violent shallow water strandings tend to be deposited in less intact condition than those that foundered in deeper water (O'Shea 2002:213). In addition, shallow water strandings that remained exposed to rough seas for long periods completely broke apart and the remains dispersed by wave action (Ward et al. 1999:568-569). In this scenario, the dispersal of debris decreases the level of archaeological deposition at the immediate disaster location.

A good illustration of a shallow water wrecking event is depicted in Figure 30 below. The photo shows the onshore aftermath of a nearshore grounding. A high level of shipwreck debris and cargo are deposited onshore, while the remaining portion of hull remains partially submerged and visible in the background.

Figure 30. Photo of wreckage strewn along the shoreline after the *Algoma's* 1884 wrecking. The remains of the *Algoma's* hull is visible in the background (Barry 1996[1973]:139).

Once a shipwreck's deposition has occurred, the physical and environmental characteristics of the site location dictate the level of site preservation (Stewart 1999:655; Ward et al. 1999:565; Wheeler 2001:1155; O'Shea 2002:211). In particular, shallow water sites on rocky substrates are not favorable for site preservation or sites located in high energy environments (Muckelroy 1978:180; Ward et al. 1999:565; Wheeler 2001:1152). High energy areas also prohibit the deposition of protective sediment layers and promote high levels of sediment turbidity that contribute to feature deterioration through abrasion (Stewart 1999:582-583; Ward et al. 1999:564-565; Wheeler 2001:1150). These specific physical and environmental conditions, or n-transforms, ultimately contribute to the degradation of wreck material within a submerged wreck site and are often responsible for inter-site movement, re-distribution or complete extraction of disarticulated debris (Muckelroy 1978:180; Stewart 1999:582; O'Shea 2002:213-214).

Again, of particular importance to the current study are the findings of previous regional shipwreck studies that have further characterized the affects of n-transforms on shallow water shipwreck sites along Lake Huron's western shore (O'Shea 2002). A study conducted of scattered wreck sites 50 miles south in Au Sable nearshore areas found that wave and current action are the primary n-transforms interacting with cultural remains. In addition, continual wave and current activity were responsible for transporting buoyant wooden vessel remains to different locations over time (O'Shea 2002: 218-219). The study further suggests that the overall deposition of archaeological remains from Great Lakes shipwrecks in nearshore areas may or may not be associated or in close proximity to the original wreck site (O'Shea 2002:223, 225). Other principal n-transforms identified by the Au Sable shipwreck study were repetitive cycles of scouring and aggradation common to Great Lakes nearshore areas (O'Shea 2002:222). The removal or re-distribution of protective sediment layers by this reoccurring cycle served to destabilize archaeological remains and further undermined the original archaeological deposition.

As the physical and environmental conditions present at North Point Reef Ship Trap are consistent with the above description of a high energy, nearshore environment, it can be assumed that the identified n-transforms will also be ongoing scrambling devices at North Point Reef Ship Trap. North Point Reef is composed of a limestone substrate with a thin overlay of glacial till and alluvium. As stated previously, the reef's shallow water environment also experiences a high level of wave and current activity, as well as ice scouring. Subsequently, the archaeological site remains within North Point Reef Ship Trap are predominantly exposed or resting on top of the lake bed and subject to the unadulterated impact of n-transforms. Therefore, the presence or absence of certain material types can be attributed, in part, to these specific n-transforms.

Given the nearby Au Sable survey findings, it should also be recognized that some of the shipwreck remains in the North Point Reef Ship Trap site assemblage could be remains from shipwrecks that occurred at other locations and have been re-deposited at the location by ongoing wave, current and storm activity. Conclusions drawn from Au Sable and other shallow water wreck sites suggest that heavier vessel parts, like a vessel's keel assemblage and machinery, remain within the immediate vicinity of the original wreck site despite turbulent environmental conditions (Muckelroy 1978:176; Murphy 1990:4, 15; Stewart 1999:573; Ward et al. 1999:568; O'Shea 2002:221). In other words, the overall weight of an object will ensure the archaeological deposition. By extension, lighter-weight ship components in high energy sites are likely to experience some level of translocation or re-deposition from the immediate wreck site (Murphy 1990:14-15). Studies have shown that re-distribution patterns for light weight material typically follow the general direction of shoreline currents, or littoral drift, and accumulate at natural collection points along underwater obstacles (Muckelroy 1978:157; Murphy 1990:14-15; Ward et al. 1999:565; O'Shea 2002: 224-225). Moreover, regional studies indicate that heavy concentrations of apparently unrelated debris are the result of re-deposition by these n-transforms (O'Shea 2002:224).

In order to try and identify the location and number of original shipwreck sites extant at North Point Reef, the types of buoyant or non-buoyant vessel parts have been quantified below in Table 8. All vessel components and isolate materials were assessed for material composition, as well as weight and size parameters to determine the individual probability for re-distribution through water and current activity. The presence or absence of iron material was heavily relied upon to make the final category determination and in a few cases the accumulation of sediment also determined the designation.

Table 8: Probabilities for Migrant Vessel Parts in North Point Site Assemblage

Vessel Part	Buoyant	Non-Buoyant	Circumstantially	Unknown	Total
Hull Section	2	9	4	0	15
Keel Assemblage	0	10	0	0	10
Bow Fragment	0	1	1	0	2
Stern Fragment	0	1	1	0	2
Deck Planking	1	0	0	0	1
Engine Bed	0	1	0	0	1
Hogging Arch Section	0	1	0	0	1
Articulated Iron Beams	0	1	0	0	1
Misc. Debris Scatter	0	5	0	0	5
Isolated Artifacts	4	6	0	3	13
Unrecorded Sites	0	0	0	4	4
Total # of Sites/Features	7	**35**	**6**	7	**55**

Taking into consideration both the Au Sable findings and the described principles of inter-site migration and extraction, it is highly likely that the 10 extant keel assemblages identified in Table 8 are in their original wreck locations. Along the same line of logic, there are also nine hull sections, one hogging arch segment, one bow fragment, one stern fragment, one engine bed, and one length of articulated iron beams that are also likely to be in their original placement locations within the site assemblage distribution of North Point Reef Ship Trap. The same set of assumptions also contributed to the categorization of five miscellaneous debris scatters and six isolate locations.

All nine hull sections designated as non-buoyant were large sections ranging in size from 29 feet to 105 feet in length with intact inner and outer planking, extant frame sets, and in most cases, iron components of some sort are present. While relatively large hull fragments have been shown to be buoyant by the nearby Au Sable scattered wreck site study (O'Shea 2002:225), it has been postulated that the level of articulation for the hull sections and presence of iron components contribute to weighting the sections down. It is also likely that the physical attributes of North Point Reef create some sheltered areas that promote stable placement of sites in their original archaeological context. This determination is supported by the location of three wooden hull sections identified to be the remains of the *E.B. Palmer* (NP0019a, NP0019b, NP0019c). While these hull remains do not have iron components present, they are associated with cut stone cargo and the remains are located on the north side of the reef in 15 feet of water. Both the depth and placement of the remains protect the site from turbulent wave action and southward currents that would typically promote site migration.

Based on these findings, the overall percentage for probable site location types has been quantified in Figure 31, following.

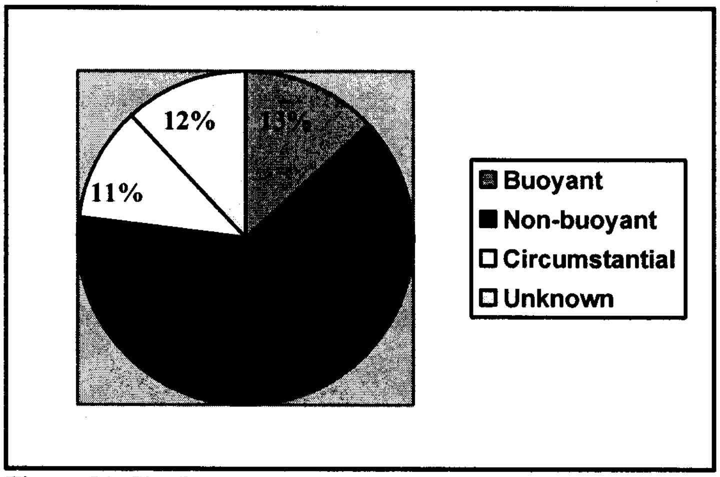


Figure 31. Site Location Types at North Point Reef Ship Trap.

As depicted by the pie graph, 64% of the site and isolate locations extant at North Point Reef are determined to be in their original archaeological context based on their buoyancy level. In contrast, 13% of the sites and isolates were determined to be buoyant. The specific ship wreck remains designated as buoyant are listed in Table 8 and were categorized according to opposing characteristics from non-buoyant materials. Two hull fragments without iron bracing and ranging in length from 16 to 18 feet were postulated to be buoyant as was one section of articulated decking 12 feet in length. In addition, a total of four isolated artifacts were determined to be buoyant based on their individual characteristics. Overall, buoyant material locations can be viewed as either translocated material originating from wreck sites within the confines of the North Point Reef Ship Trap or transient material introduced from external wrecking events.

In addition, remains designated as circumstantially buoyant can also be considered translocations or introduced material with a compromised inter-site archaeological context. The six instances listed in Table 8 make up an 11% total of the shipwreck distribution and again, their determination was made based on the individual characteristics of the material. For instance, four hull sections (NP0002, NP0011, NP0012, NP0024) were categorized as variable due to their large size and level of articulation without the presence of heavy iron components. While the weight of the pieces would provide some placement assurance, depending on the location of remains along the reef, the original context could be undermined by particularly heavy surge and storm conditions. This is illustrated well by NP0002, a 52' hull section known to be articulated remains from the *B.W. Blanchard* wrecked on North Point Reef in 1904. Referring back to the site location map at the beginning of the chapter, the wooden section's inherent level of buoyancy appears to have been mitigated by the nearshore placement of the wreck in three feet of water, however inter-site movement may be observed with future research.

The potential does exist that the evaluation criteria for material buoyancy may be incorrect. Likewise, using the designation of buoyancy to predict original archaeological deposition may also be flawed. It has been acknowledged that 12% of remains are categorized as unknown because the sites were not assessed by ECU researchers. In addition, ECU recorded sites only represent a sample of shipwreck remains at North Point Reef. To prove validity, further observation of individual site and isolate locations and their relative positions is necessary. For many of the unidentified remains further analysis needs to be conducted to determine the likelihood of re-deposition from external locations. Furthermore, future research that considers buoyancy in conjunction with bathymetric and geological placement could also be used to identify a spatial pattern for both North Point Reef and ship traps in general.

C-transforms

An equally important consideration for the presence or absence of material remains at North Point Reef is the potential affect of c-transforms. Beginning with the initial wrecking process again, Figure 31 below delineates the type of wreck formation processes that are likely to occur at an underwater shipwreck site. Figure 31 is Hardy's (1990) modified version of Muckleroy's (1978) flow chart for the evolution of a shipwreck site. Using both Muckelroy and Michael Schiffer's (1987) terminology, the flow chart attempts to delineate specific wreck formation processes that contribute to an underwater site's archaeological context. It should be noted that the chart omits Schiffer's additional delineation of site formation processes into n-transforms and c-transforms. Rather, Hardy places salvage under Muckelroy's general category of 'extractive filters.' The current study, however, will demonstrate that salvage in the Great Lakes acts as both an extractive filter, removing material remains both during and after the site's initial deposition, and as a c-transform that acts as a scrambling device, mixing evidence on-site once it has been deposited.

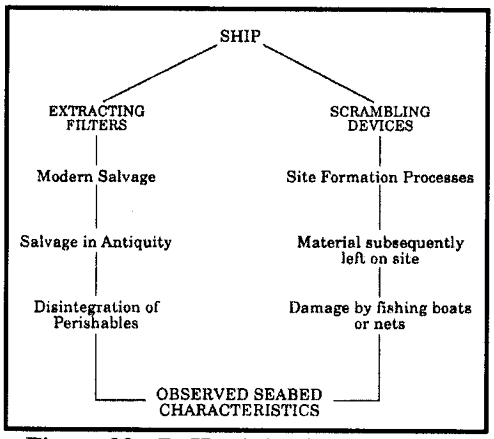


Figure 22: D. Hardy's 1990 flow chart describing wreck formation (Ward et al. 1999:562).

As North Point Reef is a ship trap, considerable potential does exist for the disturbance of distribution patterns due to multiple and overlapping wreck events or even minor ship casualties. Although Hardy's flow chart does not list multiple wrecking events as a scrambling device, it is certain that the archaeological context at North Point Reef has been shaped by the numerous wreck events. It has been well documented throughout this thesis that historic and contemporary pre- and post-depositional salvage occurred throughout the Great Lakes. Great Lakes salvage was essentially a large-scale formal reuse mechanism that was employed to facilitate the intensive economic pursuits of regional historic populations. Given Alpena's commercial prominence in the region and reef's proximity to navigation routes, the comprehensive or partial salvage of shipwrecks and cargo most likely occurred routinely at North Point Reef.

The affect of repetitive wrecks and commercial salvage will, therefore, be considered the primary c-transform impacting individual site contexts within the North Point Reef Ship Trap site assemblage. Initial salvage operations typically began immediately after a casualty occurred while the vessel was still in a transitional systemic state, rather than an archaeological one. During the pre-depositional phase, historic documentation provided in Appendix D details how anything that could be immediately removed from the vessel was, and then repeat visits to the wreck site followed daily until comprehensive recovery was achieved. As a consequence, the period of salvage activity that occurred during the vessel's transitional systemic state can also be considered a post-depositional site formation process because salvage occurring on the shipwreck is highly likely to have affected both the context of previous archaeological deposits, as well as the archaeological deposition of material that was lost by the vessel during the contemporaneous wreck event.

A good example of this is the stranding, and subsequent total wrecking, of *Galena* (NP0032) at North Point Reef. *Galena* stranded on the reef while heading outbound from Alpena harbor loaded with timber (*Alpena Weekly Argus* 1872b:3, col.2). Unfortunately, the heavy seas and strong wind conditions that contributed to the wreck also prohibited immediate rescue of the vessel. In order to keep the ship from being repeatedly dashed against the rocky substrate the captain ordered the vessel scuttled. At this time it was decided that anything that could be carried on board the life raft would be removed along with the few passengers. Comprehensive salvage operations would have to wait for the surge conditions to pass.

Despite the captain's preventative measures, weather conditions worsened, and the stranded ship became a total loss one week later (*Alpena Weekly Argus* 1872d:3, col. 1). However, in the interim, repeated visits had been made to recover "furniture, bedding and machinery" (*Alpena Weekly Argus* 1872b:3, col.2). During this time, the repeated anchoring of salvage vessels could have become ensnared on extant shipwreck remains already deposited on the reef, disturbing the original archaeological context of the site. Likewise, the selective recovery of jettisoned cargo or cargo washed overboard could also produce the same deleterious effect. Additional disturbance to archaeological deposits from this single wrecking event also likely occurred one year later when salvagers finally removed the boiler, engine, and machinery from the wreck site (*Alpena Weekly Argus* 1873:3, col.1).

This kind of prolonged salvage activity is unique to the Great Lakes and is significant when trying to understand the distribution of extant remains at North Point Reef. As demonstrated by *Galena's* wrecking, the long term, selective recovery of cargo and vessel parts from a stranded but not abandoned vessel places the archaeological deposition in a suspended state where pre-depositional and post-deposition stages become blurred. According to previous typologies, salvage is typically viewed in an archaeological context as a reclamation process that is enacted to restore the systemic function of an abandoned artifact (Schiffer 1978:29, 103). Due to the nature of Great Lakes salvage, however, the role of regional recovery operations can be viewed as a mechanism of both commercial reclamation and discard. Not only did salvage operations interrupt the archaeological deposition of shipwreck sites to facilitated all forms of material reuse, but the final abandonment of wreck sites by ship owners or salvagers indicates an underlying decision making process that also significantly contributed to the final deposition of site remains. From this perspective, further research into Great Lakes ship traps' site formation processes has the potential to reveal unexplored nuances of commercial reuse and abandonment patterns.

Collectively, the current examination of site formation processes has shown that both n-transforms and c-transforms have dramatically affected the archaeological deposit at North Point Reef Ship Trap. The deleterious affects of variable wave, wind, current and sedimentation rates, as well as the area's historic commercial salvage practices have badly fragment wreck remains and compromised the inter-site context of artifact distributions. While the original archaeological position has potentially been preserved for 64% of the 32 designated wreck sites, only 11% of the 55 site locations can be explicitly associated with an actual wrecking event at this time. The aim of the current investigation will, therefore, shift in focus from recreating the conditions for singular wreck events to recreating the overarching systemic context that is responsible for the entire site assemblage at North Point Reef. Ultimately, this additional analysis will provide the clearest insight into the associated systemic behaviors that are represented by the constantly changing composition of North Point Reef's archaeological context.

Temporal and Behavioral Indicators

The analysis presented in the next section specifically examines temporal and behavioral indicators reflected in the archaeological record. While traditional archaeological methods focus on site stratigraphy and artifact distribution to determine temporal association and behavioral relationships, the previous assessment of site formation processes has indicated that the presence and absence of material remains will be more revealing than an interpretation of spatial associations between extant remains. In addition, given the lack of vessel identities and the fragmented nature of remains the analysis will also rely heavily on the type and quantity of extant material remains as well as use corresponding evidence from the historic record to qualify results. Using this approach, a definitive time frame will be assigned to the ship trap's operational uselife, the hazardous nature of the location will be examined, and the specific historic activities that occurred at North Point Reef will be identified.

Temporal Designators

The widespread locations, number and variety of vessel remains at North Point Reef suggest that Alpena experienced a high volume of maritime traffic at some point historically. In addition, the density of archaeological remains along the reef also indicates that the specific location was the site of frequent shipwrecks. Historic evidence presented throughout this thesis confirms that a period of intensive maritime commerce existed region-wide from approximately 1830 to the onset of the Great Depression in 1930 (Barry 1996 [1973]:189). Additional historic evidence has likewise been presented to further suggest that the port city of Alpena was not just actively engaged in the same intensive regional commerce, but was founded as a result.

Independent of this historic evidence, an analysis of the archaeological remains can also be used to provide a temporal range for increased maritime commerce. Technological transitions in ship construction are well documented for the region and therefore the material composition of wreck remains can be examined to give an approximated time frame for wrecking events. As ship technology evolved world wide to accommodate larger vessel types, metal hulls supplanted wood hulls in order to provide greater structural support and durability. Shortly after the turn of the nineteenth-century British shipbuilders began using iron and later steel for marine vessel fabrication. This departure from the tradition of wooden ship construction was largely due to the dwindling supply of suitable timber in Europe as well as improved smelting and iron works technology. The merit of iron hulled vessels gained fast recognition and spread to North America within the matter of a few years. Iron hulled vessels began plying

American river ways by the 1920s with entire vessels or vessel components that were imported from England. By the late 1830s homegrown rolling mills were established in Wilmington, Pennsylvania producing a new iron ship building industry in America (Tyler 1957).

Despite the change over in technology, however, wooden hulled vessels continued to dominate the inland waterways until their uselife was completely extinguished. Given the abundance of timber resources in the Great Lakes region, wooden hulled vessels remained the most economical ship construction method until the last few decades of the nineteenth-century (Griffiths 1997:40-42; Rodgers 1996:124-125). In fact, a full transition to steel hulled vessels did not occur within the Lakes ship construction industry until the late 1920s. A region wide refusal to adopt iron hulls, however, did not prevent the adoption of iron vessel components. As vessel sizes began to increase in the Great Lakes, a corollary need arose to augment the structural integrity of longer, narrower wooden hulled vessels. By the 1850s, the advent of a reinforced wooden vessel type appeared that utilized iron strapping, basket trusses, and iron hogging arches on wooden hulled ships (Barry 1996 [1973]:79). The presence of iron reinforced wooden vessel remains, as well as the absence of metal hull fragments can therefore be used to establish a temporal range for the current project's archaeological remains. According to the survey results table in Appendix C, 25 shipwrecks remains appear to be wood only construction, eight had evidence for iron reinforced wood construction, and no remains indicated iron construction.

When considering only the remains of shipwreck sites, rather than the total number of sites and isolates, wood-only vessel remains comprise 76% of the entire site assemblage. The other 24% is comprised of vessel remains with clear wood and iron construction. Only one potential candidate, NP0018, existed within the site assemblage that could represent an iron hulled vessel. Site NP0018 consisted of two metal plates associated together. While the dimensions of the plates could be consistent with a fragment from a larger hull plate, it is more likely that these metal pieces came from a boiler, boiler base, or ash pan. This determination is based on documented construction features that were later recognized as being consistent with boiler tube holes on one piece and multiple layers on the other piece that is also indicative of a boiler chamber. On the surface the material composition analysis appears to be somewhat superficial. Not only is the sample size relatively small, but given the high prevalence of historic salvage, it is likely that all the archaeological evidence for later period iron ships has been removed. However, using the archaeological evidence for ship construction in conjunction with evidence from the historic record an approximated terminus post quem of 1850 and terminus ante quem of 1930 can still be derived for the remains at North Point.

The local historic record supports the assertion that Alpena served as a major maritime commercial center from 1850 onward. As stated previously the area was first settled in 1835 as a fishing camp and then entered into the timber production business in 1859. Additional historic documentation also provides conclusive evidence that North Point Reef was a hazardous maritime location that routinely experienced shipwrecks. A list of newspaper articles in Appendix D details a sample of North Point Reef wrecks between 1868 and 1930. The articles chronicle 26 wrecking events and subsequent salvage operations. While the list of articles is not comprehensive, it does provide insight into the range of maritime disaster and salvage activities at North Point Reef historically. Moreover, the articles support the existence of a temporal association for extant archaeological remains within the defined period established by this research.

An Examination of Disaster Promoting Conditions

To determine the specific circumstances that contributed to the hazardous nature of the location, the reef's geographic context in proximity to the port of Alpena, Michigan was considered. Acting as the bay's northern breakwater, the reef provided sheltered waters for commercial vessels coming in and out of port for routine stops, as well as acted as a port of refuge for vessels during inclement weather and sea conditions. Unfortunately, North Point Reef extends approximately three miles out into the open waters of Lake Huron from the exposed land base. Vessels coming into port from the north, around Thunder Bay Island, needed to give both the reef and the island's shallow water obstructions a wide berth in order to pass without incident. Referring back to Figure 2 depicting Thunder Bay's bathymetry, the reef's maximum depth is about 30 feet near its lake floor terminus, as are some areas around and between Thunder Bay Island and Sugar Island. This depth gave the historic mariner enough room for a normal route of passage or an expedient refuge at these locations in times of trouble.

Navigation problems, however, easily arose due to situation of Alpena at the base of North Point peninsula. The port's location was advantageous for historic settlers as it was at the mouth of a river in the most protected area of the bay and there was deep water access in a direct line with the open waters of Lake Huron. Regardless of these settlement advantages, Alpena's location was a challenge for commercial mariners that traveled along nearshore navigations routes. This was especially true in low visibility conditions when navigation by dead reckoning was not possible. Similarly, severe wind conditions had the potential to dramatically alter the depth of water along nearshore areas. Both of these environmental aspects decreased the margin of error for lakes pilots navigating too closely toward the shore line during bad weather and ultimately increased the likelihood for disaster. Compounding the problem was the high rate of commercial traffic at Alpena's port that also increased the statistical likelihood for shipwreck incident.

Supporting historical evidence for North Point Reef's reputation as a ship trap comes from Thunder Bay's Life Saving Station records and newspaper accounts (see Appendix D). Table 10 shows the locations of shipwrecks in the vicinity of the Thunder Bay Island Life Saving Station from 1877 to 1930. The totals depicted in the table were derived from Steve Tongue's Collection on Thunder Bay Life Saving Station. Both Steve Tongue's Collection and the Thunder Bay Island Life Saving Station records are archived in Alpena County Library.

Table 9. Reported Wrecks by Thunder Bay Life Saving Service between 1877 and 1916 (Thunder Bay Life Saving Service Records 1877-1930)

Wreck Location	Number of Wrecks	Percentage of Area Wrecks
North Point	57	24
Thunder Bay Island	42	18
Sugar Island	14	6
Other Proximal Response Locations	126	52
Total Number of Wrecks	**239**	**100**

The totals in Table 10 indicate that North Point Reef's was part of a larger area ship trap that encompasses nearby Sugar and Thunder Bay Islands. Referring back to the previous discussion on North Point's geological context, Sugar and Thunder Bay Islands are located just north of North Point Reef and also have surrounding shallow water obstacles that are part of the same limestone reef system that spans the Lake Huron coastline up to Presque Island. As North Point wrecks constitute 24% of the total number of area wrecks, it appears that the point was the most treacherous regional shallow water obstruction for historic mariners.

The quantity of archaeological sites scattered along the reef further supports this conjecture as does additional historical evidence presented in Table 11 below. The chronicle of North Point Reef shipwrecks in Table 11 clearly correlates ship casualties with navigation miscalculations along Alpena's heavily traveled commercial navigation route. It should also be noted that the list also provides a partial list of potential candidates for any further research into the identity of the reef's extant archaeological remains.

Table 10.
North Point Shipwrecks between 1877 and 1916
(Thunder Bay Life Saving Service Records 1877-1930)

Date of Disaster	Vessel Name	Vessel Types	Wrecking Comments
April 23, 1877	S. C. Baldwin	Steamer	Stranded
November 9, 1877	Sunnyside	Not Listed	Stranded
November 9, 1877	Empire State	Schooner	Stranded
November 9, 1877	Charles Hinkley	Schooner	Stranded
September 8, 1879	Three Brothers	Schooner	Stranded
October 16, 1882	James Reed	Tug	Stranded
September 12, 1883	Alison Sumner	Tug	Stranded
November 5, 1883	Detroit	Fishing boat	Capsized
November 12, 1883	Unknown	Not listed	Found by P. J. Fergueson
November 21, 1883	H.B. Tuttle	Steamer	Stranded
September 9, 1885	J.S. Fay	Steamer	Stranded

Table 10. continued			
Date of Disaster	**Vessel Name**	**Vessel Types**	**Wrecking Comments**
May 31, 1887	Mary Pringle	Steamer/Consort	Stranded
May 31, 1887	Fame	Schooner	Not listed
September 30, 1887	Selkirk	Schooner	Stranded
October 23, 1887	Alice B. Norris	Schooner	Lost rudder
October 29, 1887	Mineral State	Schooner	Stranded
May 8, 1888	Montreal	Steamer	Stranded
October 2, 1888	T.B. Gardiner	Schooner	Not listed
October 2, 1888	Christian B. Jarvis	Schooner	Not listed
October 2, 1888	Manitowac	Schooner	Not listed
November 2, 1890	Gulnair	Schooner	Stranded
July 16, 1891	Arthur & Lighter	Tug	Not listed
August 20, 1891	Herschel	Schooner	Stranded
November 14, 1891	Thesia	Schooner	Not listed
June 5, 1892	Annie Moiles	Tug	Stranded
November 1, 1892	E.B. Palma	Schooner	Stranded
November 20, 1892	Bay City	Schooner	Stranded
November 20, 1892	Alice Richards	Schooner	Stranded
September 13, 1894	Enterprise	Steamer	Stranded
June 4, 1895	Wayne Isbell	Propeller	Stranded
July 9, 1895	C.C. Barnes	Schooner	Stranded
May 22, 1897	Result	Schooner	Stranded
May 26, 1897	J.W. Wescott	Tug	Stranded
October 26, 1898	Republic	Steamer	Stranded
October 21, 1900	C. Hickox	Steam barge	Stranded
November 19, 1900	Gillah	Steamer	Stranded
November 19, 1900	Connely Bros	Barge	Stranded
November 25, 1900	Rube Richards	Steamer	Stranded
April 26, 1902	Whiskers	Skiff	Sunk
May 27, 1902	Vienna	Schooner	Stranded
October 1, 1902	Hiawath	Steamship	Stranded
October 1, 1902	Angus Smith	Schooner	Stranded
November 28, 1904	B.W. Blanchard	Steamer	Stranded
November 28, 1904	John J. Johnson	Schooner Barge	Stranded
November 28, 1904	John Kilderhouse	Schooner	Stranded
December 4, 1904	Ralph	Tug	Not listed
November 1, 1906	Dutch Girl	Fishing boat	Centerboard broke
September 26, 1908	Ionia	Steamer	Stranded
September 27, 1908	Winslow	Tug	Stranded
November 20, 1909	Dutch Girl	Fishing boat	Stranded
July 15, 1911	Vessel not named	Lighter	Capsized
July 21, 1911	Eyo	Gas boat	Not listed
November 26, 1913	J.W.Nicholas	Not listed	Stranded
June 13, 1915	Mary C	Gas launch	Engine disabled
July 28, 1915	James H. Prentiss	Steamer	Stranded
July 3, 1915	Martha	Gas fish boat	Engine disabled
August 4, 1916	Vessel not named	Motor boat	Engine disabled

Examination of North Point Reef's casualty list indicates that 72% of the 57 shipwreck incidents were commercial vessel strandings. Of those strandings, 47% of the vessels were schooners, 28% were steam powered vessels, 17% were tugs, 7% were barges, and 2% were fishing boats. Based on the summary table of archaeological remains at North Point Reef in Appendix C, a higher proportion of schooner remains is also reflected in the archaeological record. Sail powered vessel remains comprise 63% of the shipwreck sites at North Point Reef Ship Trap. In comparison identifiable steam powered vessels remains only comprise 31% and 2% are unidentified vessel types. In addition, the number of schooner keel assemblages comprises 90% of the total number of keel assemblages present at North Point Reef. This is significant because the presence of a keel assemblage in the archaeological record, schooner related or otherwise, indicates a total wrecking event rather than a partial wrecking event (O'Shea 2002:216). Combined the evidence suggests that sail powered vessels were simply more susceptible to both stranding and total shipwreck events during this time period.

Additional historic and archaeological evidence also supports a higher stranding rate and total shipwreck rate for sailing vessel in comparison to steamships (O'Shea 2002:216). Sail powered vessels were at a disadvantage during inclement weather conditions because they were more easily driven off course or against a reef. In addition, from the 1850s onward schooners were routinely used as consort vessels towed by steamers to maximize commercial shipping productivity (Rodgers 2003:3-4). Several of the transcribed articles in Appendix D describe North Point wreck events occurring after consort schooners breaking loose from their escort in foul weather.

As demonstrated by this thesis, once grounded sailing vessels were at a disadvantage in comparison to steamships. Large sailing ships did not have a secondary power source to back off an underwater obstruction or engines that could be use by salvagers in recovery operations. Consequently, large sail vessels that suffered grounding events had to be recovered in stages by salvage tugs that did not possess enough collective power to re-float the vessel. Similarly, if recovery operations required time consuming extraction of cargo to lighter the vessel from the reef, the danger was heightened for the ship to break apart in adverse wave and weather conditions.

Indicators for Specific Salvage Activity

Based on the high prevalence of reef strandings demonstrated by the Life Saving Service records and newspaper reports, it is apparent that North Point Reef was a submerged marine obstacle that promoted both shipwreck and ship salvage. Furthermore, from this same evidence, it is reasonable to conclude that salvage operations at North Point Reef ranged between comprehensive vessel recovery to selective salvage operations aimed at recovering cargo only or valuable vessel components. Working from this assumption, the reef's site assemblage can be analyzed for evidence that demonstrates the type of salvage operations that occurred, the most desirable salvage commodities historically, and indicators for specific salvage methodology.

In order to identify possible salvage indicators that occurred on North Point Reef, it is first necessary to categorize and quantify the type of shipwreck remains present at

North Point Reef. Table 12, following, depicts a generalized list of vessel parts that are extant archaeologically at North Point Reef.

Table 11.
Types of Vessel Parts Represented in North Point Site Assemblage

Vessel Part	Number Extant	Percentage of Site Assemblage
Hull Section	15	36
Keel Assemblage	10	24
Bow Fragment	2	5
Stern Fragment	2	5
Deck Planking	1	2
Engine bed	1	2
Hogging Truss Fragment	1	2
Miscellaneous Debris Scatter	5	12
Unknown Shipwreck Site	4	10
Articulated Iron Beams	1	2
Total Number of Sites/Features	**42**	**100**

As indicated by Table 12, the majority of archaeological remains are partial keel assemblages that have some level of articulated frame and hull sections. Articulated keel assemblages at North Point represent 24% of the total number of sites and ranged in size from 16 feet to 46 feet in length. Hull sections make up 36% of the entire site assemblage and range in size from 16.6 feet to 105 feet in length. Field documentation further suggests that these hull sections are predominantly side sections from a vessel, above the turn of the bilge. In contrast, articulated sections of deck planking only comprise 2% of the entire site assemblage and bow and stern fragments just 10% combined. Likewise, other complex structural components like hogging trusses and engine beds combined only represent 4% of the site assemblage.

At the outset, it should be acknowledged that the majority of fragmented remains at North Point Reef are likely the result of cataclysmic wrecking events rather than vessels that were disarticulated during salvage operations. It has already been established that the type and quantity of extant archaeological remains are both a product of the type of wrecking event and subsequent n-transforms and c-transforms. As discussed previously, North Point Reef's high energy environment did not promote salvage operations during inclement weather. Ships that stranded on the reef during rough seas suffered greater damage with prolonged exposure and in the most extreme cases strandings broke up before salvage efforts could be made. If vessels broke up during a cataclysmic wrecking event, heavy vessel fragments and ship machinery should have sunk to the lakefloor and remained in the original archaeological context up to the present.

Referring back to Table 12, 10 or more vessels can be inferred to have been total shipwreck events as represented by the total number of existing keel assemblages. By extension, there should also be an existing deposition of other complex vessel components and machinery for 10 shipwrecks. As it stands, however, only one possible donkey boiler is present at North Point Reef Ship Trap. Given the virtual absence of complex vessel components and machinery in the archaeological record, this can be inferred as evidence for both comprehensive and selective recovery operations. In addition, the relative absences of large amounts of bulk cargo and vessel remains intact above the waterline in deeper sections of the reef also supports a conjecture that salvage operations carried out at North Point Reef were largely successful in retrieving most stranded vessels intact and with the ship's contents.

Extensive historical evidence has already been presented to support the commercial value of salvaged Great Lakes vessels parts and machinery. It has also been demonstrated that the expense involved in constructing a new vessel was routinely mitigated by using recycled components recovered from shipwrecks. In this scenario, the most expensive construction elements carried a higher retrieval priority than those that could be inexpensively reproduced. Hence, historic salvage operations at North Point Reef likely focused on intact vessel remains, machinery and retrievable cargo first and later selective salvage efforts would be aimed at picking apart shipwreck remains as the need for recyclable material arose.

This hypothesis also explains both the low incidence of machinery and large articulated sections of bow and stern assemblages. Historically, as ship construction technology became more refined and ultimately more standardized, these central components could be used interchangeably in any ship as long as the parts had not been damaged beyond repair. Bow and stern assemblages were initially constructed stout to withstand groundings and collisions. In conjunction with the keel assemblage, these components provided the necessary framework and structural support for the rest of the vessel components. Consequently, if a large enough section of a ship's bow or stern was left intact after a wrecking event, these components are known to have been recovered and used to refurbish other vessels or converted into barges and other ancillary support vessels. In contrast, it is highly unlikely that keelson assemblages would be recycled if extensively damaged and the same holds true for fragmentary sections of hull planking.

In regards to the specific type of ship recovery methods that were employed on North Point Reef wrecks, there was not conclusive archaeological evidence to identify any particular salvage methodology. A review of the field notes, photographic record and site plans did not reveal evidence for intentional cut marks on documented remains. This does not mean that evidence does not exist for the type of salvage methods employed at North Point. Selective retrieval of disarticulated or damaged vessels may have required minimal cutting for removal and the small amount of evidence left behind eroded over time. Given the time constraints and frequent inhospitable diving conditions, however, it is likely that evidence for salvage is still visible but was missed by ECU researchers. There are also a number of sites not examined by ECU researches, therefore, further research specifically designed to collect data on this topic could yield additional evidence.

The historic record, however, can be drawn upon to shed light on the type of salvage methods employed at North Point Reef. The newspaper articles and Thunder Bay Island Lifesaving Station records detailing ship rescues indicate that the reef environment was highly conducive for the successful recovery of stranded ships. As chronicled by both, an entire vessel and its contents were typically recovered from the wreck location. Lightering and other less invasive salvage methods were typically used to re-float a stranded or slightly damaged ship. In cases of such minor wrecking events little evidence would be left behind outside of randomly lost pieces of cargo or insignificant vessel components. From this perspective, the type and abundance of isolated debris finds in the archaeological record can be viewed as evidence for this kind of salvage activity.

Ultimately the archaeological remains at North Point Reef clearly demonstrate that the location served as a ship trap historically. Collectively the North Point Reef site assemblage represents a microcosm of Alpena's maritime activity that can be viewed within the broader context of regional economic development. Using evidence from both the archaeological and historic record, the analysis of the ship trap remains delineated specific maritime behavioral patterns in a temporal context. As demonstrated by the discussion of site formation processes, establishing a linkage between the systemic and archaeological contexts was extremely important for this kind of dynamic site environment. This was also especially true given the overlay of debris from multiple wrecking events that also obscured associative patterns.

There was, however, considerable archaeological evidence identified that was definitely associated with temporal and cultural affiliations, navigation practices, and salvage activities. In total, the repeated wrecking events left a residual mark on the landscape that reflects 100 years of regional growth and economic development. In addition to demonstrating Alpena's importance as a center of historic maritime activity, the extant archaeological remains revealed region-wide behavioral patterns that could be related to social, technological and economic trends within the maritime community between 1830 and 1930. The historical value for this kind of physical manifestation is considerable given the wealth of information and insight that was interpreted from the fragmented remains.

The broader archaeological findings of the project are significant as well. Ship traps are both an archeological and physical phenomena that are known to exist, but have received little investigative attention aside from inquiries into local folklore. With this in mind, the current study of North Point Reef Ship Trap attempted to look at the archaeological evidence in conjunction with the historic record to produce sound explanations for the formation of this kind of hazardous maritime location. Based on the current study findings other regional ship traps should occur at locations where natural navigation hazards intersect with heavily traveled commercial trade routes. In identifying the underlying social, economic and environmental conditions that contributed to the perpetuation of North Point Reef Ship Trap, other regional areas with similar collections of submerged cultural resources can and should be better assessed. Furthermore, the analysis as a whole can also be used in future research as a comparative tool to form a predictive model that would identify the location and archaeological variables of other ship traps worldwide.

CHAPTER 8

CONCLUSIONS

The relevance of the current salvage and ship trap research can be summarized in both an historic and archaeological context. Historically, waterborne navigation routes have traditionally served as the main commercial thoroughfares in both the United States and internationally. The historic precedence for marine transportation, combined with the lack of established overland roadways, sustained the growth of Great Lakes maritime commerce throughout the country's frontier development. The transcontinental railroad did not come into being until 1869 and this was only accomplished to link the gold rushed west with the rich ports of the east coast, and effective railroad extensions did not reach many parts of the Great Lakes until the late 1800s (Mansfield 1899:530,548). As regional resource extraction and mid-western agricultural production increased, the need arose to transport vast amounts of materials across the Great Lakes to both national and international markets. To meet the commercial demand for reliable and efficient bulk cargo transport, an aggressive pursuit of technological advances in ship construction and propulsion systems resulted.

Given the historic context, it is understandable how an early reliance on waterborne transportation ultimately led to the institution of intensive commercial shipping practices in the Great Lakes. The mind set for these intensive commercial practices are simply a reflection of the dominant value system driving the nineteenth-century economy. Mercantilist tenants that fueled New World expansion morph easily into America's Gilded Age agenda which focuses on increased productivity and maximizing profit. Every industry that existed during this period of American history, regardless of geographic location used resources until they were nearly exhausted and then moved on to the next procurement target. By reviewing the evolution of business practices for each extractive industry, the current study has demonstrated that this intensive business model was also present at both a macro and micro level within Great Lakes maritime commerce.

Moreover, the current study has also tried to reveal how the reoccurring cycle of commercial intensity, in turn, created many social, technological and environmental implications that are also recognizable in the archaeological context. As demonstrated by the North Point Reef Ship Trap study, the opportunistic circumstances of intensive commerce are reflected in even this most extreme circumstance of the microcosm. The archaeological analysis presented in Chapter 7, expressly demonstrates how the intensive shipping practices of the era had a residual effect on the landscape. Shallow water rock shoals and reefs typical to Great Lakes near shore areas often straddled historic shipping routes or were in close proximity to important ports of call, harbors, way stations, and centers of distribution. Throughout the decades, dangerous navigation practices perpetuated the continued use of hazardous shipping corridors and many locations similar to North Point Reef became collection areas for shipwrecks. Once these ship traps were picked clean by salvagers, the remains left behind created a rich archaeological record hidden beneath the waves.

As suggested by the conclusions in Chapter 7, the archaeological implications for the assessment of North Point Reef Ship Trap are useful for the contemporary field of underwater archaeology. Recently, there has been an effort to move away from the site specific analysis of singular or spectacular shipwreck finds in order to broaden the potential for research opportunities and comparative analyses. It has been repeatedly suggested that the discipline's focus should evolve and move toward integrative research designs that address cultural site formation processes that exist parallel to the physical site formation processes of a wrecking event (Muckelroy 1978; Lenihan and Murphy 1981; Dean et al. 1992; Gibbs and McPhee 2004; Gibbs 2007). The same perspective is reiterated by proponents advocating an integration of broad based comparative analyses (Lenihan and Murphy 1981; Foster 1987; Richards 2002; Gibbs 2007). Specific to shipwreck archaeology, comparative analyses have the potential to take an isolated event and place it within a broader systemic context, where cultural conditions and patterns of behavior can be conjectured and then tested across a span of cultural and geographic space and time. Essentially, a more scientifically grounded discipline is currently being sought, where testable methodologies and broader theoretical applications can be utilized to tie archaeological evidence to the historic record.

The research performed in the current study attempted to incorporate these contemporary perspectives. The initial intent of the research into North Point Reef Ship Trap was to identify the underlying social, economic and environmental reasons for the widespread distribution of shipwrecks at this specific location. In doing so, it was hoped that generalized characteristics could be determined in order to set a base line for similar collections of submerged cultural resources. Additional documentation indicates that the formation of ship traps is common throughout the Great Lakes as well as world wide. Other locations designated as "ship traps" in the archaeological record include the Gippsland Region in Victoria, Australia; the Dry Tortugas, Florida; the Straits of Yassiada, Turkey; Cape Ira, Greece; Isle Royal, Lake Superior; the coastal locations in the Gulf of Fos off France (Delgado 1997; Murphy 1990, 1993; Duncan 2000, 2004), and areas within Wisconsin's notorious Door County (Cooper 1988, 1989; Cooper and Rodgers 1990; Cooper and Jensen 1995). While it is true that this maritime phenomenon has been observed in the archaeological record, little actual research has been done to delineate potential external site formation processes.

Despite the lack of investigation into the causes of ship traps, a number of theoretical assumptions can be put forward based on the North Point Reef Ship Trap findings. Working from the known to the unknown: the intensive shipping practices of Great Lakes commerce historically brought together the necessary physical and cultural variables to create a high potential for wrecking events. The physical and cultural variables included shallow water obstructions in close proximity to high traffic navigation corridors near central ports of call. By extension, it can be assumed that other areas with similar physical and cultural conditions will have the same potential for the creation of localized shipwreck collection points. There is also some speculation that shipwrecks will occur in close proximity to life saving stations, navigation lights, and lighthouses (Duncan 2000).

In addition, the types of materials remaining in an archaeological context will be determined by the site formation processes specific to each archaeological deposition. The integrity of the remains and their depositional context is highly malleable dependent upon the particular n-transforms acting on the site to include the physical qualities of the submerged environment (fresh water vs. salt water, cold temperatures vs. warm temperatures, shallow vs. deep). Similarly, the impact of c-transforms can be predicted to some extent using the same physical variables as well. If salvage and re-cycling of material is a consideration, then it is highly likely that shallower water wreck sites will be picked clean, and deeper water wreck sites will be more likely to have intact vessels given the greater difficulty in recovery and the preservative qualities of a lower energy physical environment.

To test these speculations, further investigation into Great Lakes ship traps should be done. It is highly likely that more archaeological evidence exists within North Point Reef Ship Trap, as well as within the adjacent shallow water areas surrounding Sugar and Thunder Bay Island and other similar regional locations. Future examination of ship trap sites should be conducted in conjunction with regional historic piloting guides, navigation maps, early U.S. Life Saving Service and Coast Guard records, as well as currents and geological considerations to identify potential collection points. For the broadest application, the study should also be included in future comparative studies. As a comparative tool the study of North Point Reef Ship Trap can help delineate the specific characteristics for this site type. Comparative analyses of multiple ship trap locations and site assemblages could also delineate a hierarchy of importance for each of the social, economic, and environmental factors outlined by the current study and others. This type of systematic research, in turn, will provide a strong foundation for the identification of other potential coastal areas where the same types of variables exist.

BIBLIOGRAPHY

Primary Sources

Anonymous

1883 *History of Lake Huron Shores with Illustrations and Biographical Sketches of Some of Its Prominent Men and Pioneers.* H. R. Page and Company, Chicago, IL.

Andrews, Israel J.

1851-52 Report of Israel D. Andrews, Consul of the United States for Canada and New Brunswick. Communication from the Secretary of the Treasury in Compliance with a Resolution of the Senate of March 1851. 32nd Congress, 1st Session, *Senate Executive Document,* 112(XI). A. Boyd Hamilton, Washington, DC.

Around the Lakes

1894 *The Story of the Wreck and Rebuilding of the Kasota.* Detroit Dry Dock Company, Detroit, MI.

Barton, James L.

1846 Lake Commerce: A Letter to the Honorable Robert M'Clelland, Chairman of the Committee on Commerce, in the U. S. House of Representatives in Relation to the Value and Importance of the Commerce of the Great Western Lakes. Press of Jewett, Thomas & Co., Buffalo, NY.

Beeson, Harvey C.

1896 *Beeson's Marine Directory, 9th Annual Edition.* Harvey C. Beeson, Chicago, IL.

1919 *Beeson's Marine Directory of the Northwestern Lakes.* Mrs. Harvey C. Beeson, Chicago, IL.

Boulton, William

1876 Alpena County: History of Alpena County. *Pioneer Society of the State of Michigan together with the Reports of County Societies,* vol. V: 170-199. Wynkoop Hallenbeck Crawford Company, Lansing, MI.

Brady, Edward M.

1960 *Marine Salvage Operations.* Cornell Maritime Press, Centreville, MD.

Garriott, Edward B.

1896 Weather Man "Talks Shop." *Beeson's Marine Directory, 9th Annual Edition*: 122. Harvey C. Beeson, Chicago, IL.

Herodotus
[460] *The Histories.* Reprinted 1972 by Penguin Group, London, England.

Lytle & Holdecamper Ship List
1868 *Merchant Steam Vessels of the USA: 1790 to 1868.* Reprinted 1975 by Steamship Historical Society of America, Staten Island, NY.

Thompson, Thomas S.
1865 *Thompson's Coast Pilot for the Upper Lakes, on Both Shores from Chicago to Buffalo, Georgian By, and Lake Superior. The Detroit Free Press Steam Book* and Job Printing House, Detroit, MI.

Mansfield, J.B.
1899 *History of the Great Lakes,* vol.1 & 2. J.H. Beers, Chicago, IL. Reprinted 1972 by Freshwater Press, Cleveland, Ohio.

Meier, Frank
1943 *Fathoms Below: Under-Sea Salvage from Sailing Ships to the Normandie.* E.P. Dutton & Co., Inc., New York.

Perry, Lawrence
1907 The 'wrecking' of ships. *Pearson's Magazine*. C. Arthur Pearson, Ltd., London.

Plumb, Ralph G.
1911 *History of the Navigation of the Great Lakes.* Committee on Railways and Canals Hearings on Commerce of the Great Lakes Report. Government Printing Office, Washington, DC.

Scott, George
1905 *Scott's New Coast Pilot for the Lakes, 7th edition.* Speaker Printing Company, Detroit, MI.

Young, Desmond
1932 Ship Ashore: Adventures in Salvage. Jonathan Cape, London.

Newspapers

Alcona County Review
1894 *Alcona County Review*, November 15. n.p.

Alpena Argus

1894a *Alpena Argus* Wednesday, September 18:3, col.5-6. Alpena, MI.
1894b *Alpena Argus* Wednesday, September 26:3, col.5. Alpena, MI.
1894c *Alpena Argus* Wednesday, October 10:3, col.3. Alpena, MI.
1894d *Alpena Argus* Wednesday, October 17:3, col.3. Alpena, MI.
1894e *Alpena Argus* Wednesday, October 24:3, col.3. Alpena, MI.
1894f *Alpena Argus* Wednesday, October 31:3, col.3. Alpena, MI.
1902 *Alpena Argus* Wednesday, June 4:5, col.3. Alpena, MI.
1904 *Alpena Argus* Wednesday, December 7:1, col.3. Alpena, MI.
1905a *Alpena Argus* Wednesday, October 11:3, col.2-3. Alpena, MI.
1905b *Alpena Argus* Wednesday, October 18:3, col.2. Alpena, MI.
1906 *Alpena Argus* Wednesday, March 6:3, col.3. Alpena, MI.

Alpena Evening News, The

1905 *The Alpena Evening News* October 4, 1905:5, col.3. Alpena, MI.
1913 *The Alpena Evening News* Monday, December 15:1, col.4. Alpena, MI.
1914 *The Alpena Evening News* Monday, November 16:1, col.1. Alpena, MI.
1930 *The Alpena Evening News* July 29:1, col.5. Alpena, MI.

Alpena Weekly Argus

1872a *Alpena Weekly Argus* Tuesday, September 17:3, col.2. Alpena, MI.
1872b *Alpena Weekly Argus* Tuesday, October 1:3, col.2 Alpena, MI.
1872c *Alpena Weekly Argus* Tuesday, October 1:3, col.1. Alpena, MI.
1872d *Alpena Weekly Argus* Wednesday, October 8:3, col.1. Alpena, MI.
1873 *Alpena Weekly Argus* Tuesday, July 22:3, col.1. Alpena, MI.
1877 *Alpena Weekly Argus* Wednesday, November 14:3, col.3-4. Alpena, MI.
1883 *Alpena Weekly Argus* Wednesday, November 28:3, col.6. Alpena, MI.
1885 *Alpena Weekly Argus* Wednesday, September 16:3, col.4-5. Alpena, MI.
1887a *Alpena Weekly Argus* Wednesday, October 5:3, col.5. Alpena, MI.
1887b *Alpena Weekly Argus* Wednesday, November 9:3, col.5. Alpena, MI.
1890a *Alpena Weekly Argus* Wednesday, November 12:3, col.2. Alpena, MI.
1890b *Alpena Weekly Argus* Wednesday, November 19:3, col.3. Alpena, MI.
1892a *Alpena Weekly Argus* Wednesday, November 16:3, col.3. Alpena, MI.
1892b *Alpena Weekly Argus* Wednesday, November 23:3, col.3. Alpena, MI.

Buffalo Commercial Advertiser

1844a *Buffalo Commercial Advertiser* July 1. Buffalo, NY.
1844b *Buffalo Commercial Advertiser* July 16. Buffalo, NY.
1868a *Buffalo Commercial Advertiser* April 15. Buffalo, NY.
1868b *Buffalo Commercial Advertiser* April 18. Buffalo, NY.
1868c *Buffalo Commercial Advertiser* October 31. Buffalo, NY.

Buffalo Daily Courier
1866a *Buffalo Daily Courier* August 17. Buffalo, NY.
1866b *Buffalo Daily Courier* September 21. Buffalo, NY

Buffalo Enquirer
1892a *Buffalo Enquirer* Saturday, November 26. Buffalo, NY.
1892b *Buffalo Enquirer* Saturday, November 30. Buffalo, NY.

Carus, Edward, Captain
1931 100 Year Span of Disasters on Great Lakes Took Heavy Toll. *Manitowac Harold News.* November 19. Manitowac, WI.

Chicago Inter-Ocean
1892 *Chicago Inter-Ocean* July 30. Chicago, IL.

Chicago Times
1861 *Chicago Times* September 5. Chicago, IL.

Chicago Tribune
1868 *Chicago Tribune* November 3. Chicago, IL.
1869a *Chicago Tribune* August 5. Chicago, IL.
1869b *Chicago Tribune* November 3. Chicago, IL.
1869c *Chicago Tribune* December 14. Chicago, IL.

Cleveland Herald
1877a *Cleveland Herald* May 2. Cleveland, OH.
1877b *Cleveland Herald* November 1. Cleveland, OH.
1877c *Cleveland Herald* November 2. Cleveland, OH.
1887d *Cleveland Herald* April 29. Cleveland, OH.

Detroit Advertiser and Tribune
1871 *Detroit Advertiser and Tribune* September 5. Detroit. MI.

Detroit Daily Advertiser
1842 *Detroit Daily Advertiser* November 4. Detroit, MI.

Detroit Free Press
1868 *Detroit Free Press* August 13. Detroit, MI.
1874 *Detroit Free Press* August 23. Detroit, MI.

Detroit Post
1868 *Detroit Post* October 31. Detroit, MI

Detroit Post and Tribune
1878 *Detroit Post and Tribune* Thursday, July 18. Detroit, MI.

Globe
1875 *Globe* Wednesday, July 14. n.p.

Monitor
1892 *Monitor* Friday, August 19. Meaford, MI.

Picton Free Press
1870a *Picton Free Press* June 6. n.p.
1870b *Picton Free Press* June 13. n.p.

Port Huron Daily Times
1876 *Port Huron Daily Times* Monday, April 30. Port Huron, MI.
1892 *Port Huron Daily Times* Tuesday, November 15. Port Huron, MI.

Toledo Blade
1868 *Toledo Blade* November 2. Toledo, OH.
1870a *Toledo Blade* June 7. Toledo, OH.
1870b *Toledo Blade* April 16. Toledo, OH.
1870c *Toledo Blade* June 7. Toledo, OH.
1870d *Toledo Blade* August 13. Toledo, OH.
1872 *Toledo Blade* Wednesday, October 8:3, col.6. Toledo, OH.

Secondary Sources

Andrews, Kenneth P.
1984 *Trade, Plunder and Settlement: Maritime Enterprise and the Genesis of the British Empire, 1480-1630.* Cambridge University Press, England.

Ashworth, William
1986 *The Late, Great Lakes: An Environmental History.* Alfred A. Knopf, New York.

Barry, James P.
1970 *Ships of the Great Lakes*. Howell-North Books, Berkeley, CA.

Coble, Wendy
1997 The S. S. Paraguay*: The Historical Importance of an Early Twentieth Century Freighter.* East Carolina University, Program in Maritime Studies, Greenville, NC.

Collins, Michael B.
1975 The Sources of bias in processual data: an appraisal. In *Sampling in Archaeology*, edited by J.W. Mueller, pp.26-32. University of Arizona Press, Tucson, AZ.

Cooper, David J.
1988 *1986-1987 Archaeological Survey of the Schooner* Fleetwing *Site, 47DR168, Garrett Bay, Wisconsin.* East Carolina Research Report No. 6. East Carolina University, Program in Maritime Studies, Greenville, NC.
1989 *Survey of Submerged Cultural Resources in Northern Door County.* State Historical Society of Wisconsin, Madison.
1996 *By Fire, Storm and Ice: Underwater Archaeological Investigations in the Apostle Islands*. State Historical Society of Wisconsin, Madison.

Cooper, David J. and John O. Jensen
1995 *Davidson's Goliaths*. State Historical Society of Wisconsin, Madison.

Cooper, David J. and Bradley A. Rodgers
1990 *Report on Phase I Marine Magnetometer Survey in Death's Door Passage, Door County Wisconsin, 1989*. State Historical Society of Wisconsin, Madison.

Dappert, Claire P.
2006 *Oaken Whale with a Cast Iron Tail: The Single Decked Wooden Bulk Carrier* Monohansett. East Carolina University, Program in Maritime Studies, Greenville, NC.

Dean, Martin, Ben Ferrari, Ian Oxley, Mark Redknap and Kit Watson (editors)
1991 *Archaeology Underwater: The NAS Guide to Principles and Practice.* Nautical Archaeology Society and Archetype Publications, London, England.

Delagado, James P. (editor)
1997 *Encyclopedia of Underwater and Maritime Archaeology.* British Museum Press, London, England.

Doner, Mary Frances
1958 *The Salvager: The Life of Captain Tom Reid on the Great Lakes.* Ross and Haines, Inc., Minneapolis, MN.

Duncan, Brad
2000 *Signposts in the Sea: An investigation of the shipwreck patterning and maritime cultural landscapes/seascapes of the Gippsland Region, Victoria.* Unpublished Thesis, James Cook University, Townsville, Australia.
2004 Risky Business, the role of risk in shaping the maritime cultural landscape and shipwreck patterning: A Case Study Application in the Gippsland Region, Victoria. *Bulletin of the Australian Institute for Maritime Archaeology*, 28:11-24.

Feltner, Charles E.
1981 Warriors of the Deep, Part II: Peter Falcon the Ship Salvor. *Diving Times* 5 (5): 4-6, 12.

Foster, Leonie
1987 Doing Shipwreck History. *Bulletin Australian Institute for Maritime Archaeology,* 11(2):47-49.

Fuller, George N.
1939 *Historic Michigan: Land of the Great Lakes, Local Histories of Several Michigan Counties, Volume III.* National Historical Association, Chicago, IL.

Gardiner, Robert and Dr. Basil Greenhill (editors)
1993 *The Advent of Steam: The Merchant Steamship before 1900.* Conway Maritime Press Ltd, London.

Gibbs, Martin
2006 Cultural Site Formation Processes in Maritime Archaeology: Disaster Response, Salvage and Muckelroy 30 Years on. *The International Journal of Nautical Archaeology* 35.1:4-19.

Gibbs, Martin and Ewan McPhee
2004 The Raine Island Entrance: Wreck traps and the Search for a Safe Route through the Great Barrier Reef. *The Great Circle: Journal of the Australian Association for Maritime History* 47(4):24-54.

Griffiths, Davis

1997 *Steam at Sea: Two Centuries of Steam Powered Ships.* Conway Maritime Press, London.

Hatcher, Harlan

1944 *The Great Lakes.* Oxford University Press, London, England.

Landon, Fred

1944 *Lake Huron.* The Bobbs-Merrill Company, New York.

Lenihan, Daniel J. and Larry Murphy

1981 Considerations for Research Designs in Shipwreck Archaeology. Reprinted 1998 in *Maritime Archaeology: A Reader of Substantive and Theoretical Contributions*, edited by Lawrence E. Babits and Hans Van Tilberg, pp.233-239. Plenum Press, New York.

Lewis, Kenneth E.

1976 *Camden: A Frontier Town.* Anthropological Studies, No. 2. Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Marx, Robert F.

1967 *They Dared the Deep: A History of Diving.* The World Publishing Company, New York.

Mills, Rodney H.

2002 *Wooden Steamers on the Great Lakes.* Great Lakes Historical Society, Vermilion, OH.

Milwee, William, Jr.

1996 *Modern Marine Salvage.* Cornell Maritime Press, Centreville, MD.

Mokyr, Joel

1990 *The Lever of Riches: Technological Creativity and Economic Progress.* Oxford University Press, New York.

Morrison, John H.

1958 *History of American Steam Navigation.* Stephen Daye Press, New York.

Muckelroy, Keith

1978 *Maritime Archeology.* Cambridge, England.

Murphy, Larry E.
1983 Shipwrecks as database for human behavioral studies. In *Shipwreck Anthropology*, edited by R. Gould, pp.65-90. Albuquerque, NM.
1990 *8SL17: Natural Site Formation Processes of a Multiple Component Site in Florida*. Santa Fe, NM.
1993 *Dry Tortugas National Park: Submerged Cultural resources Assessment.* Santa Fe, NM.
1997 Shiptraps. In *Encyclopedia of Underwater and Maritime Archaeology*, edited by J. Delgado, p.377. London, England.

National Oceanic and Atmospheric Administration
1999 *Thunder Bay National Marine Sanctuary Final Environmental Impact Statement & Management Plan.* U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Coastal Resource Management Department, Washington, DC.

O'Shea, John
2002 The archaeology of scattered wreck-site: formation processes and shallow water archaeology in Lake Huron. *The International Journal of Nautical Archaeology* 31(2), 211-227.

Reid, J. Jefferson
1975 Formation processes for the practical prehistorian. In *Structure and process in southeastern archaeological*, edited by R.S. Dickens, Jr. and H.T. Ward, pp.11-13. University of Alabama Press, Tuscaloosa, AL.

Richards, Nathan
2001 *Deep Structures: An Examination of Deliberate Watercraft Abandonment in Australia.* Unpublished PhD Dissertation, Flinders University, South Australia.

Roark, James, Michael P. Johnson, Patricia Cline Cohen, Sarah Stage, Alan Lawson and Susan M. Hartmann
2005 *The American Promise: A History of the United States.* Bedford/St. Martin's, New York.

Rodgers, Bradley A.
1996 *Guardian of the Great Lakes: The U. S. Paddle Frigate* Michigan. The University of Michigan Press, Ann Arbor, MI.
2003 *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge* City of Glasgow. East Carolina University, Program in Maritime Studies, Greenville, NC.

Rosenberg, Nathan and L. E. Birdzell, Jr.
1927 *How the West Grew Rich: The Economic Transformation of the Industrial World.* Reprinted in 1986. Basic Books, United States.

Schiffer, Michael B.
1978 *Behavioral Archaeology.* Academic Press, New York.
1987 *Formation Processes of the Archaeological Record.* University of Utah Press, Salt Lake City, UT.

Shepard, Birse
1961 *Lore of the Wreckers.* Beacon Press, Boston, MA.

Souza, Donna J.
1988 *The Persistence of Sail in the Age of Steam: Underwater Archaeological Evidence from the Dry Tortugas.* The Plenum Series in Underwater Archaeology. Plenum Press, New York, NY.

Stonehouse, Fredrick
1994 *Wreck Ashore: The United States Life Saving Service on the Great Lakes.* Lake Superior Port Cities Inc. and Association for Great Lakes Maritime History, Duluth, MN.

Stewart, David J.
1998 Formation Processes affecting submerged archaeological sites: An overview. *Geoarchaeology: An International Journal* 14.6, 565-87.

Thompson, Mark L.
1991 *Graveyard of the Lakes.* Wayne State University of Press, Detroit, MI.

Wiswall, F. L., Jr.
1970 *The Development of Admiralty Jurisdiction and Practice Since 1800.* University Press, Cambridge, England.

Ward, I. K, P. Larcome and P. Veth
1999 A New Process-based Model for Wreck Site Formation. *Journal of Archaeological Science* 26:561-570.

Wheeler, A. J.
2002 Environmental Controls on Shipwreck Preservation: The Irish Context. *Journal of Archaeological Science* 29:1149-1159.

Young, Desmond
1962 *The Man in the Helmet.* Cassell & Company, London.

Online Sources

Records for the Bureau of Marine Inspection and Navigation
1852 The Steamboat Act August 30, 1852. Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington, DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1866 Act of July 28, 1866. Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington, DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1870 Headquarter Records of the Bureau of Navigation 1798-1935: History. Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1871 Act of February 28, 1871. Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington, DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1884 Act of July 5, 1884 . Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1932 Act of June 30, 1932. Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington, DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>
1936 Act of May 27, 1936.Records for the Bureau of Marine Inspection and Navigation, Group 41 abstract, 1774-1973. National Archives, Washington, DC. <http://www.archives.gov/research/guide-fed-records/groups/041.html#41.9>

APPENDIX A

EXPANDED CHRONOLOGY OF GREAT LAKES HARBOR IMPROVEMENTS

Table 4. Expanded Chronology of Great Lakes Harbor Improvements

Lake	Port	Improvement Years	Type of Improvement	Commercial Significance	Total Federal Expenditure ($)
Lake Erie	Cleveland	1807-1911	General harbor improvements including, breakwater, beacon and pier construction.	Refuge harbor and leading ore port. Annual receipt was 6,768,424 tons and export was 3,776,829 tons.	**7,224,666**
Lake Erie	Erie	1811-1911	General harbor improvements and beacon construction.	Site of first public landing, annual arrivals/departures total 2,632.	**1,502,882**
Lake Erie	Buffalo	1812-1911	General harbor improvements, Erie Canal, pier, channel and breakwater construction, as well as light house installation.	Leading Great Lakes port by 1850, site of Erie Canal entrance. Averaged 8,000 annual arrivals/ departures and over 12,000,000 commercial tonnage.	**6,000,000**
Lake Erie	Fairport	1825-1905	General harbor improvements and extensive breakwater construction and channel dredging.	Refuge harbor with lighthouse.	**1,056,316**
Lake Erie	Monroe	1825-1911	General harbor improvement.	Fishing port.	**262,015**
Lake Ontario	Sackett's Harbor	1826-1826	Dredging and causeway construction.	Naval depot opened during War of 1812.	**6,000**
Lake Erie	Huron	1826-1906	General harbor improvements.	Ore port.	**561,800**
Lake Erie	Ashtabula	1826-1911	General harbor improvements to include outer breakwaters, inner jetties and pier construction.	The port is a leading ore receiving port, situated just 12 miles west of Conneaut. Private railroad corporations have provided considerable funds to maintain port. Most significant annual receipt was 7,000,000 tons in 1905.	**1,517,826**
Lake Ontario	Oswego	1827-1905	General improvements and breakwater maintenance.	Commercial importance due to location at mouth of Oswego River and Oswego Canal which connects to Erie Canal. Site of first Great Lakes lighthouse.	**2,419,919**
Lake Erie	Dunkirk	1827-1906	General harbor improvements.	Refuge harbor.	**1,000,000**
Lake Ontario	Charlotte (Genesee)	1828-1911	General improvements to port.	Lake outlet to the City of Rochester, New York. Annual business in tonnage 1,650,000.	**833,610**

Lake Erie	Black River (Lorain)	1828-1911	General harbor improvements including breakwater and pier construction.	Refuge harbor and significant ore port. Over 2,000,000 tons received annually.	**1,213,284**
Lake Erie	Conneaut	1829-1907	General harbor improvement and pier construction.	The port is situated 30 miles west of Erie and is a leading coal and ore port in Great Lakes. Annual receipt is over 5,000,000 tons.	**849,458**
Lake Ontario	Great Soda Bay	1829-1911	Breakwater and pier construction.	Coal port.	**577,485**
Lake Erie	Black Rock	1829-1911	General harbor improvements and channel construction.	Port second in importance only to Buffalo- listed as alternative site for Erie Canal.	**4,752,420**
Lake Michigan	Saint Joseph	1832-1911	General harbor improvements including harbor dredging, channel, pier, and canal construction.	General shipping and excursionist retreat in close proximity to Chicago. Was the second port improved on Lake Michigan along with sister city Michigan City.	**905,446**
Lake Michigan	Michigan City	1832-1911	General harbor improvements including extensive outer works with a breakwater pier.	General shipping and excursionist retreat in close proximity to Chicago. Was the second port improved on Lake Michigan along with sister city Saint Joseph. One of the most dangerous navigation points on Lake Michigan known as the "the coast of bones."	**1,750,000**
Lake Michigan	Chicago	1833-1911	General harbor improvements including extensive river mouth dredging, channel and pier construction	Leading Lake Michigan port and first to receive federal improvement subsidies. Significance attributed to its location as the main outlet for goods coming from the Mississippi River as well as the developing rich northern interior.	**2,828,941**
Lake Erie	Cattaraugus Creek	1836-1838	General harbor improvements.	Small harbor- abandoned after two years work.	**57,000**
Lake Erie	Vermilion	1836-1911	General harbor improvements including pier and channel maintenance.	No commercial significance listed.	**166,277**
Lake Ontario	Oak Orchard Creek	1836-1911	General improvements and harbor deepening.	No commercial significance listed.	**207,250**

Lake Erie	Cunnigham Creek	1839-1839	General harbor improvements.	Abandoned in 1839.	**6,420**
Lake Michigan	Kenosha (Southport)	1844-1911	General harbor improvements including dredging and pier and breakwater construction.	No commercial significance listed.	**538,965**
Lake Michigan	Racine	1844-1911	General harbor improvements including dredging and pier and breakwater construction.	Significant manufacturing center.	**660,000**
Lake Erie	Sandusky	1844-1911	General harbor improvements including channel and waterway construction and deepening.	Primarily a coal port.	**1,000,000**
Lake Michigan	Milwaukee	1844-1911	General harbor improvements including light house, pier, breakwater, channel, and refuge harbor construction.	Wisconsin's leading port. The port was almost exclusively developed by private investors until 1866.	**2,375,678**
Lake Erie	Clinton River	1852-1911	Channel dredging.	No commercial significance listed.	**85,564**
Lake Erie	Saint Clair Flats	1852-1911	General harbor improvement including channel, dock and pier construction.	Infrastructure provides safe passage through the Saint Clair Flats.	**185,643**
Lake Ontario	Little Soda Bay	1852-1911	General improvements to port.	Coal port.	**500,462**
Lake Ontario	Ogdensburg	1852-1911	Channel dredging and deepening.	Eastern extremity of Great Lakes commerce, located at mouth of St. Lawrence River.	**517,006**
Lake Michigan	Sheboygan	1852-1911	General harbor improvements including channel dredging and bridge pier and breakwater construction.	One of Wisconsin's leading commercial ports.	**664,319**
Lake Michigan	Waukegan	1852-1911	General harbor improvements including dredging and breakwater construction.	Commercial significance owed to proximity to Chicago.	**675,572**

Lake Michigan	Holland (Black Lake)	1852-1911	General Harbor improvements including basin expansion and pier construction.	No commercial significance listed.	**755,867**
Lake Michigan	Grand Haven	1852-1911	General harbor improvements and maintenance including pier construction and channel dredging.	General shipping and passenger port.	**1,534,943**
Lake Michigan	Algoma	1863-1911	General harbor improvements.	No commercial significance listed.	**349,334**
Lake Superior	Portage Lake Ship Canal	1865-1911	Canal, pier, and breakwater construction and maintenance.	The canal cuts across Keweenaw Peninsula to facilitate mining shipments on Lake Superior. The region was a leading copper district as well as other mining interests. Vessel passages recorded in three month increments routinely exceed 1,000,000 with upwards of 34, 000 passengers annually. In 1905 annual freight tonnage was recorded at 3,413,445.	**1,669,594**
Lake Michigan	Frankfort (Point Aux Becs Scies)	1866-1911	Pier construction and channel dredging.	Car-ferry port.	**498,106**
Lake Michigan	Green Bay	1866-1911	General harbor improvements including channel dredging.	No commercial significance listed.	**570,130**
Lake Michigan	Sturgeon Bay Canal	1866-1911	Canal construction and harbor improvements.	Canal crosses Door County Peninsula bypassing the treacherous navigation corridor known as Death's Door." Vessel passages number in the several thousands annually.	**720,000**
Lake Michigan	Manitowoc	1866-1911	General harbor improvements including channel dredging and bridge pier and breakwater construction.	Site of Lake Michigan's most accessible natural harbor. General commercial shipping and car ferry port.	**946,812**
Lake Huron	Saginaw River	1866-1911	General harbor improvements primarily include channel dredging.	Serves 4 important port cities with principle interest in lumber trade.	**1,018,750**

Lake Erie	Toledo	1866-1911	General harbor improvement, including harbor and channel deepening.	Primarily a coal exporting port with an annual tonnage of 2,200,000.	**2,790,810**
Lake Ontario	Olcott	1867-1902	General improvements to port.	No commercial significance listed.	**178,000**
Lake Michigan	Pentwater	1867-1911	Construction of 2 piers and 16' deep channel.	Agricultural port with fruit and potatoes as main export.	**331,820**
Lake Michigan	White Lake	1867-1911	Channel construction and maintenance.	No commercial significance listed.	**374,701**
Lake Superior	Ontonagon	1867-1911	General harbor improvements including channel and pier construction.	Ore port.	**423,528**
Lake Michigan	South Haven	1867-1911	General harbor improvements.	Fruit shipping port and summer resort.	**459,437**
Lake Michigan	Muskegon	1867-1911	General harbor improvements including channel and pier construction .	Improvements made to cultivate lumber and shingle interests.	**871,623**
Lake Superior	Marquette	1867-1911	General harbor improvements including refuge harbor, pier, and breakwater construction.	One of the leading ore ports on Lake Superior. Annual exports exceed 3,000,000 tons and coal imports are equally significant.	**892,588**
Lake Michigan	Ludington (Pere Marquette)	1867-1911	Breakwater construction and continual pier maintenance due to considerable wave action and shifting sand.	Leading car-ferry port with annual arrival/departure approximately 3,000.	**1,301,435**
Lake Superior	Duluth and Superior Canals	1867-1911	Canal construction and extensive harbor improvements have been undertaken at these locations.	One of the most significant general commercial ports, The 26,000,000 annual commercial tonnage exported includes grain and other agricultural products as well as ore and lumber. Imports are equally significant.	**5,606,524**
Lake Michigan	Saugatuck	1868-1911	General harbor improvements including channel construction.	Leading fruit-shipping points on the east shore of Lake Michigan.	**200,000**

Lake Michigan	Calumet (South Chicago)	1870-1911	General Harbor improvements including parallel pier construction.	Leading iron and corn port, more significant than Chicago as it has the deep water capacity to service the largest vessels.	**1,600,000**
Lake Huron	Cheboygan	1871-1911	Primarily channel dredging.	No specific commercial significance listed.	**198,500**
Lake Michigan	Port Washington	1871-1911	General harbor improvements including channel and pier construction	No commercial significance listed.	**238,968**
Lake Michigan	Two Rivers	1871-1911	General harbor improvements including channel dredging.	No commercial significance listed, known predominantly as a fishing port.	**344,100**
Lake Michigan	Marinette and Menominee	1871-1911	General harbor and river improvements including dredging and pier construction.	Lumber port.	**475,850**
Lake Huron	Harbor Beach (Sand Beach)	1871-1911	Construction of refuge harbor including extensive three part breakwater and pier.	Refuge harbor with strong beacon due to its repute as one of the most dangerous navigation points in Great Lakes. During storms many vessels take refuge, 1905 record totaled 1,099 ships.	**2,026,357**
Lake Erie	Port Clinton	1872-1911	Channel and pier construction.	Primarily a lumber port	**100,000**
Lake Huron	Port Huron and Black River	1872-1911	Improvement of harbor facilities and channel dredging of river mouth	Primarily ships coal, gravel and pulp wood.	**147,500**
Lake Erie	Detroit	1874-1911	General harbor improvement including construction of a 600' wide channel, 21' deep.	Significant commercial port initially focused on shipbuilding due to shallow harbor, but changed with 1874 deepwater channel construction. Record annual arrivals/departures totaled 35,599.	**11,369,500**
Lake Erie	Pine River	1875-1911	General maintenance and improvements.	No commercial significance listed.	**15,560**
Lake Huron	Sebewaing	1875-1911	Channel dredging.	No commercial significance listed.	**59,000**
Lake Huron	Alpena	1876-1911	General harbor improvement	Lumber and other forest products principal trade. Also known as particularly hazardous area to navigate.	**60,000**

Lake Michigan	Charlevoix	1876-1911	Pier construction and channel dredging.	No commercial significance listed.	**225,000**
Lake Superior	Grand Marais	1879-1911	Construction of two breakwater piers.	Lumber port.	**174,350**
Lake Michigan	Manistee	1879-1911	Pier maintenance and channel construction.	Refuge harbor for Portage Lake and leading lumber port.	**505,024**
Lake Michigan	Manistique	1880-1910	General harbor improvements.	General commercial port comprised entirely of Railroad company land grants.	**206,000**
Lake Superior	Grand Marais	1880-1911	General harbor improvements including pier, pile dike, and channel construction.	Lumber and fishing port.	**525,723**
Lake Michigan	Kewaunee	1881-1910	General harbor improvements including pier construction.	Car ferry port.	**243,291**
Lake Erie	Belle River	1881-1911	Refuge harbor construction.	Refuge harbor and lumber port.	**29,000**
Lake Michigan	Oconto	1881-1911	Channel and pier maintenance.	No commercial significance listed.	**167,130**
Lake Michigan	Pensaukee	1882-1896	Pier maintenance.	Lumber port.	**16,000**
Lake Superior	Agate Bay (Two Harbors)	1886-1911	Breakwater construction.	Ore port with an annual export of 8,000,000 in 1905.	**258,786**
Lake Superior	Ashland	1886-1911	General harbor improvements including breakwater and channel construction, as well as maintenance of existing dock works.	Ore port extensively developed by private railroad and mining interests from 1855.	**519,500**
Lake Erie	Rouge River	1888-1911	Channel dredging.	No commercial significance listed.	**96,690**
Lake Erie	Tonawanda	1888-1911	Widen and deepen channel.	Part of Niagara River commerce. Annual business in tonnage 1,153,336.	**692,531**
Lake Michigan	Petoskey	1890-1911	General harbor improvement including breakwater construction.	Passenger port of call.	**145,500**
Lake Michigan	South Milwaukee	1896-1896	General harbor improvement.	Government deemed unworthy of any additional subsidy.	**5,000**

Lake Ontario	Cape Vincent	1896-1907	Breakwater and pier construction.	Protect shipping.	**128,000**
Lake Superior	Port Wing	1902-1911	Pier and channel construction.	Lumber port.	**50,000**
Lake Michigan	Escana Bay	1905-1905	Dredging.	Escana Bay had a natural harbor where it was not necessary to construct piers and all improvements were generally from private interests.	**14,000**
Lake Michigan	Arcadia	1905-1911	Channel dredging.	No specific commercial significance listed.	**15,000**
Lake Ontario	Port Ontario		None.	No commercial importance.	**0**
Total Expenditure					**85,048,086**

APPENDIX B

LIST OF GREAT LAKES VESSELS WITH SECOND HAND ENGINES

Great Lakes Vessels with Second Hand Engines

The following list of Great Lakes vessels with second hand engines was given to the author by C. Patrick Labadie, the historian for Thunder Bay National Marine Sanctuary and Underwater Preserve and donator of the C. Patrick Labadie Collection archived at the Thunder Bay National Marine Sanctuary Research Center. Labadie acquired the list while working at the Dossin Museum in Detroit. The original author of the list was never confirmed, however, Labadie cites two potential candidates as John Poole of Detroit or Herman Runge of Milwaukee. The presentation of this list is intended to illustrate the common historic practice of commercial recycling of vessel components.

When transcribing the list, it has been assumed that the recipient vessel's construction date provides a date for the engine's recycling and that the donor vessel's construction date provides a relative date for deriving the engine's age. The current table also delineated the installation of 2nd engines as rebuilds, as well as cross referenced multiple recycling events. Vessel types were only designated to vessels as indicated by the original list. Any additional information regarding the recycling event was listed in the notes section.

Recipient Vessel (RV)	Enrollment No.	RV Const. Date	Donor Vessel (DV)	Enrollment No.	DV Const. Date	Vessel Types	Notes
Charles Townsend	not listed	1835	*Superior*	not listed	1855	No vessel type listed	Engine recycled 2ce, see *Waterloo*
Waterloo	not listed	1840	*Charles Townsend*	not listed	1835	No vessel type listed	Engine recycled 2ce: from *Superior* to *Charles Townsend* to *Waterloo*
Waterloo	not listed	1840	*Walk on the Water*	not listed	1818	No vessel type listed	Only engine parts were used from the *Walk on the Water*
John Owen	not listed	1842	*Little Erie*	not listed	1836	No vessel type listed	Engine recycled 2ce, see *Phil Parsons*
Anthony Wayne, rebuilt 1849	not listed	1842	*Columbus*	not listed	1835	No vessel type listed	*Anthony Wayne* wrecked in 1847
St. Louis	not listed	1844	*Sandusky*	not listed	1834	No vessel type listed	
A.D. Patchin	not listed	1846	*Missouri*	not listed	1840	No vessel type listed	
Louisiana	not listed	1846	*Thomas Jefferson*	not listed	1834	No vessel type listed	

Southerner	not listed	1847	*Anthony Wayne*	not listed	1842	No vessel type listed	*Anthony Wayne* wrecked in 1847
Ploughboy	not listed	1851	*Transit*, formerly *Constitution*	not listed	1832	No vessel type listed	
Kaloolah	not listed	1852	*Lexington*	not listed	1838	No vessel type listed	
Forester	not listed	1853	*London*	not listed	1845	No vessel type listed	Engine recycled 2ce, see *Alpena*
City of Toronto (2nd)	not listed	1854	*Zimmerman*	not listed	1840	No vessel type listed	
R.R. Elliott	not listed	1854	*Michigan* (2 of 2 engines)	not listed	1833	No vessel type listed	Engine recycled 2 times, see *City of Sandusky*
Forest Queen		1855	*Pacific*		1848	No vessel type listed	Engine recycled 2 times, see *Saginaw*
Western Metropolis	not listed	1856	*Empire State*	not listed	1848	No vessel type listed	
Ark	not listed	1857	*E.K. Collins*	not listed	no date	No vessel type listed	Engine recycled 4 times, see *Marine City*
Nile	not listed	1859	*Milwaukee*	not listed	1837	No vessel type listed	
Detriot, later *Congress*	4392	1861	*M.B. Spaulding*	not listed	no date	Steam propeller	Engine recycled in 1860 after *Spaulding* wrecked
Philo Parsons	19678	1861	*John Owen*	not listed	1842	No vessel type listed	Engine recycled 2ce: from *Little Erie* to *John Owen* to *Philo Parsons*
Union	25048	1861	*Ogontz*	not listed	1848	Steamer	
Morning Star	16463	1862	*Ocean*	not listed	1850	No vessel type listed	
Fire Queen	not listed	1862	*Western World*	not listed	no date	No vessel type listed	Dismantled in 1857 panic
Plymouth Rock (2nd)	not listed	1862	*Plymouth Rock* (1st)	not listed	no date	No vessel type listed	Dismantled in 1857 panic

Guiding Star	not listed	1862	*Mississippi*	not listed	no date	No vessel type listed	Dismantled in 1857 panic
Morro Castle	not listed	1862	*City of Buffalo*	not listed	no date	No vessel type listed	Dismantled in 1857 panic
Evening Star	not listed	1862	*Queen of the West*	not listed	no date	No vessel type listed	Dismantled in 1857 panic
Foh-Kien	not listed	1862	*St. Lawrence*	not listed	no date	No vessel type listed	Dismantled in 1857 panic
Morning Star	not listed	1862	*Crescent City*	not listed	no date	Steam propeller	Dismantled in 1857 panic
Thomas Cornell	not listed	1862	*Southern Michigan*	not listed	no date	Steam propeller	Dismantled in 1857 panic
Osprey	not listed	1863	*Jenny Lind*	not listed	1858	No vessel type listed	
Alpena	not listed	1866	*Forester*	not listed	1853	No vessel type listed	Engine recycled 2ce: from *London* to *Forester* to *Alpena*
Marine City	16447	1866	*Ark*	not listed	1857	No vessel type listed	Engine recycled 4 times: from *Chief Justice Robinson* to *E.K. Collins* to *Ark* to *Marine City*
Keweenaw	14043	1866	*North Star*	not listed	1854	No vessel type listed	
City of Sandusky	6062	1866	*R.R. Elliott* (1 of 2 engines)	not listed	1854	No vessel type listed	Engine recycled 2 times: from *Michigan* to *R.R. Elliott* to *City of Sandusky*
Northwest	18107	1867	*Canada*	not listed	1846	Steam propeller	
Northwest	18107	1867	*Caspian*	not listed	1851	Steam propeller	
Northwest	18107	1867	*E.K. Collins*	not listed	1853	Steam propeller	
Northwest	18107	1867	*Planet*	not listed	1855	Steam propeller	
Northwest, rebuild 1876	18107	1867	*Detroit*	6198	1859	Steam propeller	

Northwest, rebuild 1876	18107	1867	*Detroit*	6150	no date	No vessel type listed	
Francis Smith	not listed	1867	*Clifton*	not listed	1854	No vessel type listed	from burned vessel
Dove	6512	1867	*Susan Ward*	22402	1862	No vessel type listed	
New Era, rebuild	18467	1867	*Trader*	24158	1865	Steamer; Tug	
Metropolis	17608	1868	*Pearl*	19685	1851	No vessel type listed	
Sheboygan	115119	1869	*Garden City*	not listed	1853	Steam propeller	
Sheboygan	115119	1869	*City of Cleveland*	not listed	1857	Steam propeller	
Muskegon	90466	1871	*Orion*	18917	1866	Steam propeller	
Cumberland	not listed	1871	*Cataract*	not listed	1846	No vessel type listed	
Menominee	90720	1872	*Navorino*	18703	1900	Steamer	
Chieftain	not listed	1873	*Gildersleeve*	not listed	1839	No vessel type listed	
Susan Peck	116110	1873	*Amazon* (1 of 2 engines)	105252	1873	Steamer	
Argonaut	29755	1873	*Inter-Ocean* (1 of 2 engines)	100046	1872	Steamer;Twin Screw	
State of Michigan	6849	1873	*William A. Moore*	26244	1865	Steamer; Tug	
Chicago	125338	1874	*May Queen*	not listed	1853	Steam propeller	
Chicago	125338	1874	*Manitowac*	not listed	1868	Steam propeller	
Chief Justice Waite	125281	1874	*Reindeer*	21199	1863	No vessel type listed	
Sparta	95278	1874	*Havana*	115242	1907	Steamer	

Flora	120210	1875	*Dart*	not listed	1853	Steam propeller	
Flora	120210	1875	*City of Toledo*	4548	1865	Steam propeller	
Urania, formerly *Flora*, rebuild 1899	10030	1875	*Andrew Johnson*	538	1865	Steam propeller; Revenue Cutter	
Saginaw	115118	1877	*Forest Queen*		1855	No vessel type listed	Engine recycled 2 times: from *Pacific* to *Forest Queen* to *Saginaw*
Ruby	110236	1877	*Island Queen*	12097	no date	No vessel type listed	
Grace McMillan	85595	1879	*Magnet*	16318	1856	No vessel type listed	
City of Cleveland	125818	1880	*United States*	25125	no date	No vessel type listed	
A.L. Hopkins	105937	1880	*Merchant*	16332	1862	Steamer	
S.M. Stephenson	115722	1880	*Cleveland*	4376	1860	Steamer	
M.M. Drake	91485	1882	*Amazon* (1 of 2 engines)	105252	1873	Steamer	
Nevada	130218	1882	*Cuyhoga*	4264	1856	Steamer	
Oregon	155065	1882	*Plymouth*	19621	1854	Steamer	
City of Detroit	125662	1883	*R.N. Rice*	21191	1866	No vessel type listed	
Pacific	not listed	1883	*Emerald*	not listed	no date	No vessel type listed	Engine recycled 2ce: from *Germanic* to *Emerald* to *Pacific*
Lansdowne	88629	1884	*Great Western*	not listed	1866	Steam propeller	from burned vessel
H.S. Pickands	95836	1884	*New Era*	18467	1867	Steamer	
Darius Cole	157173	1885	*George L. Dunlap*	10347	1864	Steam propeller	
George E. Dyer	86016	1886	*William T. Graves*	36172	1867	Steamer	

Roumania	110733	1887	*Portage*	150042	1875	Steamer	Engine Recycled 2ce, see *Sturgeon Bay*
Alice Gill, rebuild	106499	1887	*Norma*	13097	1882	Steamer	
Charles McVea	126517	1888	*Joseph L. Hurd*	75154	1869	Steamer	
Caledonia, rebuild 1907-08	81191	1888	*Kittie M. Forbes*	14413	1883	Steamer	
Heneping	86016	1888	*William T. Graves*	26172	1867	No vessel type listed	
Manitoba	94879	1889	*Algoma*	not listed	1882	No vessel type listed	from wrecked vessel
A. Wehrle, Jr.	106652	1889	Reportedly came from a Baltimore Blockade Runner or New York Ferry Boat	not listed	no date	No vessel type listed	
Frank E. Kirby	120796	1890	*John Sherman*	75408	1865	Steam propeller; Revenue Cutter	
Frank E. Kirby	120796	1890	*Alaska*	105798	1878	Steam propeller	
City of Marquette	126614	1890	*St. Maries*	155473	1875	Steamer	
Duchess of York	103342	1895	*Prince of Wales*	not listed	1860	No vessel type listed	
Arrow	107155	1895	*Jay Cooke*	13780	1869	No vessel type listed	
Thunder Bay	131060	1895	*Nicaragua*	130669	1894	Steamer	
Malta	2237	1895	*Nicaragua*	140936	1894	Barge; Steamer	
George Farwell	10505	1895	*George L. Cowel*	85629	1880	No vessel type listed	
City of Toronto	94769	1896	*Manitou*	not listed	1877	No vessel type listed	

Corona	10367	1896	*Cibola*	92732	1877	No vessel type listed	
Polyensia	54525	1897	*Caledonia*	81191	1888	Steamer	
Amazon	30089	1897	*Italia*	100450	1889	Steamer, former barge	
Australia	30094	1897	*Aurora*	106493	1887	Steamer, former barge	
Germanic	not listed	1898	*Pacific*		1898	No vessel type listed	Engine recycled 2ce, see *Pacific*
Pennsylvania	150813	1899	*John A. Dix*	75440	1865	Steam propeller	
Francis L. Robbins	201802	1905	*Geroge W. Roby*	86031	1889	Steamer	
G.A. Boeckling	206423	1909	*Shrewsbury*, later *New York*	116152	1887	Steam propeller	
J.S. Ashley	206695	1909	*Lafayette*	141657	1900	Steamer	
Tourist	206052	1909	*Wayward*	80911	1882	Steamer	
Sturgeon Bay	216276	1918	*Roumania*	110733	1887	Steamer	Engine recycled 2ce: from *Portage* to *Roumania* to *Sturgeon Bay*
City of Toronto (3rd)	not listed	no date	*City of Toronto* (2nd)	not listed	1854	No vessel type listed	
New England	not listed	no date	*Henry Clay*	not listed	no date	No vessel type listed	
E.K. Collins	not listed	no date	*Chief Justice Robinson*	not listed	1842	No vessel type listed	Engine recyled 4 times, see *Marine City*
Evening Star	7936	no date	*Ruby*	not listed	1851	No vessel type listed	
J.D. Morton	not listed	no date	*Constitution*	not listed	1847	No vessel type listed	
A.D. Patchin	not listed	no date	*Missouri*	not listed	no date	No vessel type listed	Wrecked 1843
Water Witch	not listed	no date	*Fashion*	not listed	no date	No vessel type listed	

Prince of Wales	not listed	no date	*Sir James Kempt*	not listed	no date	No vessel type listed	
T. Whitney	not listed	no date	*Buena Vista*	not listed	no date	No vessel type listed	
Lady Elgin	not listed	no date	*Cleopatra*	not listed	no date	No vessel type listed	
S. Clement	not listed	no date	*John Owen*	not listed	no date	No vessel type listed	Engine recycled 4 times: from Constitution to *Julius D. Morton* to *John Owen* to *S. Clement*
John Owen	not listed	no date	*Julius D. Morton*	not listed	no date	No vessel type listed	Engine recycled 4 times, see *S. Clement*
Julius D. Morton	not listed	no date	*Constitution*	not listed	no date	No vessel type listed	Engine recycled 4 times, see *S. Clement*
Landsdown	88629	no date	*Great Western*	not listed	no date	No vessel type listed	
Franklin Moore	not listed	no date	*Huron* (1st)	not listed	no date	No vessel type listed	Engine Recycled 2ce, see *Wave*
Wave	not listed	no date	*Franklin Moore*	not listed	no date	No vessel type listed	Engine recycled 2ce: from *Huron* to *Franklin Moore* to *Wave*
Water Witch	not listed	no date	*Fashion*	not listed	no date	No vessel type listed	
British Queen	not listed	no date	*Oneida*	not listed	no date	No vessel type listed	
Mississippi	not listed	no date	*J.T. Morris, N.Y.*	not listed	no date	No vessel type listed	
Active	not listed	no date	*Witby*	not listed	no date	Steamer	
W.B. Hall	90694	no date	*W.T. Robb*	not listed	no date	Steamer; Tug	
Avon	105733	no date	*Dick Tinto*	not listed	no date	Steamer	
City of Boston	4325	no date	*City of Superior* (1 of 2 engines)	not listed	no date	Steamer	
Empire	7325	no date	*City of Superior* (1 of 2 engines)	not listed	no date	Steamer	

Union	25048	no date	*Ogontz*	not listed	no date	Steamer	
Fleetwood, rebuild	81145	no date	*Van Vleck*	not listed	no date	Steamer	
H.C. Scrmoor	95886	no date	*Ella Burrows*	not listed	no date	Steamer	
Lowell	14655	no date	*Ontario*	not listed	no date	Steamer	
J.C. Clark	not listed	no date	*Gore*	not listed	no date	No vessel type listed	
Mapleheath, rebuild	129767	no date	*Simla*	not listed	no date	Steamer	
F.R. Buell, rebuild	120720	no date	*William Goodrow*	not listed	no date	Steamer; Tug	Engine recycled 3 times: from 1st *Alleghany* to 2nd *Alleghany* to *William Goodrow* to *F.R. Buell*
William Goodrow	not listed	no date	*Alleghany* (2nd)	379	no date	Tug; Steamer	Engine recycled 3 times, see *F.R. Buell*
Italia, rebuild	100450	no date	*Yackima*	not listed	no date	Steamer	
Lake Inaha, rebuild	217971	no date	*Missouri*	not listed	no date	Barge; Steamer	
Lake Pleasant, rebuild	216738	no date	*Maitland No. 1* (1 of 2 engines)	not listed	no date	Steamer	
Lake Freeland, rebuild	217764	no date	*Maitland No. 1* (1 of 2 engines)	not listed	no date	Steamer	
Alva S. Chisholm, rebuild	107557	no date	*Ohio*	not listed	no date	Steamer	
Louis Philipe, rebuild	134491	no date	*P.M. No. 2*	112207	no date	Steamer	
Lulu, rebuild	not listed	no date	*Tempest*	74940	no date	Steamer	
Belle P. Cross, rebuild	2719	no date	*J. Emery Owen*	76731	no date	Steamer	
Belle P. Cross, 2nd rebuild	2919	no date	*Bon Voyage*	3497	no date	Steamer	
Grays Reef Light Vessel	not listed	no date	*D.F. Rose*	35149	1868	No vessel type listed	
William G. Perry	63046	no date	*John Gordon*	76499	no date	Lighter; Tug	
Petrel	96917	no date	*McArthur*	not listed	no date	Tugs	
Laura Grace	107171	no date	*Mary Ann*	not listed	no date	Tugs	

Stoig, rebuild	138145	no date	*Arvidale*	not listed	no date	Tug; Steamer	
Protector	not listed	no date	*Fire Queen*	not listed	no date	Tugs	
Beaver	83157	no date	*Boner*	not listed	no date	Tugs	
Reliance	97115	no date	*Resolute*	not listed	no date	Tugs	
Ashtabula	212966	no date	*Chris Grover*	not listed	no date	Tugs	
Lorain	212968	no date	*H.B. Abbott*	not listed	no date	Tugs	
Columbia, rebuild	not listed	no date	*Waldo A. Avery*	not listed	no date	Tugs	
Alpena	216022	no date	*Townsend Davis*	not listed	no date	Tugs	
Buffalo	210571	no date	*Robert N. Hebard*	not listed	no date	Tugs	
Liberty, rebuild	not listed	no date	*Ufasco*	not listed	no date	Tugs	
Ben Campbell, rebuild	3620	no date	*S.S. Stone*	not listed	no date	Tugs	
Texas	214624	no date	*Cascade*	not listed	no date	Tugs	
Illinois	121542	no date	*E.G. Crosby*	not listed	no date	Tugs	
Dunkrik	207694	no date	*H.L. Chamberlain*	not listed	no date	Tugs	
Detriot	215738	no date	*Sunol*	not listed	no date	Tugs	
Missouria	213598	no date	*Excelsior*	not listed	no date	Tugs	
Vermont	212455	no date	*Fabin*	not listed	no date	Tugs	
Fairport	212730	no date	*Oscar C. Stedman*	not listed	no date	Tugs	
Gary	210878	no date	*Peerless*	not listed	no date	Tugs	
Indiana	208915	no date	*O.B. Green* (2nd)	not listed	no date	Tugs	
Yale (2nd)	not listed	no date	*Yale* (1st)	not listed	no date	Tugs	
Q.A. Gilmore	211152	no date	*Monarch*	not listed	no date	Tugs	
Abner G. Harding	204588	no date	*Chauncey A. Morgan*	not listed	no date	Tugs	
Huron	213668	no date	*Kunkle Brothers*	not listed	no date	Tugs	
Ecorse	not listed	no date	*George A. Rand*	not listed	no date	Tugs	
Harvard	204745	no date	*E.G. Haytham*	not listed	no date	Tugs	
D.T. Helm	157378	no date	*Red Cloud*	not listed	no date	Tugs	
W. Batcheller	not listed	no date	*H.Warner*	not listed	no date	Tugs	

Eliza Bonner	not listed	no date	*Ellen Jeffers*	not listed	no date	Tugs	
Allan Gilmore	not listed	no date	*Francis*	not listed	no date	Tugs	
Minnesota	208339	no date	*G.A. Tomlinson*	not listed	no date	Tugs	
G.A. Tomlinson	not listed	no date	*Belle Cross*	not listed	no date	Tug; Steamer	
Iowa	213566	no date	*T.T. Morfund*	not listed	no date	Tugs	
Louisiana	214846	no date	*B.B. Inman*	not listed	no date	Tugs	
E.M. Pierce	206840	no date	*Industry*	not listed	no date	Tugs	
Kenosha	210162	no date	*Wisconsin* (1st)	not listed	no date	Tugs	
New York	211165	no date	*W.M. Kennedy*	not listed	no date	Tugs	
T.C. Lutz (2nd)	211746	no date	*T.C. Lutz* (1st)	not listed	no date	Tugs	
Virginia	212640	no date	*James McGordon*	not listed	no date	Tugs	
Mississippi	214556	no date	*Zenith*	not listed	no date	Tugs	
L.C. Sabin	205129	no date	*M.F Merick*	not listed	no date	Tugs	
W.L. Mercerean	208117	no date	*George D. Mau*	not listed	no date	Tugs	
North Harbor	210681	no date	*Perfection*	not listed	no date	Tugs	
George D. Nan	56254	no date	*O.B. Green* (1st)	not listed	no date	Tugs	
Ohio	208153	no date	*Favorite* (1st)	not listed	no date	Tugs	
John M. Truby	207930	no date	*Prodigy*	not listed	no date	Tugs	
R.P. Reidenbach	207693	no date	*William D.*	not listed	no date	Tugs	
James R. Sinclair	203853	no date	*G.A. VanSchaick*	not listed	no date	Tugs	
J.R. Sprankle, rebuild	77138	no date	*Robert Tarrant*	not listed	no date	Tugs	
Waukegon	210369	no date	*Leathem D. Smith*	not listed	no date	Tugs	
Sandusky	210472	no date	*Mollie Spencer*	not listed	no date	Tugs	
Toledo	213726	no date	*Thomas Wilson*	not listed	no date	Tugs	
Vigilant	161767	no date	*Alanson Summer*	not listed	no date	Tugs	
Wisconsin (2nd)	212367	no date	*Wisconsin* (1st)	not listed	no date	Tugs	
Antelope	92398	no date	*Canada*	not listed	no date	Tugs	
M.E. Hacket	103137	no date	*Flora*	not listed	no date	Tugs	
Thomas Osborne	not listed	no date	*J. Henry*	not listed	no date	Tugs	

George A. Wallace, rebuild	not listed	no date	*Clevelander*	not listed	no date	Tugs	
Bismark	2767	no date	*Equator*	7233	no date	Tug; Steamer	
Ocean	not listed	no date	*Mayflower*	not listed	no date	No vessel type listed	
Alexandria	not listed	no date	*Phoenix*	not listed	no date	No vessel type listed	
Orion	not listed	no date	*R.R. Elliott* (1 of 2 engines)	not listed	no date	No vessel type listed	Engine Recycled 2ce: from *Michigan* to *R.R. Elliott* to *Orion*
Penobscot	not listed	no date	*Labelle*	not listed	no date	Steamer; Yatch	
Allegheney (2nd)	379	no date	*Alleghany* (1st)	not listed	no date	Steamer	Engine recycled 3 times, see *F.R. Buell*
Emile	9690	no date	*Island Rambler*	not listed	no date	Steamer	
J.W. Brooks, later *William*	not listed	no date for rebuild	*William IV*	not listed	no date	No vessel type listed	

APPENDIX C

NORTH POINT REEF SHIP TRAP
TABLE OF SITES AND SITE RECORDS

Table of Wrecks

Site	Vessel Name	Resource Type	Vessel Type	Description	Latitude	Longitude	Depth
NP0001	*John T. Johnson*	Shipwreck Site	schooner	46' keelson assemblage with centerboard trunk and 26 articulted double and triple frame sets	N45 01.303'	W83 15.723'	7
NP0002	*B.W. Blanchard*	Shipwreck Site	schooner	52' hull side section with articulated planking and 28 frame sets	N45 01.271'	W83 15.763'	3
NP0003	*B.W. Blanchard*	Shipwreck Site	schoonerg	60' hull section with large steel arch and double frames	N45 01.228'	W83 15.705'	9
NP0004	Unknown	Shipwreck Site	schooner	16' hull bottom section with keelson and 6 articulated double frame sets	N45 01.070'	W83 15.840'	12
NP0005	Unknown	Isolated Artifact	unknown	13' iron davit with welded hook	N45 01.022'	W83 15.719'	12
NP0006	Unknown	Shipwreck Site	schooner	16.6' hull section with 6 articulated single and 1 double frame set	N45 01.080'	W83 15.640'	16
NP0007	Unknown	Shipwreck Site	schooner	35.6' keelson assemblage with 14' centerboard trunk	N45 01.026'	W83 15.484'	13
NP0008	Unknown	Shipwreck Site	schooner	16' keelson with 3 articulated triple frame sets and 1 double frame	N45 01.044'	W83 15.469'	15
NP0009	Unknown	Shipwreck Site	schooner	31.6' notched keelson with adjacent 24.9' timber	N45 01.049'	W83 15.438'	14
NP0010a	Unknown	Shipwreck Site	schooner	Intact forefoot and stempost assemblage with adjacent articulated keelson and sister keelson	N45 01.041'	W83 15.409'	14
NP0010 b	Unknown	Isolated Artifact	unknown	Ship's anchor	N45 01.030'	W83 15.431'	12
NP0011	Unknown	Shipwreck Site	schooner	84.4' hull section at turn of the bilge with 34 articulated double frame sets	N45 01.030'	W83 15.425'	15
NP0012	Unknown	Shipwreck Site	schooner	95' hull section with 28 articulated double and 3 single frame sets	N45 00.928'	W83 15.293'	13
NP0013	Unknown	Shipwreck Site	schooner	34.9' hull bottom section laying keel up with 9 articulated double frames and 5 hull strakes	N45 00.873'	W83 15.378'	13
NP0014	Unknown	Shipwreck Site	schooner	40' section of hull bottom with articulated keelson assemblage and 5 double frame sets	N45 00.857'	W83 15.401'	9

NP0015	*Empire State*	Shipwreck Site	schooner	48.6' lower bildge section of hull with articulated frames and remains of iron ore cargo	N45 00.853'	W83 15.377'	12
NP0016 a	Unknown	Shipwreck Site	unknown	18.5' rudder with articulated rudder post	N45 00.692'	W83 15.244'	18
NP0016 b	Unknown	Shipwreck Site	unknown	17.6' sternpost with associated scantling	N45 00.693'	W83 15.249'	14
NP0017	Unknown	Shipwreck Site	unknown	Debris scatter of iron straps, fastners, and plating	N45 00.697'	W83 15.257'	14
NP0018	Unknown	Shipwreck Site	unknown	Debris scatter consisting of 4 iron plate fragments	N45 00.647'	W83 15.260'	12
NP0019a	*E.B. Palmer*	Shipwreck Site	schooner	1 of 3 associate articulated hull sections with intact planking and frames with adjacent cut stone	N45 00.671'	W83 15.206'	14
NP0019 b	*E.B. Palmer*	Shipwreck Site	schooner	2 of 3 associate articulated hull sections with intact planking and frames with adjacent cut stone	N45 00.678'	W83 15.214'	15
NP0019 c	*E.B. Palmer*	Shipwreck Site	schooner	3 of 3 associate articulated hull sections with intact planking and frames with adjacent cut stone	N45 00.681'	W83 15.194'	15
NP0019 d	*E.B. Palmer*	Shipwreck Site	schooner	Cut stone cargo adjacent to 3 associated articulated hull sections	N45 00.666'	W83 15.183'	16
NP0020	unknown	Shipwreck Site	unknown	Keel with 7 sets close double frames and iron plating	N45 00.656'	W83 15.181'	13
NP0021	unknown	Shipwreck Site	steamer	105' hull section with iron cross bracing	N45 00.649'	W83 15.191'	10
NP0022	unknown	Shipwreck Site	unknown	Hull section with 4 double frames sets, 17 hull strakes, iron plating and possible burning	N45 00.625'	W83 15.208'	unknown
NP0023	unknown	Isolated Artifact	unknown	10' circular iron bar with knuckle and 6' iron strap	N45 00.813'	W83 15.331'	unknown
NP0024	unknown	Shipwreck Site	schooner	48' hull section, exterior up, with 28 double frame sets, 17 hull strakes and copper scupper liner	N45 00.754'	W83 15.208'	16
NP0025	unknown	Isolated Artifact	unknown	16' long iron bar 2.5" in diameter with bent end	N45 00.735'	W83 15.154'	unknown

NP0026	unknown	Shipwreck Site	unknown	Undetermined wreckage not recorded	N45 00.698'	W83 15.352'	unknown
NP0027	unknown	Shipwreck Site	unknown	Articulated deadwood with notching for 3 cant frames	N45 00.737'	W83 15.318'	unknown
NP0028	*Congress*	Isolated Artifact	unknown	1 of 2 pieces of 27.2' rail iron possibly associated with the wrecking of *Congress*	N45 00.703'	W83 15.391'	15
NP0029	unknown	Shipwreck Site	unknown	Potential segment of internal hogging arch	N45 00.742'	W83 15.405'	15
NP0030	unknown	Isolated Artifact	unknown	Possible donkey boiler buried under lake floor	N45 00.689'	W83 15.324'	14
NP0031	unknown	Shipwreck Site	schooner	22.75' hull section with 4 triple frame sets, keel, keelson, and outer planking	unknown	unknown	15
NP0032a	*Galena*	Shipwreck Site	steamer	30' x 20' articulated engine bed with associated debris	N45 00.602'	W83 15.134'	12
NP0032b	*Galena*	Shipwreck Site	steamer	42.2' section of articulated iron beams with associated debris	N45 00.602'	W83 15.324'	12
NP0032c	*Galena*	Shipwreck Site	steamer	23.5' hull section with articulated ceiling and outer hull planking, 3 double frame sets and iron bracing.	N45 00.591'	W83 15.169'	11
NP0032d	*Galena*	Shipwreck Site	steamer	12' section of articulated deck planking	N45 00.591'	W83 15.169'	11
NP0032e	*Galena*	Shipwreck Site	steamer	33' hull section with articulated ceiling planking with 1 double frame set	N45 00.591'	W83 15.169'	11
NP0032f	*Galena*	Shipwreck Site	steamer	29' hull section with articulated ceiling planking with double frame sets, iron bracing and plates	N45 00.591'	W83 15.169'	11
NP0032g	*Galena*	Shipwreck Site	steamer	Complex feature containing anchor, anchor chain, windlass and capstan remains and other associated debris	N45 00.591'	W83 15.169'	11
NP0033	unknown	Isolated Artifact	unknown	Iron cone not recorded in detail	N45 00.233'	W83 15.003'	17
NP0034	unknown	Shipwreck Site	unknown	Stone cargo remnants not recorded in detail	N45 00.189'	W83 14.970'	23
NP0035	unknown	Isolated Artifact	unknown	Metal strap fragment not recorded in	N45 00.553'	W83 15.145'	9

				detail			
NP0036	unknown	Isolated Artifact	unknown	Undetermined piece of iron not recorded in detail	N45 00.522'	W83 15.083'	8
NP0037	unknown	Shipwreck Site	unknown	No recorded site description	N45 00.291'	W83 14.911'	unknown
NP0038	unknown	Shipwreck Site	unknown	No recorded site description	N45 00.712'	W83 15.273'	unknown
NP0039	unknown	Shipwreck Site	unknown	No recorded site description	N45 00.700'	W83 15.364'	unknown
NP0040	*Congress*	Isolated Artifact	unknown	2 of 2 pieces of 27.2' rail iron possibly associated with the wrecking of *Congress*	N45 00.710'	W83 15.409'	unknown
NP0041	unknown	Isolated Artifact	unknown	16' timber not recorded in detail	N45 00.665'	W83 15.327'	17
NP0042	unknown	Isolated Artifact	unknown	Metal eye not recorded in detail	N45 00.689'	W83 15.324'	14
NP0043	unknown	Isolated Artifact	unknown	Piece of timber not recorded in detail	N45 00.766'	W83 15.444'	17
NP0044	unknown	Isolated Artifact	unknown	Duplicate recording of buried donkey boiler	N45 00.748'	W83 15.363'	12
NP0045	unknown	Shipwreck Site	unknown	18' hull frag with 5 hull strakes, 14 ceiling planks, 1 double frame set	unknown	unknown	12

SITE # NP0001			RECORDER:	Stephanie Allen
			Photographer:	Wayne Lusardi
MAX L:		46'	MAX BR.	6'
ORIENTATION:		270°	WATER D.:	7'
Latitude/Longitude	N 45 01.303' W 83 15.723'			
BOTTOM TYPE:	Cobbles			

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	14'		14'
SISTER KEELSON	1'		1'
RIDER KEELSON	N/A		N/A
FRAMES	0.3'		0.3'
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

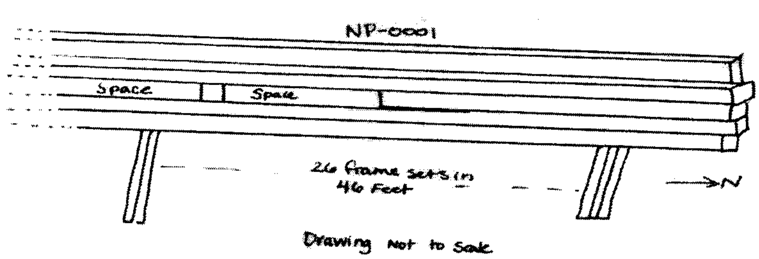
Centerboard trunk runs from 49' to end. There were 26 frame sets, some doubled and some tripled.

FRAME SPACING	1.5'			
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)

SITE DESCRIPTION:

This site consists of a keelson with two sister keelsons, a rider keelson with two sister riders and a centerboard trunk, which runs for 35 feet to its terminus. The frames are spaced 1.5 feet apart, with sided and molded dimensions of 0.3 feet. The keelson is 1.15 feet sided by 1.15 feet molded. The sister keelsons measure 1 foot sided and molded. A total of 26 frame sets, both double and triple, ran for 46 feet along the length of the vessel's centerline.

SKETCHES:



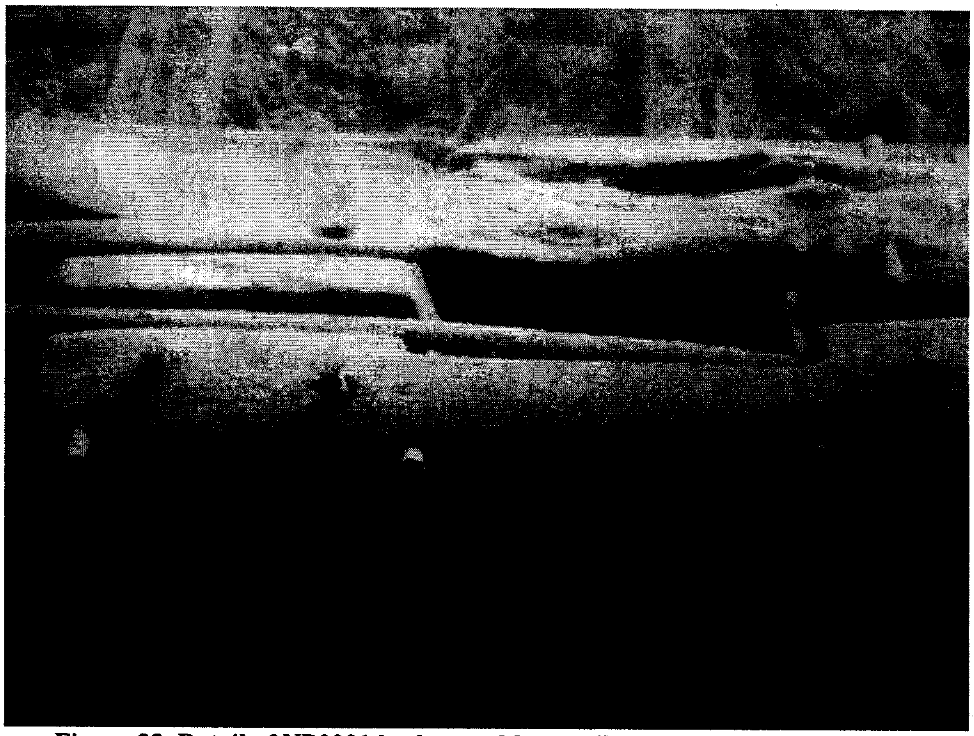


Figure 33. Detail of NP0001 keel assemblage wtih articulated frames visible.

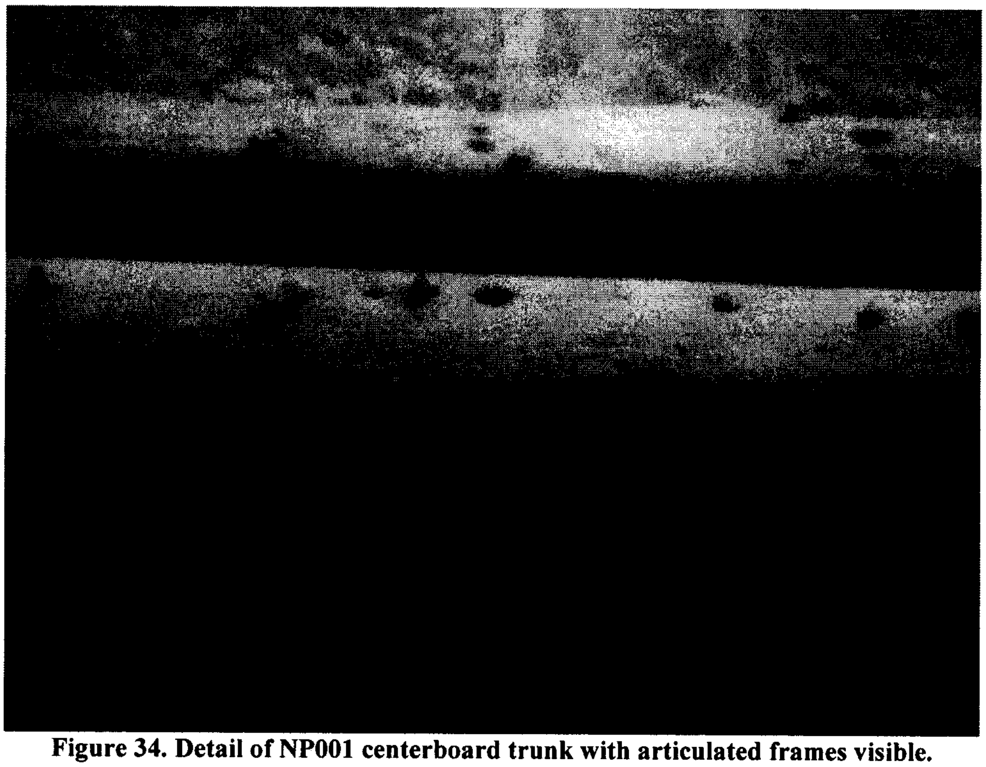


Figure 34. Detail of NP001 centerboard trunk with articulated frames visible.

SITE # NP0002		**RECORDER:**	Stephanie Allen
		Photographer:	Wayne Lusardi
MAX L:	52'	**MAX BR.**	10.5'
ORIENTATION:	240°	**WATER D.:**	2.3'
Latitude/Longitude	N45 01.271' W83 15.763'		
BOTTOM TYPE:	Cobbles		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	0.1'		0.5'
CEILING PLANKING			0.8'-1.0'
BILGE KEELSON/ STRINGER			
SISTER KEELSON			
RIDER KEELSON			
FRAMES	0.6'		0.4'
OTHER (NAME)			

SPECIAL FEATURES (NOTE AND DESCRIBE)

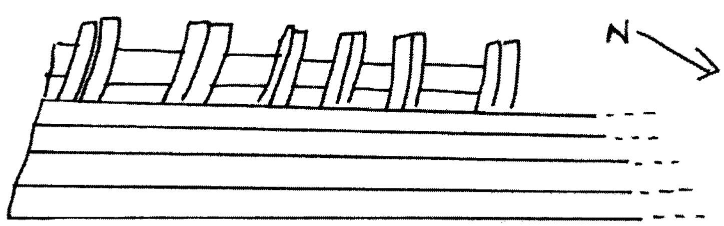
Ceiling planking was through fastened every 4 planks, bung hole through ceiling along one side. Iron band inside for support 15" x 1/2"

FRAME SPACING	1.2'				
# FRAME SETS (SINGLE)		**(DOUBLE)**	28	**(TRIPLE)**	

SITE DESCRIPTION:

Located close to shore, this site sits in 2-3 feet of water. The section measures 52 feet long and consists of 28 frame sets with sections of both ceiling and outer hull planking. Frames, spaced 1.2 feet apart, measure 0.6 feet molded by 0.4 feet sided. The outer planking is 0.1 feet molded and 0.5 feet sided. The ceiling planking is 0.4 feet thick and ranged from 0.8 feet to 1.0 foot wide and is fastened every fourth piece. There is a hole through the ceiling along one side of the wreckage. This hole is likely a salt stop, used to salt the frames for preservation. Additionally, there was an iron band inside for support, measuring 15 inches by ½ inch. A significant number of iron fasteners protruded from the wreckage.

SKETCHES:



NP-002 Not to Scale
S. Allen Sept. 27, 2005

Figure 35. NP0002 exposed keel with articulated frames and exposed fastners.

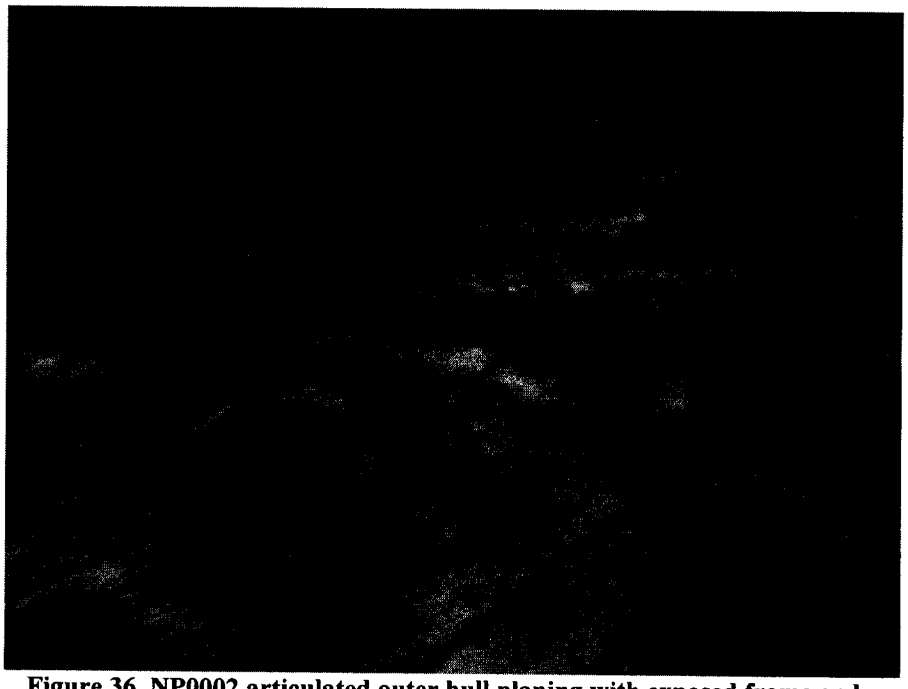


Figure 36. NP0002 articulated outer hull planing with exposed frame ends.

Figure 37. NP0002 frame detail with intact ceiling planking visible.

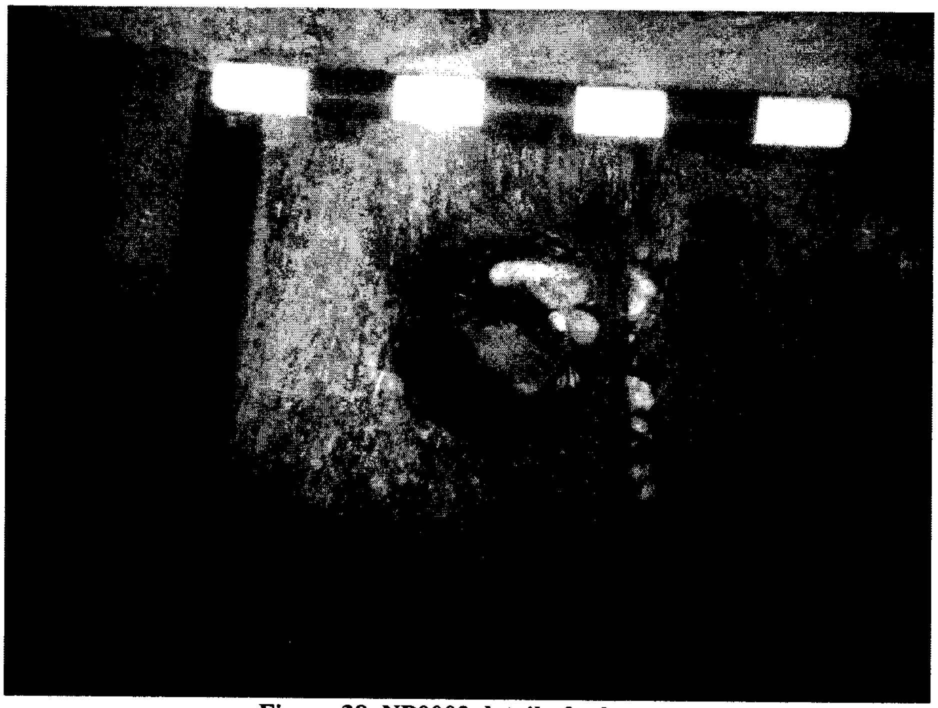


Figure 38. NP0002 detail of salt stop.

SITE # NP0003			RECORDER:	Stephanie Allen
			Photographer:	Wayne Lusardi
MAX L:		60'	MAX BR.	10'
ORIENTATION:		105°	WATER D.:	9'
Latitude/Longitude	N45 01.228' W83 15.705'			
BOTTOM TYPE:	Cobbles			

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	0.2'		0.8'-1.2'
CEILING PLANKING	0.15'		0.5'
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.9'		0.4'
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

notched timber 0.7' wide (notched on both sides) x 24' long. Metal planks 1.5' wide x 0.05 feet deep.

FRAME SPACING	1.4'				
# FRAME SETS (SINGLE)	0	(DOUBLE)	6	(TRIPLE)	0

SITE DESCRIPTION:

This site consists of a hull section with a large steel arch. The hull section, lying inside up on the lakebed, is 60 feet long and 10 feet wide. Outer hull planking measures 0.2 feet thick and ranges from 0.8 feet to 1.2 feet wide. The upper most strake is notched for deck beams. The ceiling planks are 0.15 feet molded by 0.5 feet sided. The doubled frames, spaced 1.6 feet apart, measure 0.9 feet molded by 0.4 feet sided. The steel arch is 1.5 feet wide and 0.08 feet thick and sandwiches the hull inside and out. The sections of the arch are joined by 3 foot sections of overlapping plates with fasteners running through both sections.

SKETCHES:

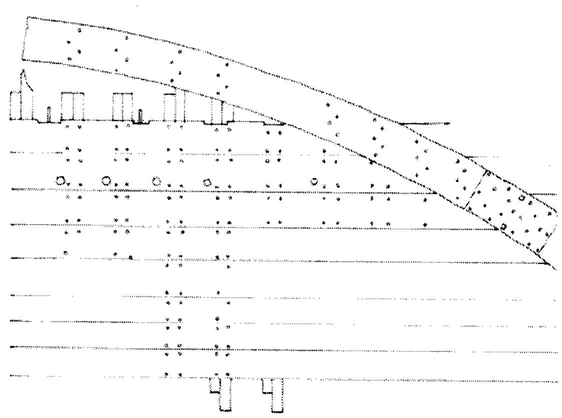


Figure 39. NP0003 detail of frames and iron plates.

Figure 40. NP0003 overview of exposed frames with intact inner and outer hull planking.

SITE # NP004		RECORDER:	Wayne Lusardi
		Photograper:	
MAX L:	16.4'	MAX BR.	15.25'
ORIENTATION:	100°	WATER D.:	12'
Latitude/Longitude	N 45 01.070' W 83 15.840'		
BOTTOM TYPE:			

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING (garboard strake)	0.2'		0.6'
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES	0.9'		0.4'
OTHER: KEEL	0.25'		0.9'
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING	1.65' centers			
# FRAME SETS (SINGLE)		(DOUBLE)	6	(TRIPLE)

SITE DESCRIPTION:

This site is a section of hull bottom from a lightly framed schooner. The remains consist of a 16 foot section of keelson and doubled frames. It is lying upside down so the keel and garboard strake fragment are exposed. The limber passage is visible on several floor bottoms. The garboard strake measures 0.2 feet molded and 0.6 feet sided. The frames, 6 sets of doubles, are spaced on 1.65 foot centers and have a molded dimension of 0.9 feet and a sided dimension of 0.4 feet. The keel measures 0.25 feet molded and 0.9 feet sided.

SKETCHES:

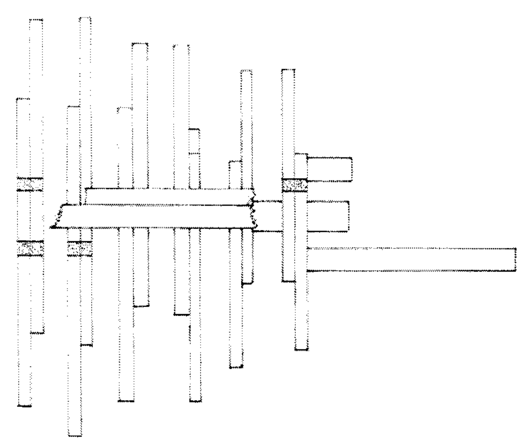


Figure 41. NP0004 eastern extension with keel and articulated frames visible and 1 inch scale bar.

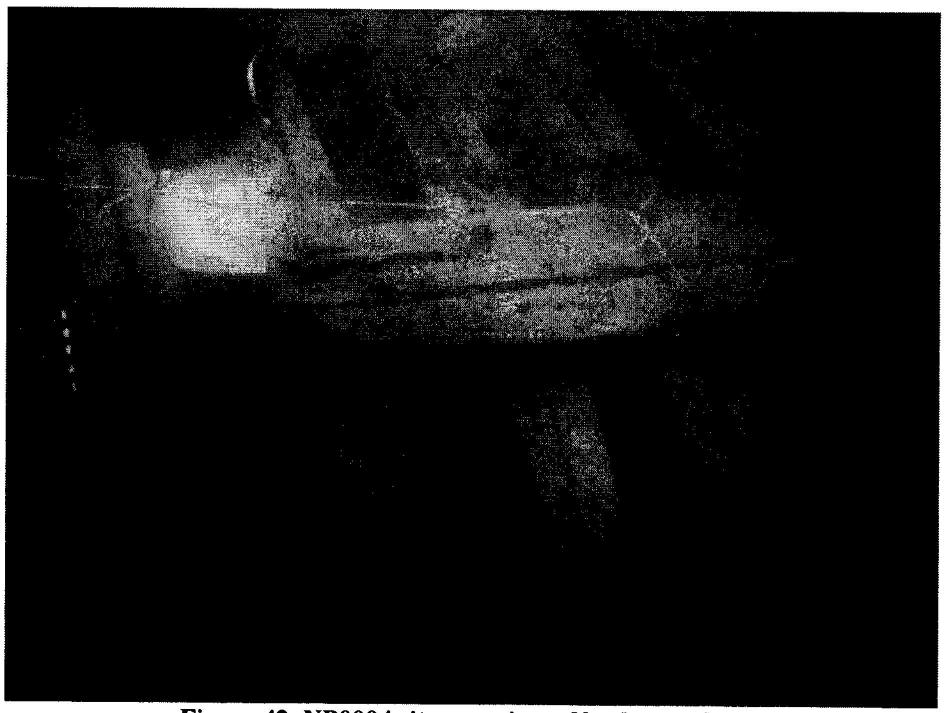


Figure 42. NP0004 site overview of keel assemblage with extant frame pairs and 1 inch scale bar.

SITE # NP0005		**RECORDER:**	Stephanie Allen		
		Photographer:	Wayne Lusardi		
MAX L:	13.0'	**MAX BR.**	0.9'		
ORIENTATION:	225°	**WATER D.:**	12'		
Latitude/Longitude	N 45 01.022' W 83 15.719'				
BOTTOM TYPE:	Cobbles				
SCANTLING DIMENSIONS			**[MOLDED]**		**[SIDED]**
OUTER PLANKING			N/A		N/A
CEILING PLANKING			N/A		N/A
KEELSON			N/A		N/A
SISTER KEELSON			N/A		N/A
RIDER KEELSON			N/A		N/A
FRAMES			N/A		N/A
OTHER (NAME)			N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING		N/A			
# FRAME SETS (SINGLE) N/A		**(DOUBLE)**	N/A	**(TRIPLE)**	N/A
SITE DESCRIPTION:					
This isolated artifact is an iron davit with a metal hook measuring 13 feet in length. The davit has four cross braces spaced along its structure, the largest of which measured 0.9 feet long.					
SKETCHES:					

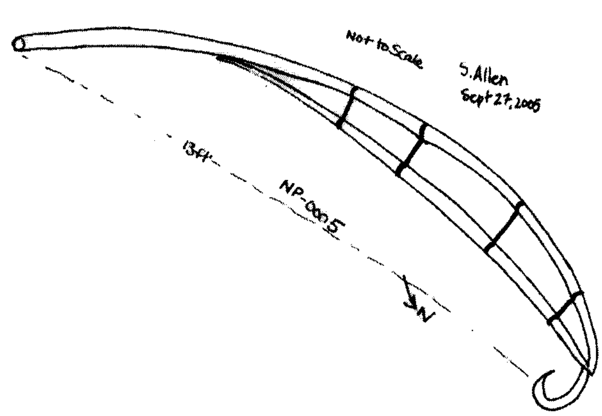


Figure 43. NP0005 iron davit overview.

Figure 44. NP0005 davit hook detail with 1 inch scale.

SITE # NP0006			RECORDER:	Wayne Lusardi
			Photographer:	
MAX L:		16.6'	MAX BR.	7'
ORIENTATION:		50°	WATER D.:	16
Latitude/Longitude	N45 01.080' W83 15.640'			
BOTTOM TYPE:				

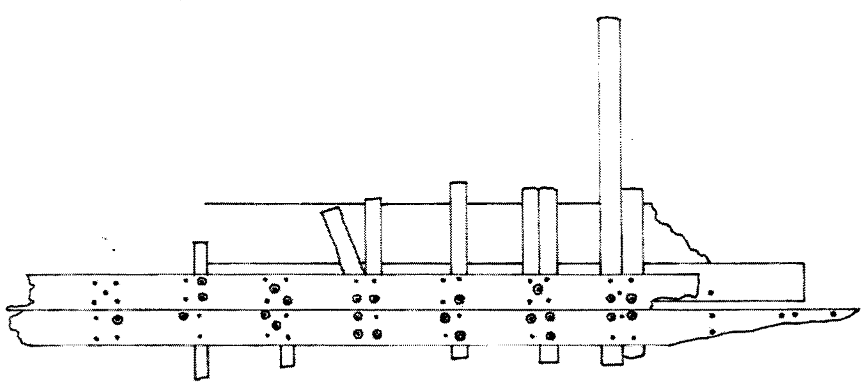
SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES	0.65'		0.35'
OTHER: stringers	0.3'		0.7'
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE) 0	(DOUBLE)	7	(TRIPLE)	0	

SITE DESCRIPTION:

This site consists of a small section of frames with two stringers or wales attached. The overall site measurement is 16.6 feet long with a breadth of 7 feet. There are 7 sets of double frames that are 0.65 feet sided and 0.35 feet molded. Stringers are each 0.3 feet molded and 0.7 feet sided and are attached to each underlying frame with two iron fasteners, most with roves.

SKETCHES:



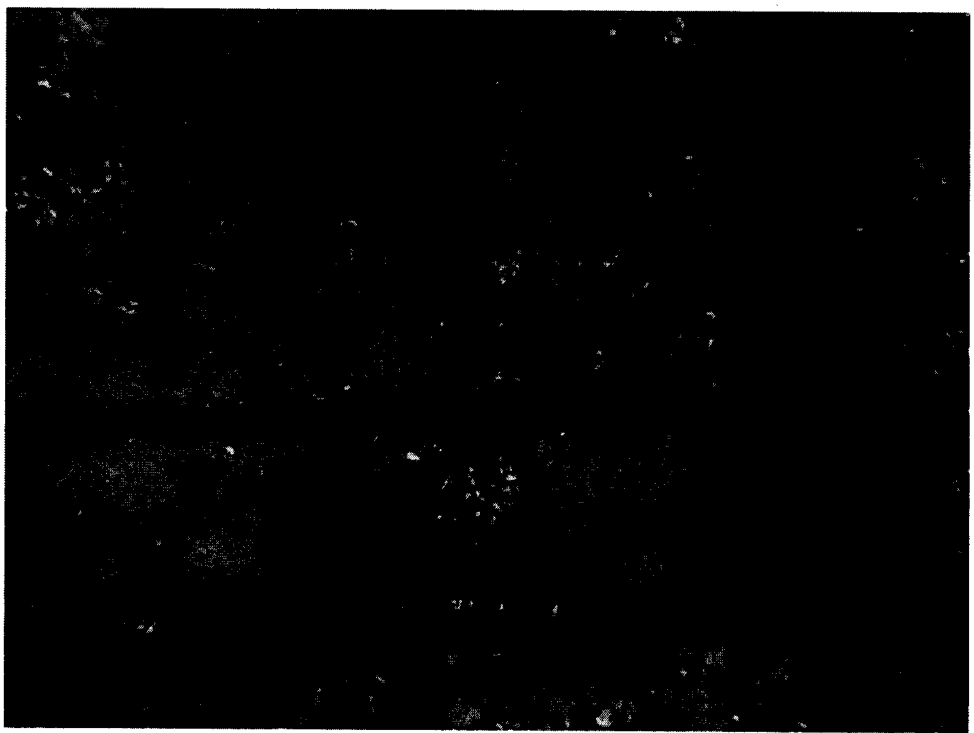


Figure 45. NP0006 detail of stringers with visible fastener pattern and attached frames.

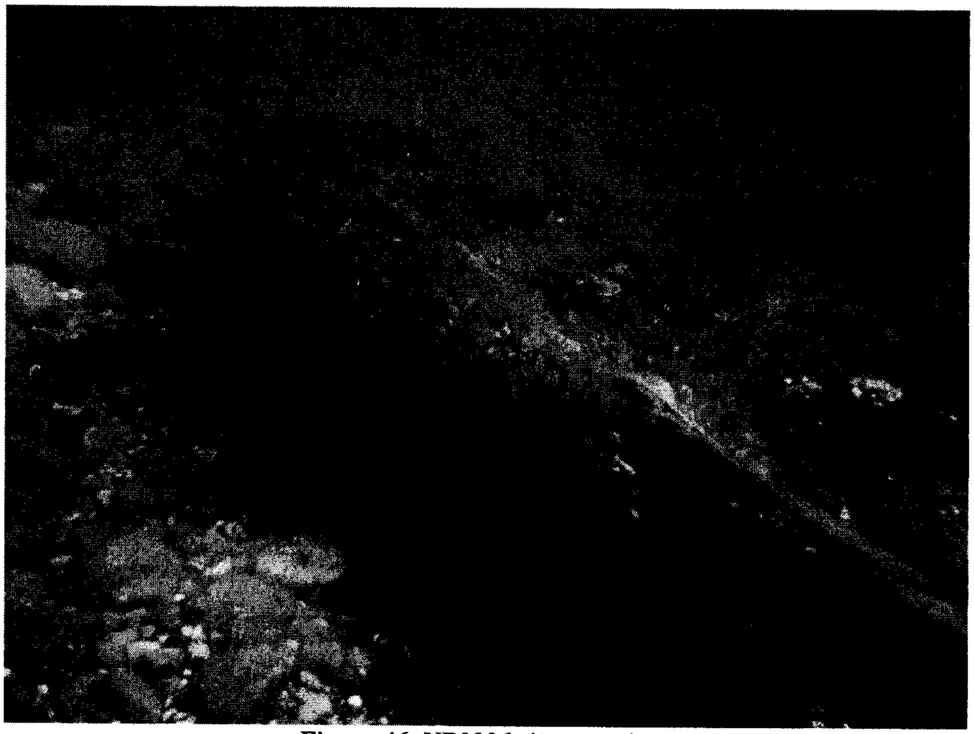


Figure 46. NP0006 site overview.

SITE # NP0007		**RECORDER:**	Dina Bazzill
		Photographer:	Sami K. Seeb
MAX L:	35.6'	**MAX BR.**	1.4'
ORIENTATION:	150°	**WATER D.:**	13
Latitude/Longitude	N45 01.026' W8315.484'		
BOTTOM TYPE:	Large and small cobbles		

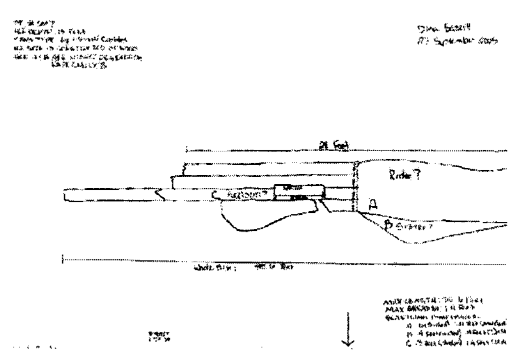
SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING	N/A				
# FRAME SETS (SINGLE) N/A		**(DOUBLE)**	N/A	**(TRIPLE)**	N/A

SITE DESCRIPTIONS:

This site consists of a keel and keelson, along with doubled sister keelsons all measuring 0.35 feet sided. The backbone assemblage ran for 35.6 feet with a centerboard trunk sitting on the western end. The centerboard trunk measures 14 feet long by 1.4 feet molded and 0.5 feet sided. There was an additional large curved timber separated by a cut notch in the wood.

SKETCHES:



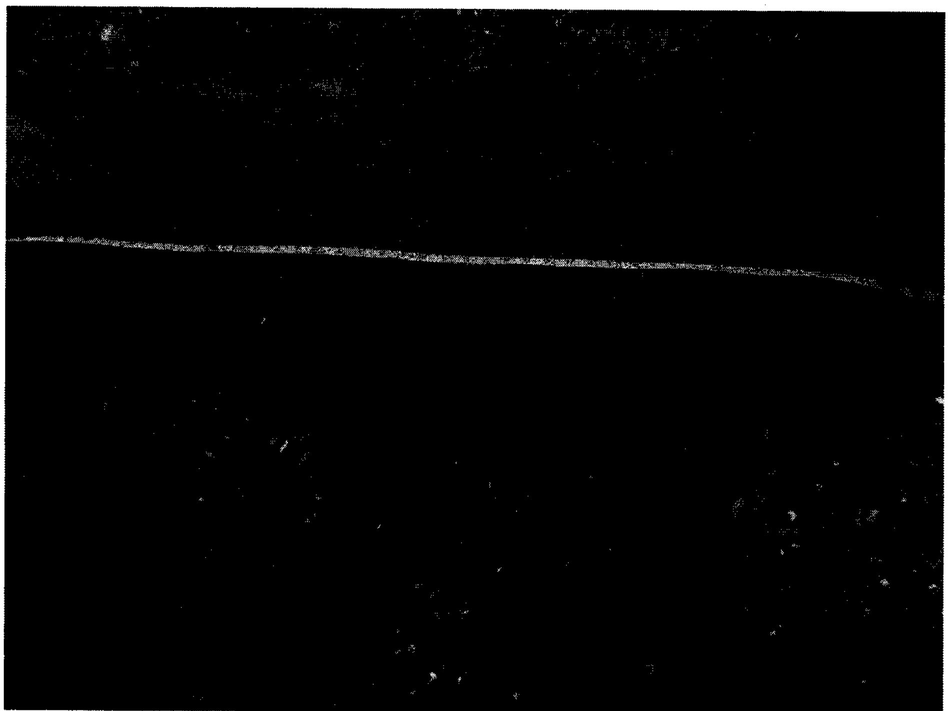


Figure 47. NP0007 keel assemblage overview with articulated sister and rider keelsons.

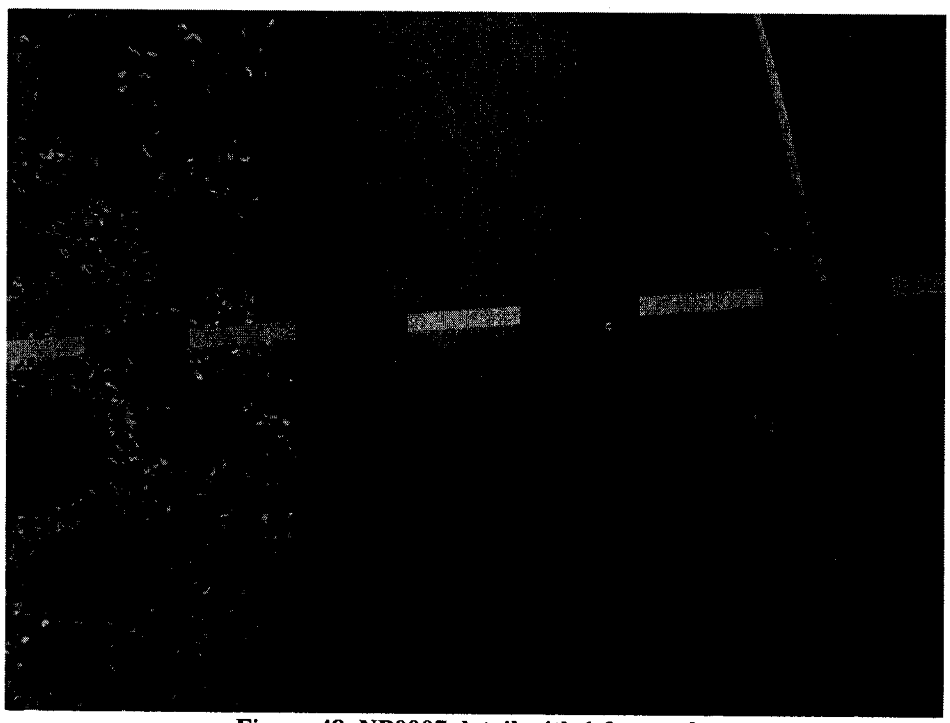


Figure 48. NP0007 detail with 1 foot scale.

SITE # NP0008			RECORDER:	None	
			Photographer:		
MAX L:			MAX BR.		
ORIENTATION:	°		WATER D.:	15'	
Latitude/Longitude	N45 01.044' W 83 15.469'				
BOTTOM TYPE:					
SCANTLING DIMENSIONS			[MOLDED]		[SIDED]
OUTER PLANKING					
CEILING PLANKING					
KEELSON					
SISTER KEELSON					
RIDER KEELSON					
FRAMES					
OTHER (NAME)					
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING					
# FRAME SETS (SINGLE)	(DOUBLE)	1	(TRIPLE)	3	

SITE DESCRIPTION:

This site consists of the remains of a schooner. Extant remains include a 16 foot keelson with four sets of articulated frames, three frame sets are triple frames and one is double. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0009			RECORDER:	Dina Bazzill
			Photographer:	Sami K. Seeb
MAX L:		31.6'/ 24.9'	MAX BR.	2.2'
ORIENTATION:		270°	WATER D.:	14'
Latitude/Longitude		N45 01.049' W83 15.438'		
BOTTOM TYPE:		Large and small cobbles		

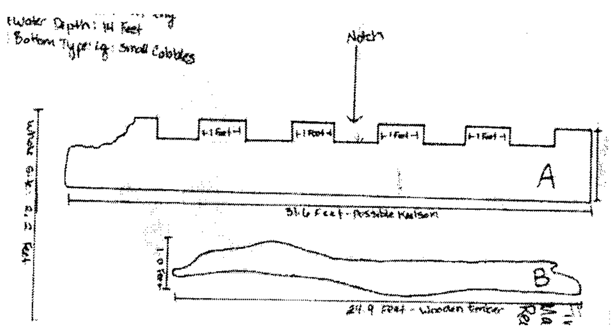
SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING				
# FRAME SETS (SINGLE)	(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This site contains two large features adjacent to one another. The features appear to be a notched keelson and a scantling timber. The keelson piece measures 31.6 feet long with a molded dimension of 1.25 feet. The keelson has 8 notches which are spaced 1.0 foot apart from one another. The adjacent timber measures 24.9 feet long and 1.0 foot wide, sitting 0.05 feet from the keelson piece.

SKETCHES:



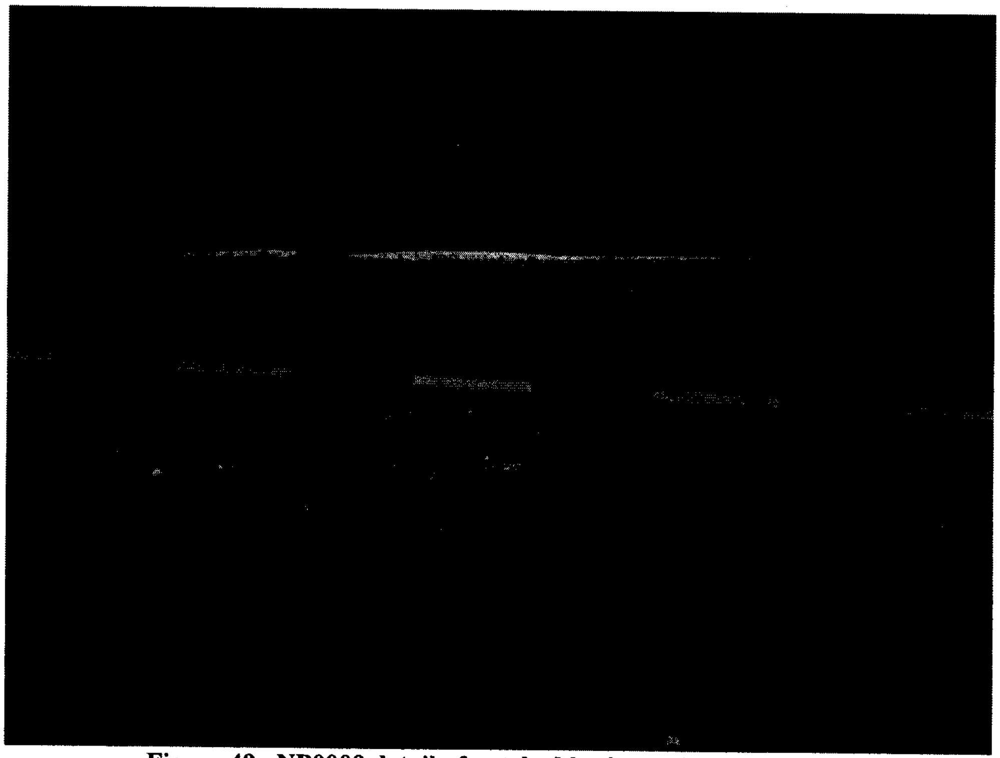


Figure 49. NP0009 detail of notched keelson with 1 foot scale.

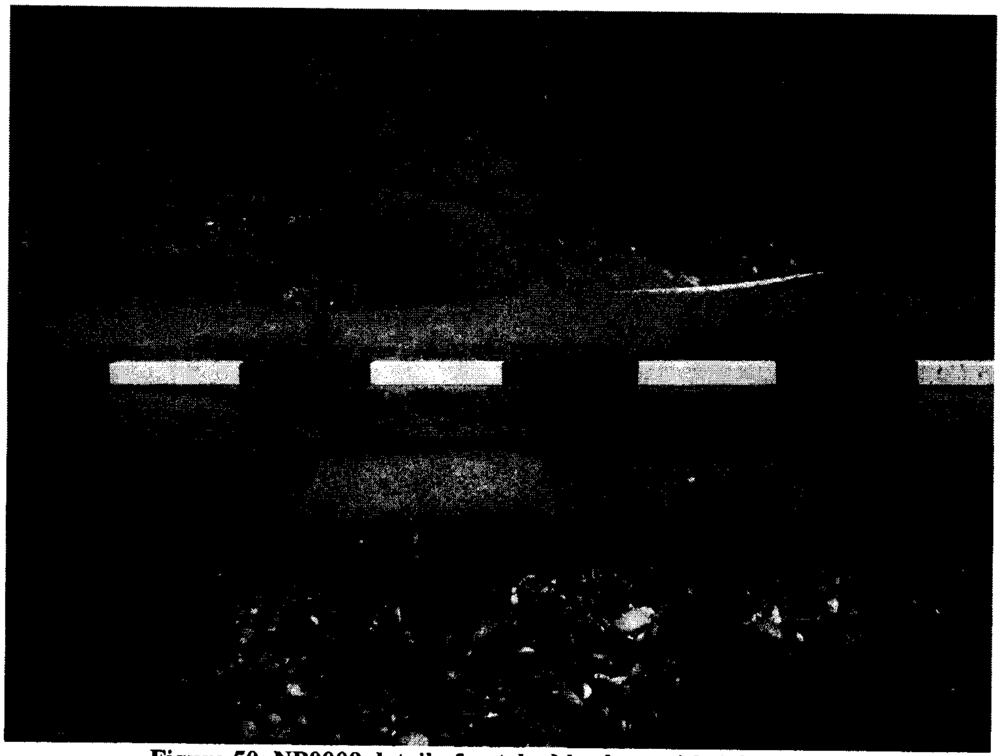


Figure 50. NP0009 detail of notched keelson with 1 foot scale.

SITE # NP0010a		**RECORDER:**	Tiffany Pecoraro
		Photographer:	Brian Diveley
MAX L:	60.4'	**MAX BR.**	2.8'
ORIENTATION:	260°	**WATER D.:**	14'
Latitude/Longitude	N45 01.041' W83 15.409'		
BOTTOM TYPE:	Sandy with cobblestones		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

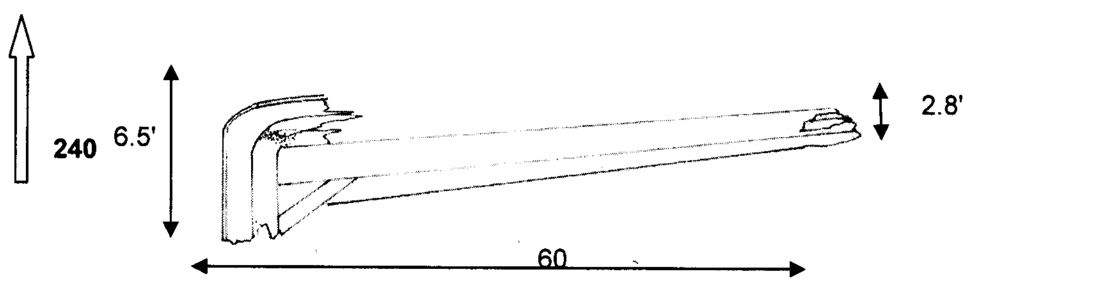
Potential sister keelsons- molded-1.0'- 1.1' sided- 0.8'

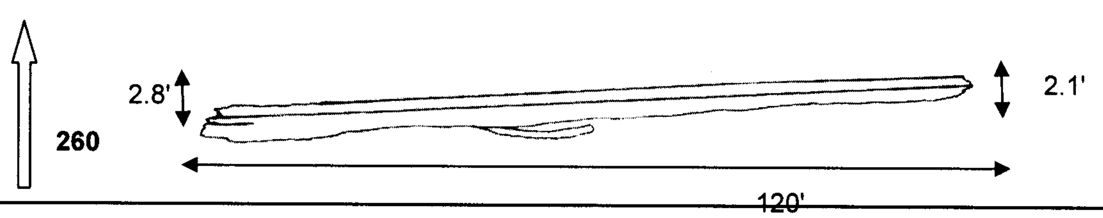
FRAME SPACING	N/A				
# FRAME SETS (SINGLE) N/A	**(DOUBLE)**	N/A	**(TRIPLE)**	N/A	

SITE DESCRIPTION:

This site is comprised of two components, a gripe or forefoot with attached stempost and separate keelson with attached sister keelson. The intact forefoot and stempost assemblage measures 60.4 feet overall. The adjacent keelson and sister keelson measures 120' and is articulated with iron fasteners.

SKETCHES:





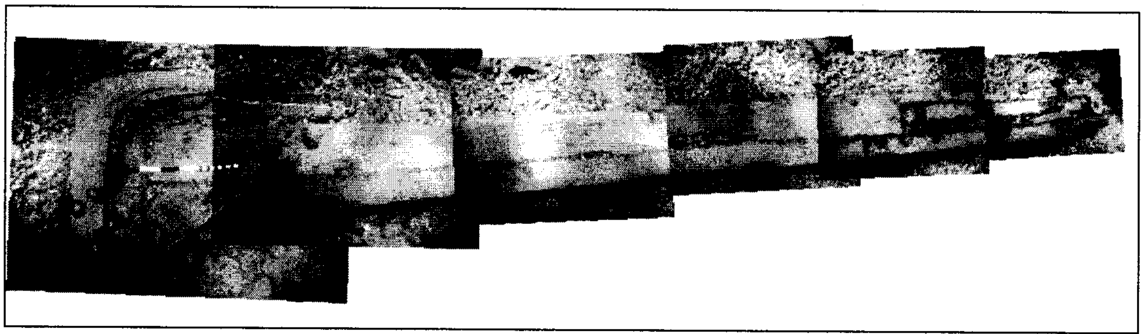


Figure 51. NP0010a photo mosaic of stempost and forefoot (Mosaic by Brian Diveley).

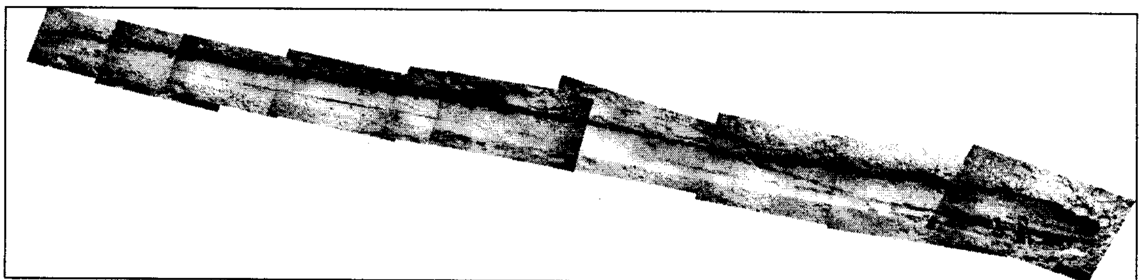


Figure 52. NP0010a photo mosaic of adjacent keelson assemblage (Mosaic by Brian Diveley).

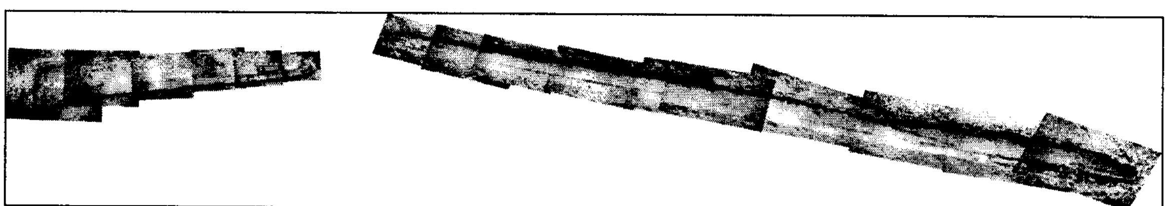


Figure 53. NP0010a features depicted in locational context to one another (Mosaics by Brian Diveley).

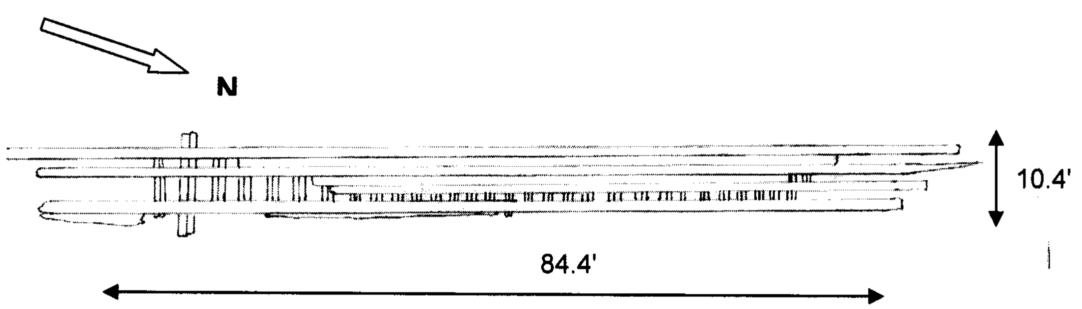
SITE # NP0010b			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	12'		
Latitude/Longitude	N45 01.030' W83 15.431'					
BOTTOM TYPE:						
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING						
CEILING PLANKING						
KEELSON						
SISTER KEELSON						
RIDER KEELSON						
FRAMES						
OTHER (NAME)						
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING						
# FRAME SETS (SINGLE)			(DOUBLE)		(TRIPLE)	
SITE DESCRIPTION:						
This isolated artifact is a ship's anchor. A detailed documentation of the artifact was not conducted by ECU.						
SKETCHES:						
No site sketch or photographic record was accomplished.						

SITE # NP0011		RECORDER:	Tiffany Pecoraro		
		Photographer:	Brian Diveley		
MAX L:	84.4'	MAX BR.	10.4'		
ORIENTATION:	280°	WATER D.:	15'		
Latitude/Longitude	N45 01.030' W83 15.425'				
BOTTOM TYPE:	sandy with cobblestone				
SCANTLING DIMENSIONS			[MOLDED]		[SIDED]
OUTER PLANKING			0.8'		0.15'
CEILING PLANKING			0.8'		0.15'
KEELSON			0.7'		0.4'
SISTER KEELSON			N/A		N/A
RIDER KEELSON			N/A		N/A
FRAMES			0.7'		0.4'
OTHER (NAME)			N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING		1.0' spacing between frames			
# FRAME SETS (SINGLE)		(DOUBLE)	34	(TRIPLE)	

SITE DESCRIPTION:

This site consists of an 84.4 feet by 10.4 feet articulated section of vessel floor at the turn of the bilge. It has relatively intact ceiling and exterior planking and over 34 sets of double frames, spaced 1.0 foot apart, with an attached bilge keelson. The keelson is 0.7 feet molded and 0.4 feet sided. Frames are 0.7 feet molded and 0.4 feet sided.

SKETCHES:



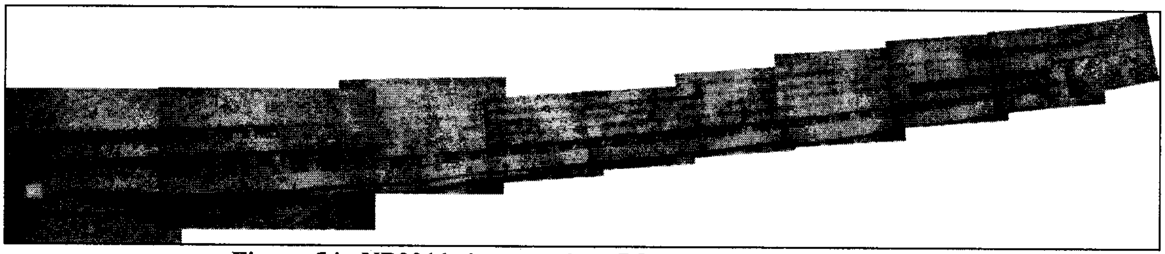
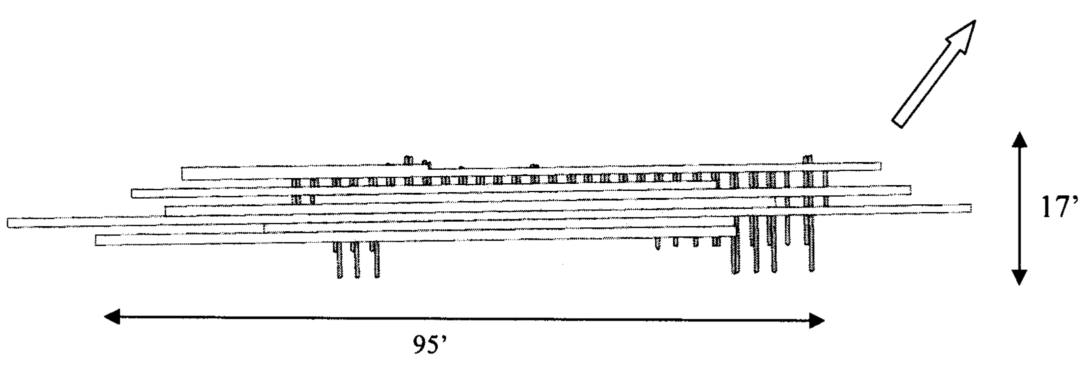


Figure 54. NP0011 site overview (Mosaic by Brian Diveley).

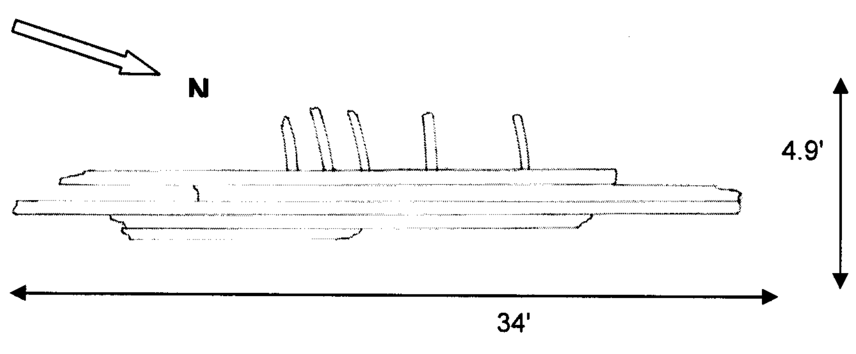
SITE # NP012		RECORDER:	Brian Diveley		
		Photographer:	No photographic record was made.		
MAX L:	95' (est.)	MAX BR.	17' (est.)		
ORIENTATION:	300°	WATER D.:	13'		
LAT/LONG	N45 00.928' W83 15.293'				
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes (range .3' to 2.5')				
SCANTLING DIMENSIONS			[MOLDED]		[SIDED]
OUTER PLANKING			0.4'		.9'
CEILING PLANKING			N/A		N/A
KEELSON			N/A		N/A
SISTER KEELSON			N/A		N/A
RIDER KEELSON			N/A		N/A
FRAMES			0.65'		.4'
OTHER (NAME)			N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)					
Frame sets appear to be composite and fractured at or past the final outer hull planking piece. Appears to be start of the turn of the bilge.					
FRAME SPACING		.9' spacing between frame sets			
# FRAME SETS (SINGLE)		2	(DOUBLE)	28	(TRIPLE)
SITE DESCRIPTION:					
This site consists of ceiling planking and single and double frame sets. There are approximately 28 paired frame sets and three single frames spaced approx. 0.9 feet apart. Ceiling planking and frame sets are inverted to the surface with the outer hull planking facing the surface. Frame sets extending past the remaining outer hull planking to the northeast are molded and at a slight curve to the sandy bottom. This is consistent with the turn in the bilge noted above. Frame sets appear to be composite and fractured at or past the remaining outer hull planking. Frames are 0.65 feet molded and 0.4 feet sided.					
SKETCHES:					



SITE # NP0013			RECORDER:	Tiffany Pecoraro		
			Photographer:	Brian Diveley		
MAX L:		34.9'	MAX BR.	11.9'		
ORIENTATION:		260°	WATER D.:	10'-13'		
Latitude/Longitude	N45 00.873' W83 15.378'					
BOTTOM TYPE:	sandy with cobblestone					
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING				0.55'		0.1'
CEILING PLANKING				0.5'		0.1'
KEELSON				0.7'		0.25'-0.3'
SISTER KEELSON				N/A		N/A
RIDER KEELSON				N/A		N/A
FRAMES				0.45'		0.85'
OTHER: KEEL				0.65'		0.25'-0.3'
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING			0.9'			
# FRAME SETS (SINGLE)			N/A	(DOUBLE)	9	(TRIPLE) N/A
SITE DESCRIPTION:						

This site is comprised of a 34.9' articulated section of hull that is laying bottom up with the keel exposed. The section of hull has nine sets of double frames with five intact planks. One frame set has become dislodged and is situated 7.5 feet from the eastern terminus. The keelson is 0.7 feet molded and 0.25 feet to 0.3 feet sided. Frames are .45 feet molded and 0.85 feet sided. The keel is 0.65 feet molded and 0.25 feet to 0.3 feet sided.

SKETCHES:



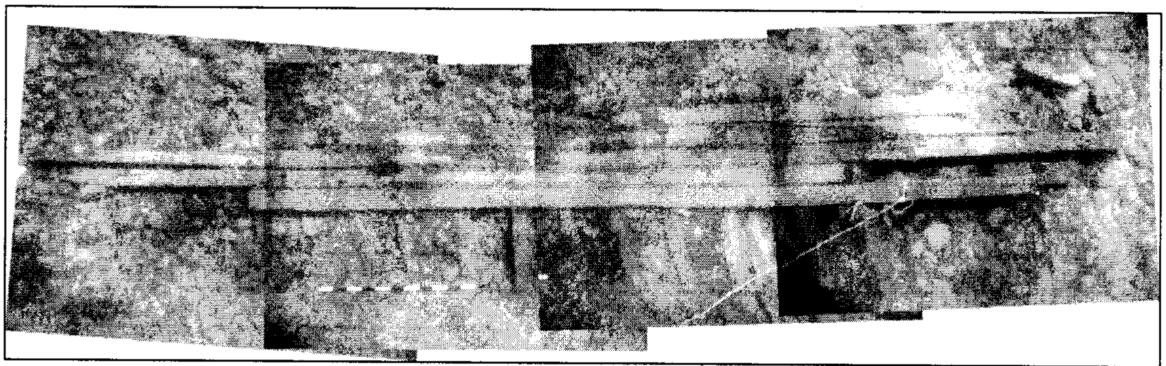


Figure 55. NP0013 site overview (Mosaic by Brian Diveley).

Figure 56. NP0013 site profile with keel and frames visible and 1 foot scale.

SITE # NP0014		**RECORDER:**	Sami K. Seeb
		Photographer:	Dina Bazzill
MAX L:	40'	**MAX BR.**	21'
ORIENTATION:	30°	**WATER D.:**	9'
Latitude/Longitude	N45 00.857' W83 15.401'		
BOTTOM TYPE:	large rocks and stones		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	.15'		1.5'
CEILING PLANKING	N/A		N/A
KEELSON	0.45'		1.0'
SISTER KEELSON	0.5'		1.0'
RIDER KEELSON	0.9'		1.0'
FRAMES	.85'		.45'
OTHER	N/A		N/A

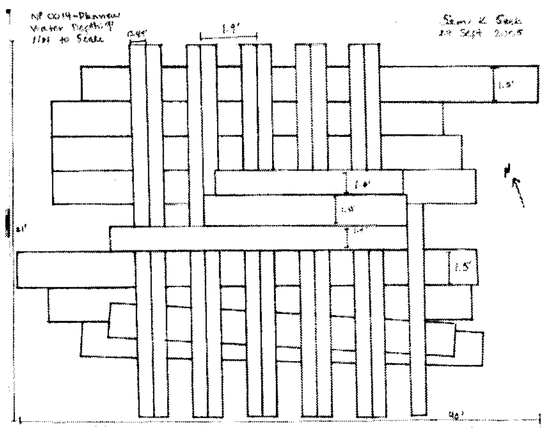
SPECIAL FEATURES (NOTE AND DESCRIBE)

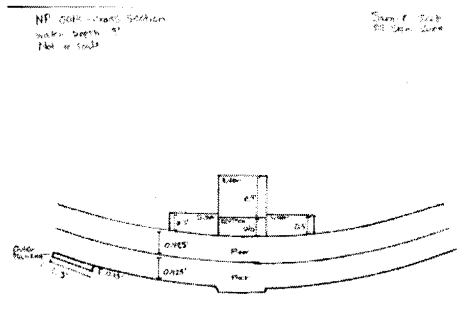
It looks as if the garboard strake may have fit directly into the bottom of two stacked floor timbers

FRAME SPACING	1.9' centers				
# FRAME SETS (SINGLE)	1	**(DOUBLE)**	5	**(TRIPLE)**	

SITE DESCRIPTION:

SKETCHES:





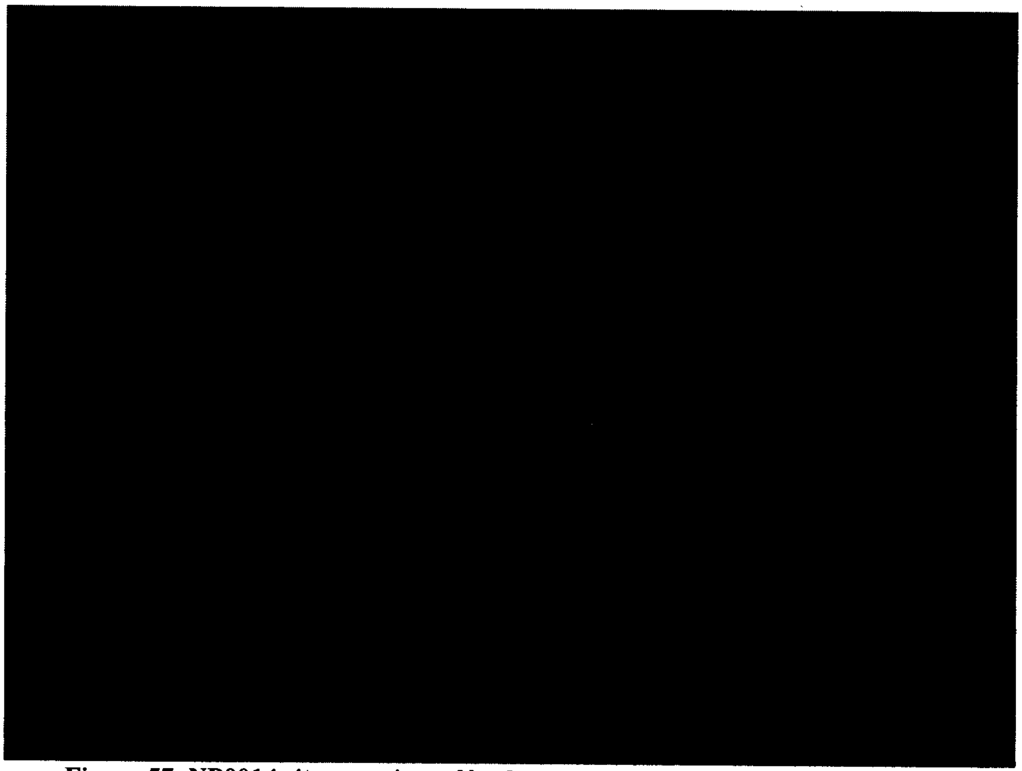


Figure 57. NP0014 site overview of keelson assemblage and intact frame pairs.

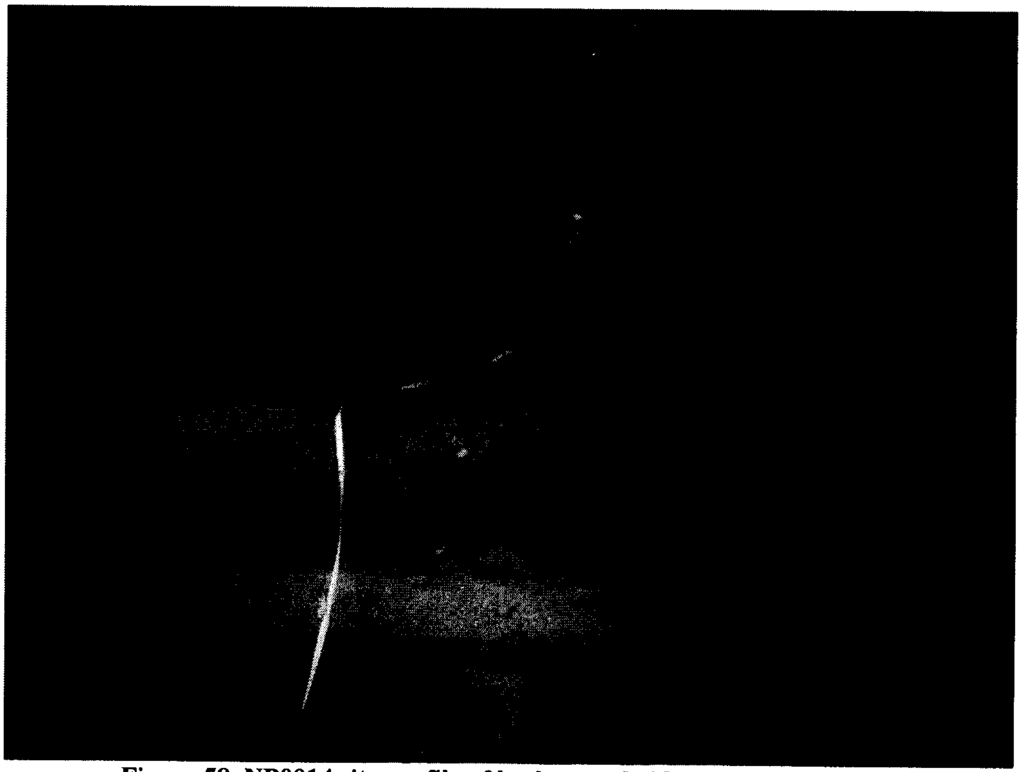


Figure 58. NP0014 site profile of keelson and rider with frame pairs.

SITE # NP0015		**RECORDER:**	Wayne Lusardi		
		Photographer:	Stephanie Allen		
MAX L:	48.65'	**MAX BR.**			
ORIENTATION:	90°	**WATER D.:**	12'		
Latitude/Longitude	N45 00.853' W83 15.377'				
BOTTOM TYPE:					
SCANTLING DIMENSIONS			**[MOLDED]**		**[SIDED]**
OUTER PLANKING					
CEILING PLANKING					
KEELSON					1.0'
SISTER KEELSON					
RIDER KEELSON					
FRAMES					0.45'
OTHER (NAME)					
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING		2.0'			
# FRAME SETS (SINGLE)			**(DOUBLE)**		**(TRIPLE)**

SITE DESCRIPTION:

This site consists of a lower bilge section of what is probably the *Empire State*, based on vessel type, location, and a large cargo of iron ore still present. The maximum length of 48.65 feet is oriented at 90 degrees. The upper surface of the keelson is rabbeted for stanchions and is 1.0 foot sided. A 0.5 foot length of the keel is exposed at the western end and is notched on the upper surface for the floors. There are double frames .45 feet sided centered at 2.0 feet. Most of the ceiling is covered with iron ore.

SKETCHES:

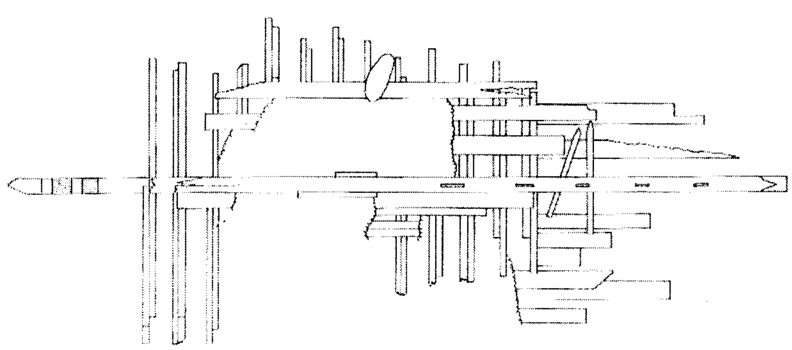


Figure 59. NP0015 site overview with extant iron ore cargo.

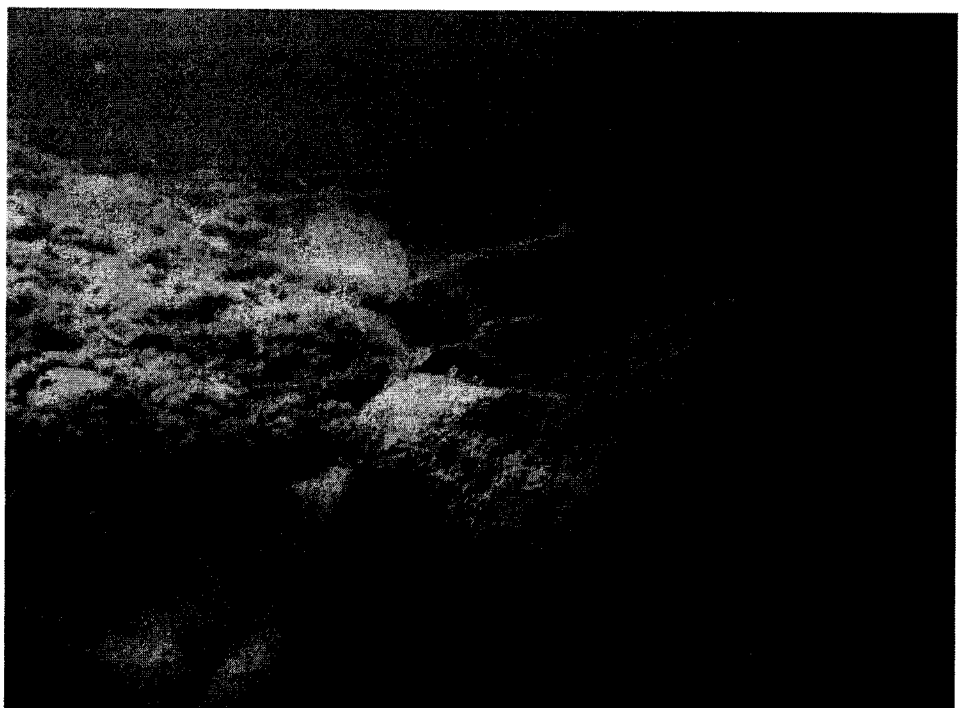


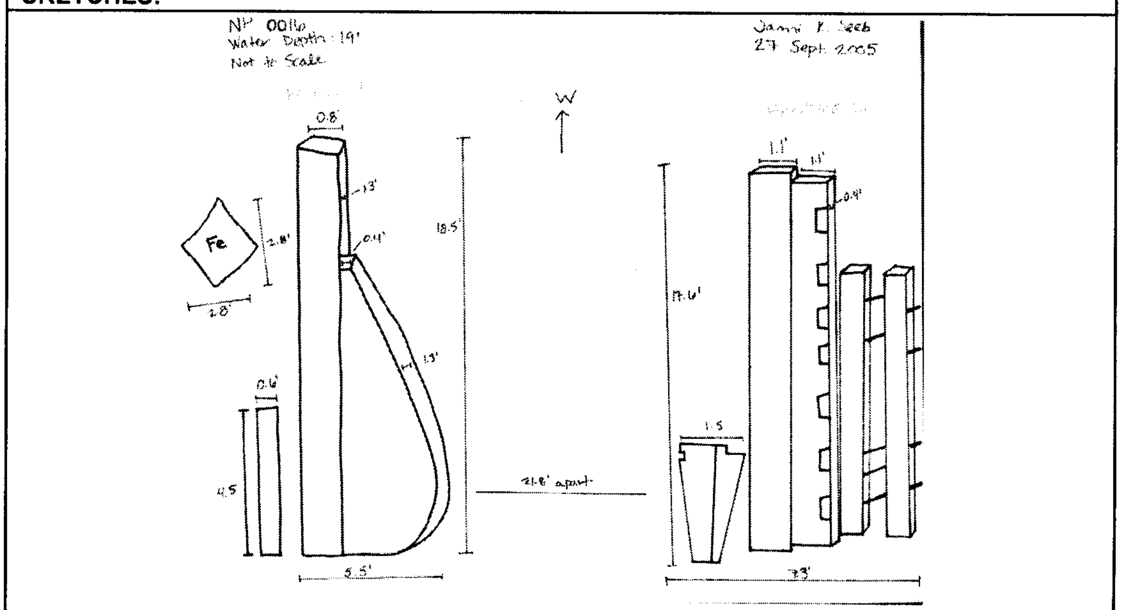
Figure 60. NP0015 lateral margin with visible frame ends and iron ore cargo.

SITE # NP0016a		**RECORDER:**	Sami K. Seeb		
		Photographer:	Dina Bazzill		
MAX L:	18.5'	**MAX BR.**	5.5'		
ORIENTATION:	270°	**WATER D.:**	19'		
Latitude/Longitude	N45 00.692' W83 15.244'				
BOTTOM TYPE:	cobbles with medium sized stones				
SCANTLING DIMENSIONS			**[MOLDED]**		**[SIDED]**
OUTER PLANKING			N/A		N/A
CEILING PLANKING			N/A		N/A
KEELSON			N/A		N/A
SISTER KEELSON			N/A		N/A
RIDER KEELSON			N/A		N/A
FRAMES			N/A		N/A
OTHER: rudder post/rudder			1.3'/1.3'		0.8'/0.4'
SPECIAL FEATURES (NOTE AND DESCRIBE)					
The two features are located 21.8' away from each other					
FRAME SPACING	N/A				
# FRAME SETS (SINGLE)	N/A	**(DOUBLE)**	N/A	**(TRIPLE)** N/A	

SITE DESCRIPTION:

This site consisted of two separate features: a rudderpost and rudder and a notched sternpost. The rudder is 18.5 feet high and 5.5 feet across at its widest point. A small piece of iron plating, 2.8 feet by 2.8 feet, is also associated with the rudder and rudderpost. The second feature on this site is a sternpost with associated pieces of debris. There are seven notches carved into the sternpost and two notches carved into a smaller associated timber.

SKETCHES:



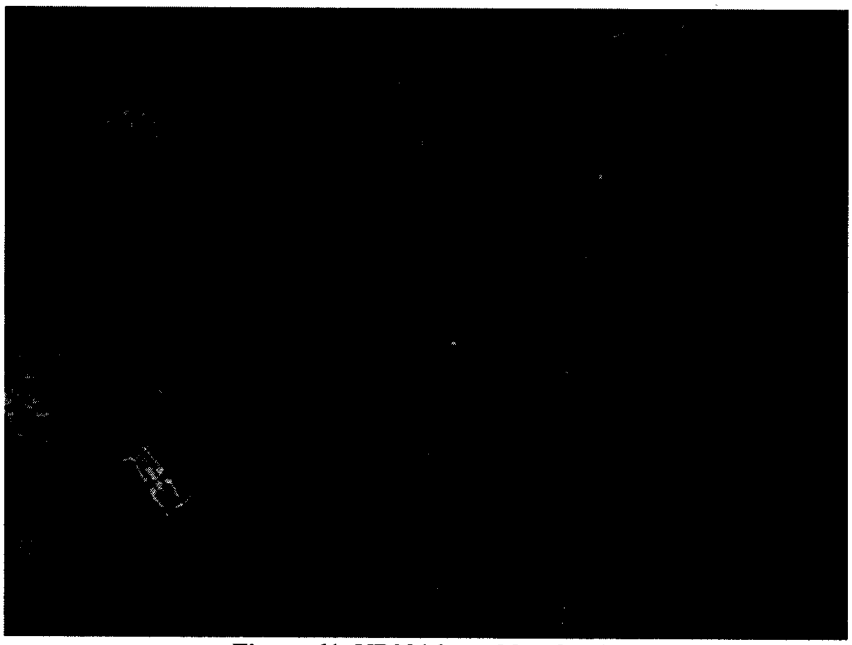


Figure 61. NP0016a rudder detail.

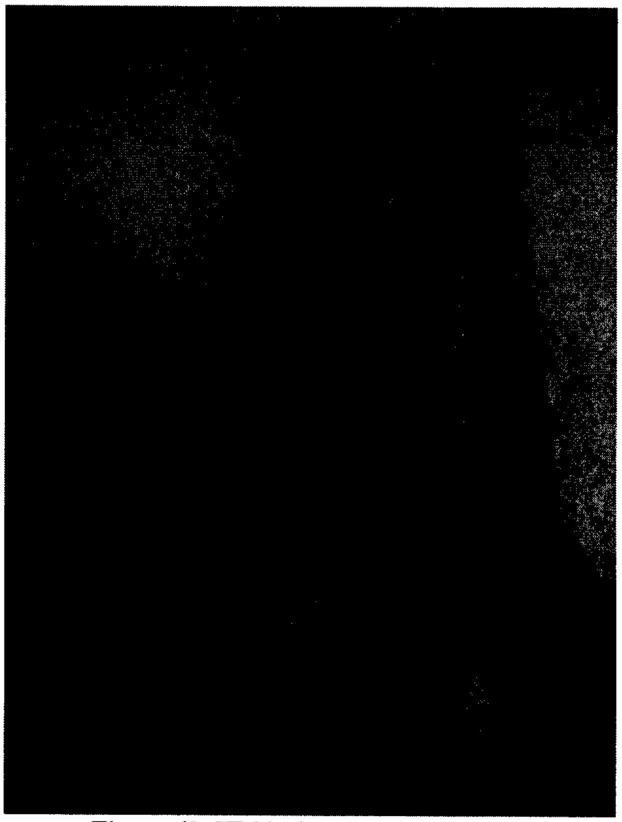


Figure 62. NP0016a notched stempost.

SITE # NP0017		**RECORDER:**	Sami K. Seeb
		Photographer:	Dina Bazzill
MAX L:	33.6'	**MAX BR.**	5.8' (iron plate)
ORIENTATION:	300°	**WATER D.:**	16'
Latitude/Longitude	N45 00.697' W83 15.257'		
BOTTOM TYPE:	cobbles with small rocks		

SCANTLING DIMENSIONS	**[MOLDED]**	**[SIDED]**
OUTER PLANKING	N/A	N/A
CEILING PLANKING	N/A	N/A
KEELSON	N/A	N/A
SISTER KEELSON	N/A	N/A
RIDER KEELSON	N/A	N/A
FRAMES	N/A	N/A
OTHER (NAME)	N/A	N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)		

FRAME SPACING	N/A				
# FRAME SETS (SINGLE)	N/A	**(DOUBLE)**	N/A	**(TRIPLE)**	

SITE DESCRIPTION:

This site is a debris field of disassociated iron material consisting of iron straps, iron plating, and iron fasteners. There are two iron straps, one measuring 1.7 feet wide and 18 feet long and another measuring 0.9 feet wide and 33.6 feet long. The iron plate is cut into the shape of a semi-circle and measures 5.8 feet across the flat base and 2.5 feet out to farthest point on the curved side. The iron fasteners are in a pile on the southern edge of the site.

SKETCHES:

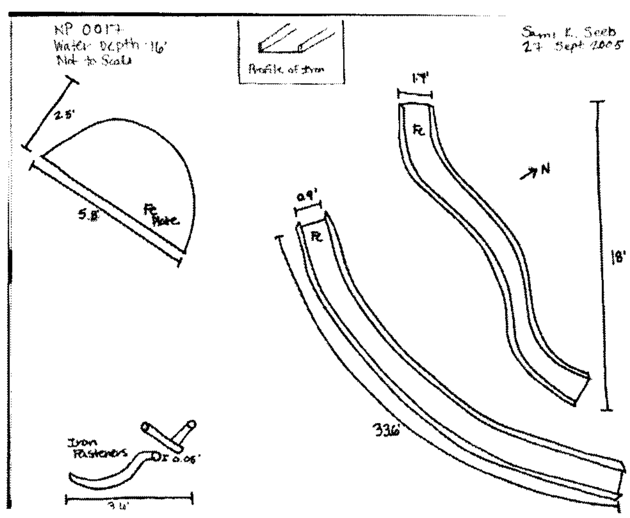


Figure 63. NP0017 site overview.

SITE # NP0018		RECORDER:	Tiffany Pecoraro
		Photographer:	Brian Diveley
MAX L:	4.3' / 4.7'	MAX BR.	4.1'/1.8'
ORIENTATION:	180°	WATER D.:	12
Latitude/Longitude	N45 00.647' W83 15.260'		
BOTTOM TYPE:	sandy with cobblestone		

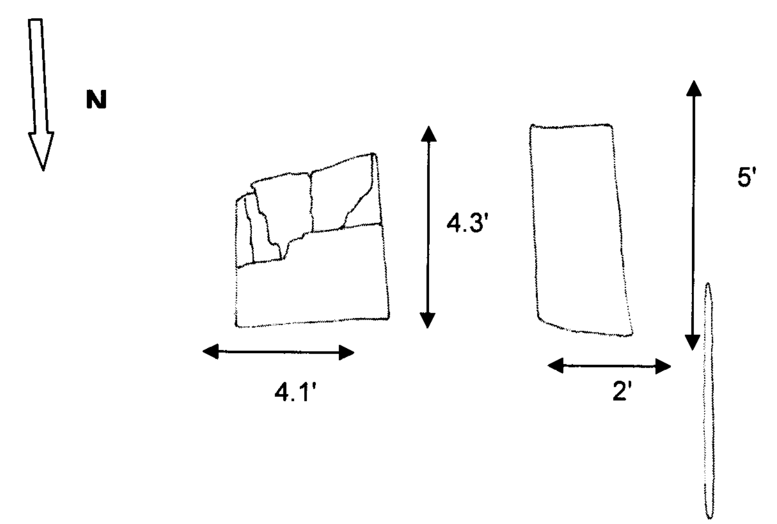
SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This site is comprised of three pieces of sheet metal or iron plating. No wooden scantlings are present. The first piece is nearly square, measuring 4.3 feet by 4.1 feet. It appears to be rolled and consists of two layers, one which is partially folded back exposing the other below it. The second piece of metal is rectangular in shape, measuring 4.7 feet by 1.8 feet. It has multiple rivet holes throughout the piece that are arranged in a patterned, linear fashion. The holes have an average 0.15 feet diameter and they occur in 0.4 foot increments across and 0.6 foot down.

SKETCHES:



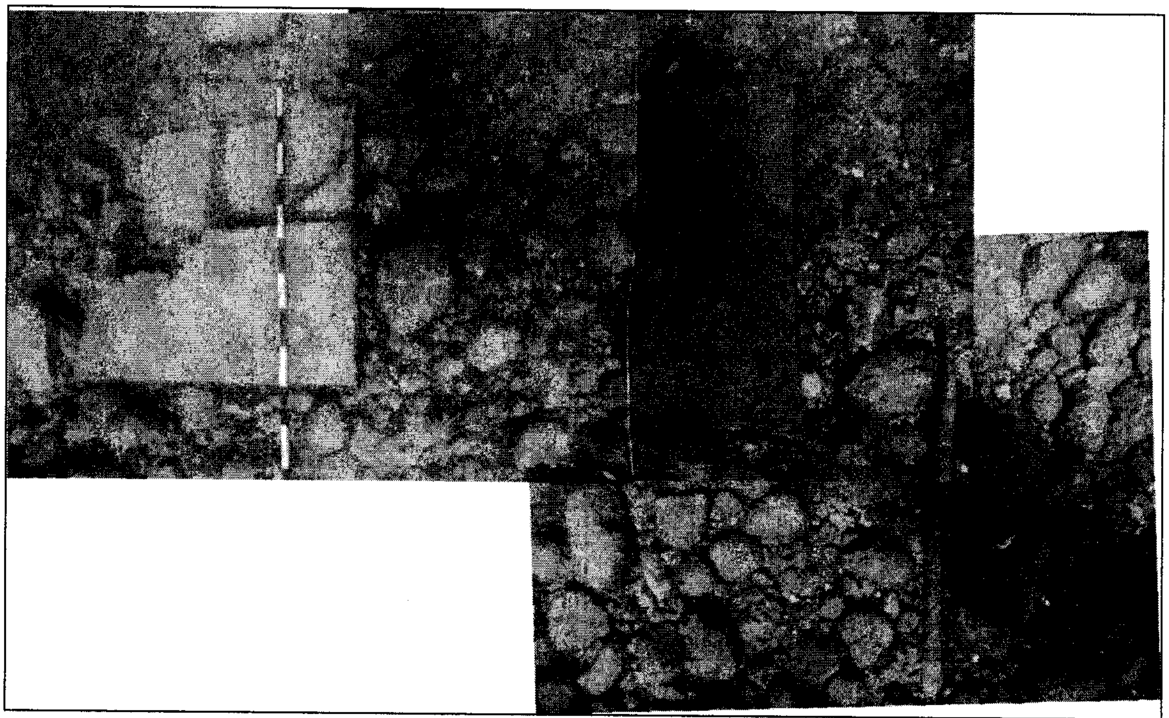


Figure 64. NP0018 photo mosaic of site overview (Mosaic by Brian Diveley).

SITE # NP0019		**RECORDER:**	Tiffany Pecoraro
		Photographer:	Brian Diveley
MAX L:	115' 36.1' 15'	**MAX BR.**	11.5' 11.9' 17'
ORIENTATION:	120°	**WATER D.:**	15'
Latitude/Longitude	N45 00.671' W83 15.206' (primary) N45 00.678' W83 15.214' N45 00.681' W83 15.194' N45 00.666' W83 15.183' (cut stone cargo)		
BOTTOM TYPE:	sandy with cobblestone		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	0.2'		0.7'
CEILING PLANKING	0.2'		0.7'-0.8'
KEELSON	0.35'		0.7'
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.6'		0.3'-0.4'
OTHER (NAME)	N/A		N/A

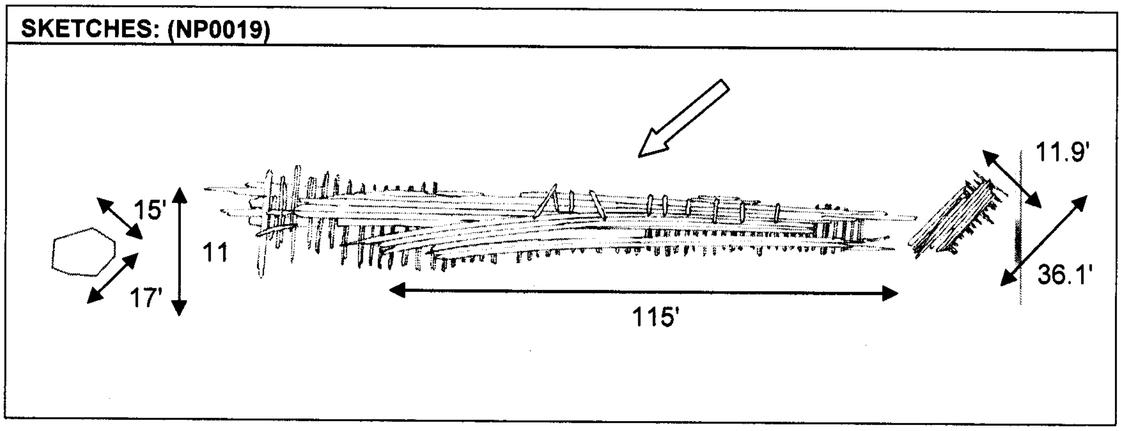
SPECIAL FEATURES (NOTE AND DESCRIBE)

Hanging Knees: molded 3.3' sided 0.5'; half round metal grate 1.8' diameter

FRAME SPACING	0.9'-1.0'				
# FRAME SETS (SINGLE)		**(DOUBLE)**	73	**(TRIPLE)**	2

SITE DESCRIPTION:

This site is comprised of four features. Three of the features are large hull sections with articulated frames and planking. The largest piece measures 115.0 feet by 11.5 feet. This large section has a series of hanging knees that are still attached, indicating the section's interior side is facing up. A stringer runs along the base of the knees. The knees are 3.3 feet molded and 0.5 feet sided. The majority of the frames sets are paired except for two triple frame sets at the southeastern end of the section. The frames are 0.6 feet molded and 0.3 feet to 0.4 feet sided. The frames are spaced 0.9 feet to 1.0 feet apart. There is also an interesting half round iron "grate" fastened to the interior planking. The "grate" is 1.8 feet in diameter with small, radially arranged holes. Two other articulated hull sections are situated at either ends of this main piece. A large layered and riveted piece of sheet metal is adjacent to the third southeast section. Also of note on this site are the stempost and sternpost. The fourth component of this site consists of what may be the remains of a cargo of cut stone. The cut stone cargo is consistent with the known cargo of the E.B. Palmer.



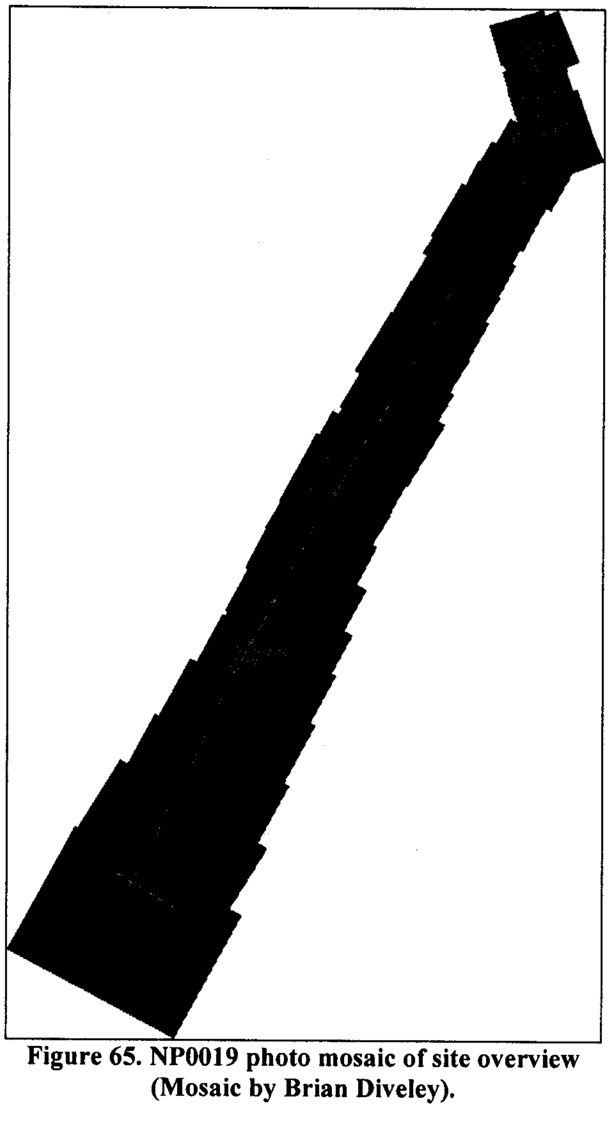


Figure 65. NP0019 photo mosaic of site overview (Mosaic by Brian Diveley).

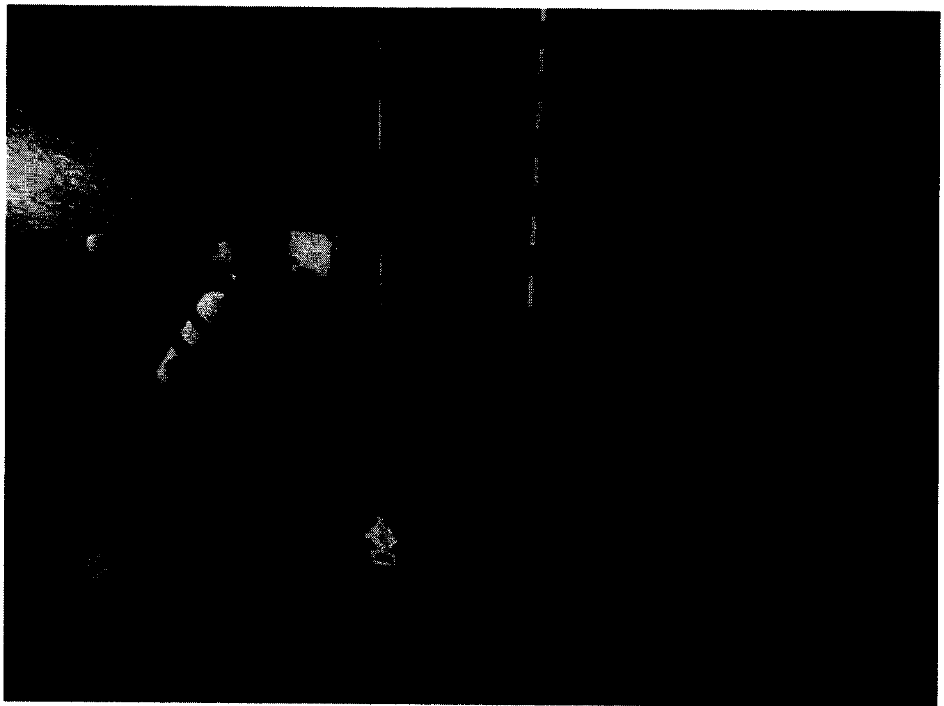


Figure 66. NP0019 detail of southern extension with 1 foot scale.

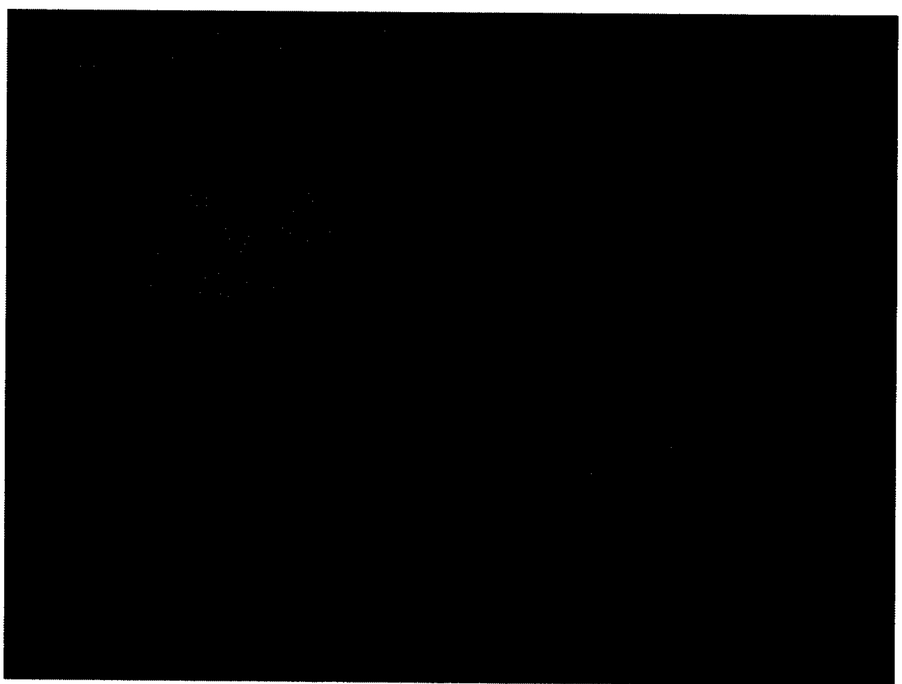


Figure 67. NP0019 detail of iron grate on northern extension of remains, inner hull and frame pairs also visible.

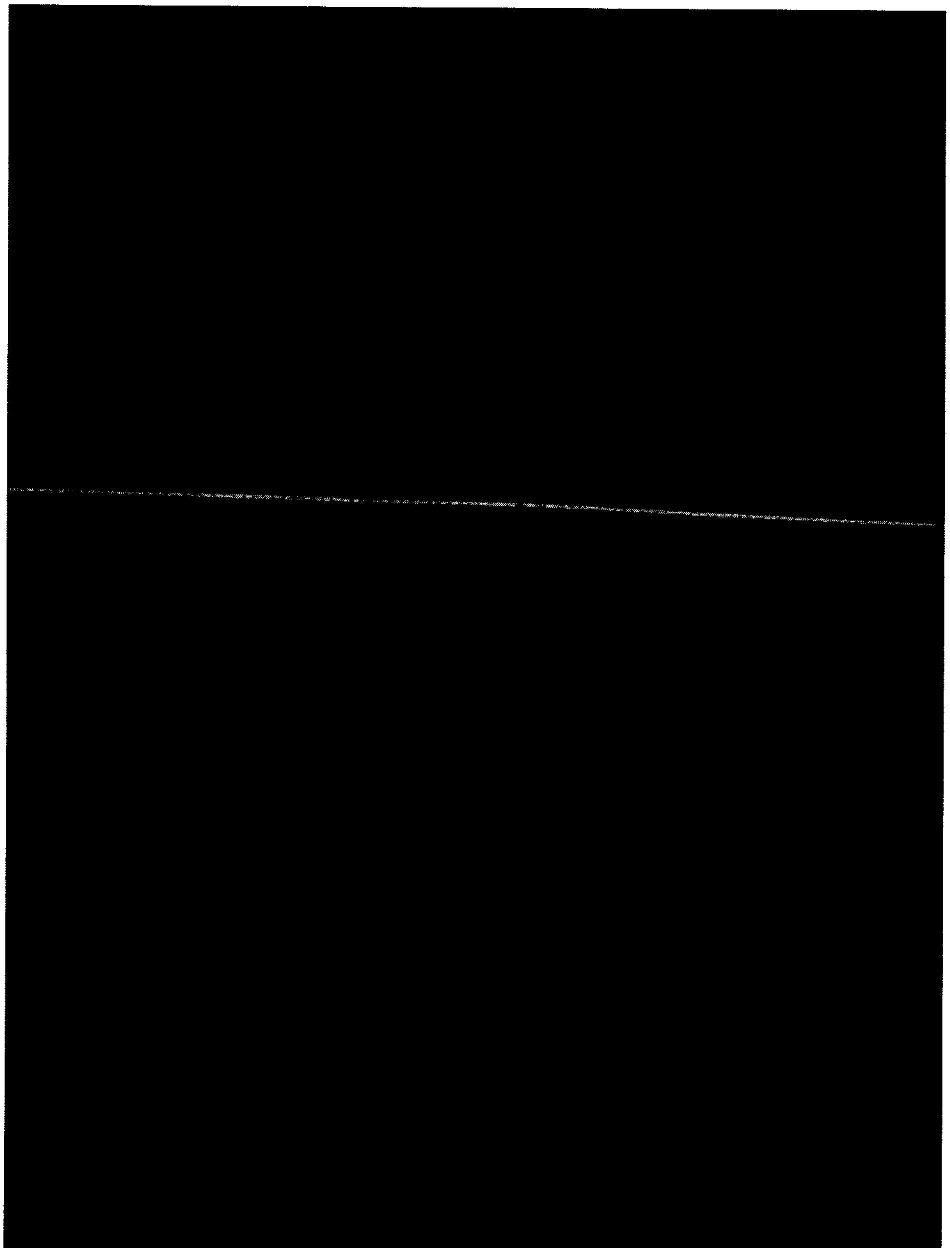


Figure 68. NP0019 detail of articulated knees and intact inner hull planking.

SITE # NP0020			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	13'		
Latitude/Longitude	N45 00.656' W83 15.181'					
BOTTOM TYPE:						
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING						
CEILING PLANKING						
KEELSON						
SISTER KEELSON						
RIDER KEELSON						
FRAMES						
OTHER (NAME)						
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING						
# FRAME SETS (SINGLE)				(DOUBLE)		(TRIPLE)
SITE DESCRIPTION:						
This site consists of a keel with 7 sets close double frames and iron plating. A detailed documentation of the remains was not conducted by ECU.						
SKETCHES:						
No site sketch or photographic record was accomplished.						

SITE # NP021		**RECORDER:**	Brian Diveley, Tiffany Pecoraro, Sami Seeb, Steph Allen
		Photographer:	Tiffany Pecoraro
MAX L:	105' (est.)	**MAX BR.**	13' (est.)
ORIENTATION:	040°	**WATER D.:**	10'
LAT/LONG	N45 00.649' W83 15.191'		
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - range not taken		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	0.9'		.3'
CEILING PLANKING	0.6'		.2'
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.7'		.5'
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

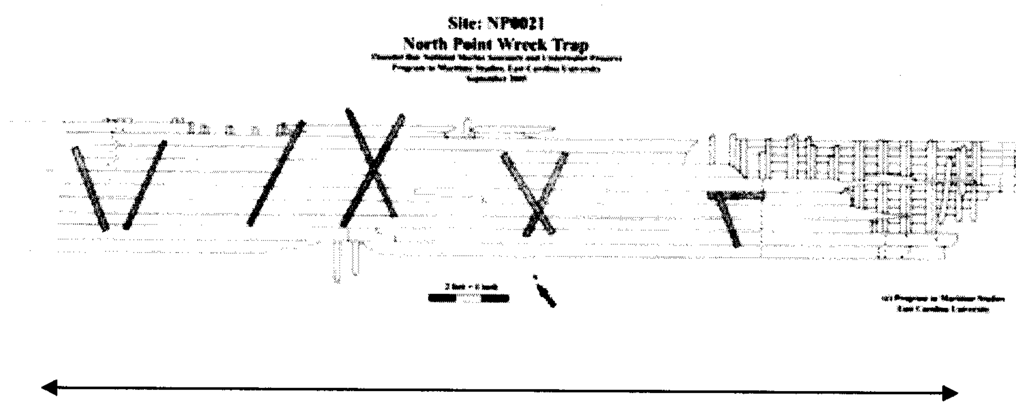
This site consists of a 105' hull section with articulated ceiling and outer hull planking and 6 single, 16 double, and 1 triple frame set. The overall section of the vessel consists of composite paired frames and frame sections disarticulated from the hull section. Frame sets are evenly distributed throughout the site and consist of six single frames, 16 double frame sets, and one triple frame set. The location of a triple frame set on the southwest corner of the vessel cannot be associated with any other part of the hull section. The frames are 0.7 feet molded and 0.5 feet sided with 0.6 feet spacing between them. There is associated iron strapping inside the ceiling planking that is cross braced at intervals along the hull feature. The iron straps are spaced approximately 10 feet to 15 feet throughout the section and are diagnostic of inner hull support features. Butt scarphing of the ceiling planking was only recorded in the mid-section of this site, but is a feature throughout the site. Close examination of areas of disarticulation reveal that they are also scarphed at these section areas.

FRAME SPACING	.6' spacing between frame sets				
# FRAME SETS (SINGLE)	6	**(DOUBLE)**	16	**(TRIPLE)**	1

SITE DESCRIPTION:

Site 021 consists of ceiling planking, single/double/triple frame sets, and outer hull planking. Frame sets are noted above and evenly distributed throughout the site. The location of a triple frame set on the SW corner of the vessel cannot be associated with any other part of the hull section. There is associated iron strapping inside ceiling planking that is cross braced at intervals along the hull feature. This are interspaced approx. 10-15 ft through the section and are diagnostic of inner hull support features, interpretation of this site as being ceiling planking face up to the surface is based on iron support features located here. Due to restrictions in time, ceiling planking butt scarphing was only recorded in the mid-section of site 021, but is a feature throughout the site. Close examination of areas of disarticulation reveal that they were also scarphed at these section areas. Overall site condition is very good with sections of disarticulation due to the wrecking process. No biological degradation was noted on this site.

SKETCHES:



105'

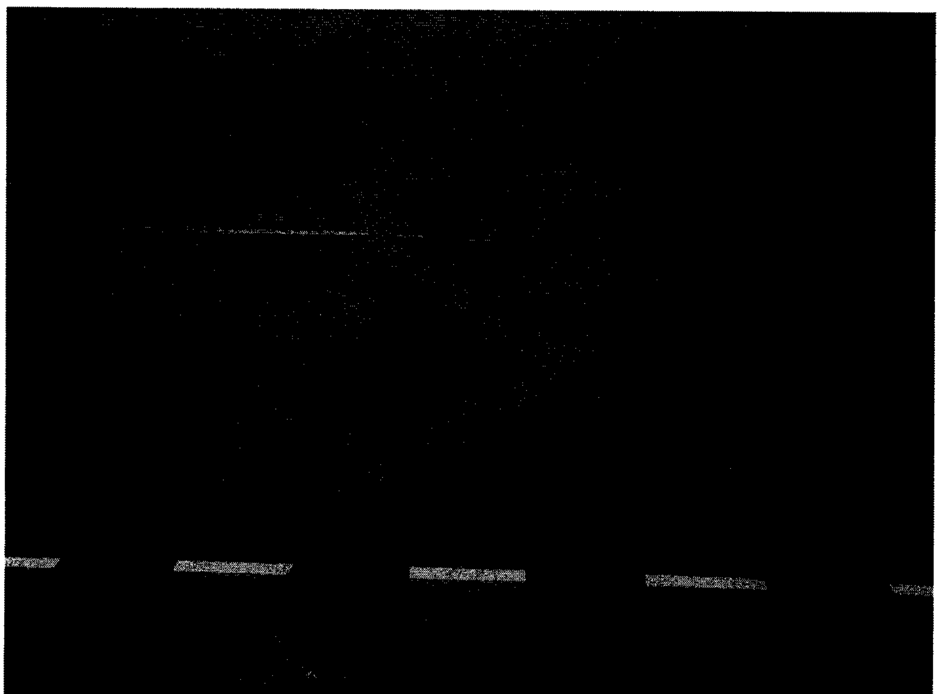


Figure 69. NP0021 detail of iron cross bracing on outer hull planking.

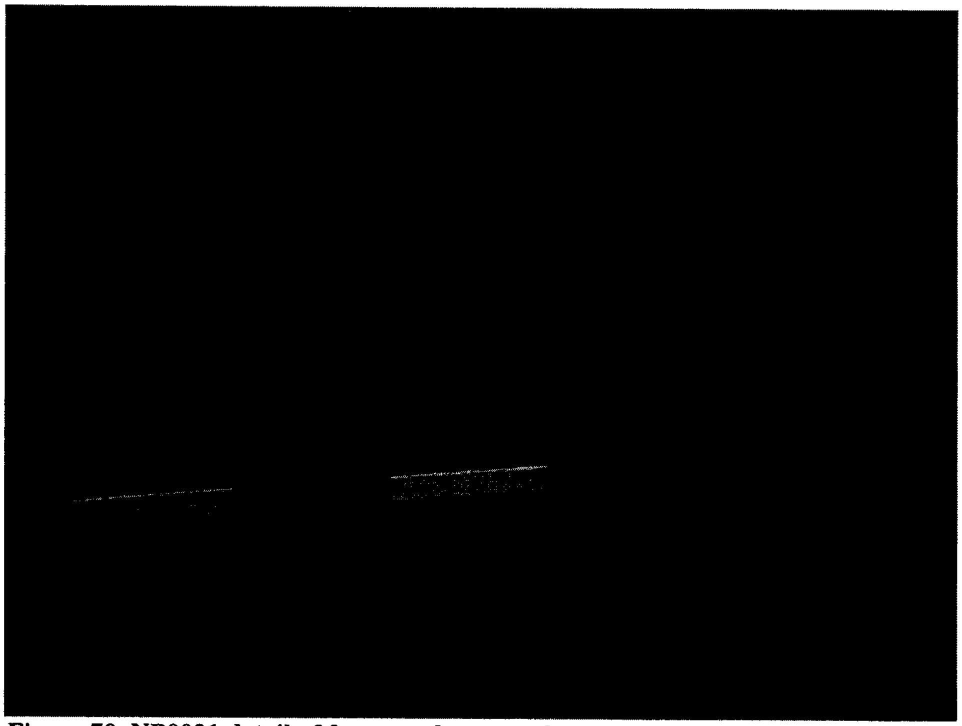


Figure 70. NP0021 detail of frame ends on northeastern extension of hull fragment.

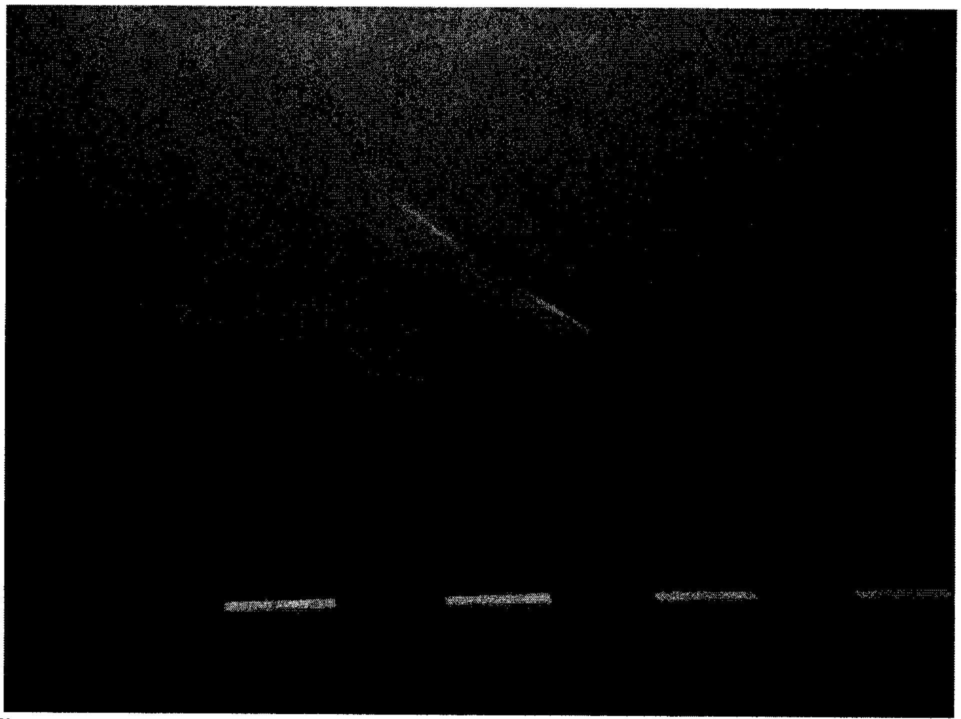


Figure 71. NP0021 detail of frame ends and intact planking at southwestern extension. One foot scale bar is visible in foreground.

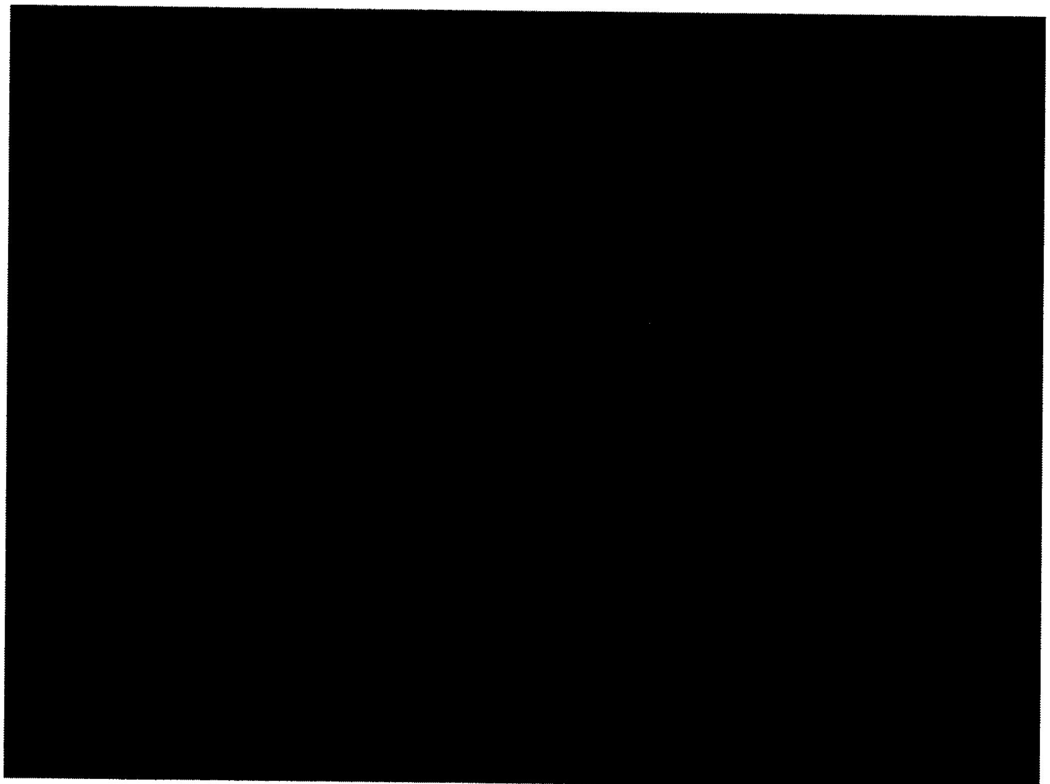


Figure 72. NP0021 detail of fastener pattern.

SITE # NP0022			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:	°		WATER D.:	
Latitude/Longitude	N45 00.625' W83 15.208'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

Possible evidence of burning.

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This site consists of a section of vessel that includes four double frame sets with 17 articulated hull strakes and iron plating. The remains show evidence for possible burning. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0023			RECORDER:	none		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:			
Latitude/Longitude	N45 00.813' W83 15.331'					
BOTTOM TYPE:						
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING						
CEILING PLANKING						
KEELSON						
SISTER KEELSON						
RIDER KEELSON						
FRAMES						
OTHER (NAME)						
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING						
# FRAME SETS (SINGLE)				(DOUBLE)		(TRIPLE)
SITE DESCRIPTION:						
This isolated artifact is a 10' circular iron bar with knuckle and 6' iron strap. A detailed documentation of the remains was not conducted by ECU.						
SKETCHES:						
No site sketch or photographic record was accomplished.						

SITE # NP0024			**RECORDER:**	Sami K. Seeb	
			Photographer:	Dina Bazzill	
MAX L:		48'	**MAX BR.**	12.0'	
ORIENTATION:		315°	**WATER D.:**	16'	
Latitude/Longitude	N45 00.754' W83 15.208'				
BOTTOM TYPE:	small and big rocks				

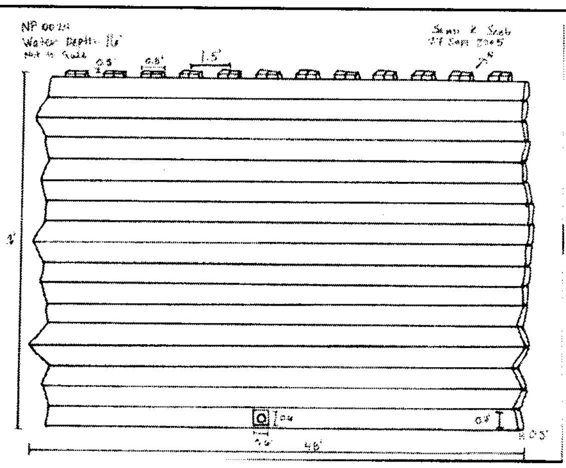
SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	0.3'		0.7'
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.5'		0.4'
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING	1.5' centers				
# FRAME SETS (SINGLE)		**(DOUBLE)**	28	**(TRIPLE)**	

SITE DESCRIPTION:

This site is a 48 foot section of hull possibly collapsed inward and may be the remains of about a 12 feet depth of hold section, broken just above the turn of the bilge. It contains 17 strakes of outer hull planking and 28 double frame sets, which are spaced at 1.5 foot centers apart. Each frame measures 0.5 feet molded and 0.4 feet sided. The outer hull planking measures 0.3 feet molded and 0.7 feet sided. There is a small copper scupper liner on one piece of outer hull planking. The remains have indications of burning.

SKETCHES:



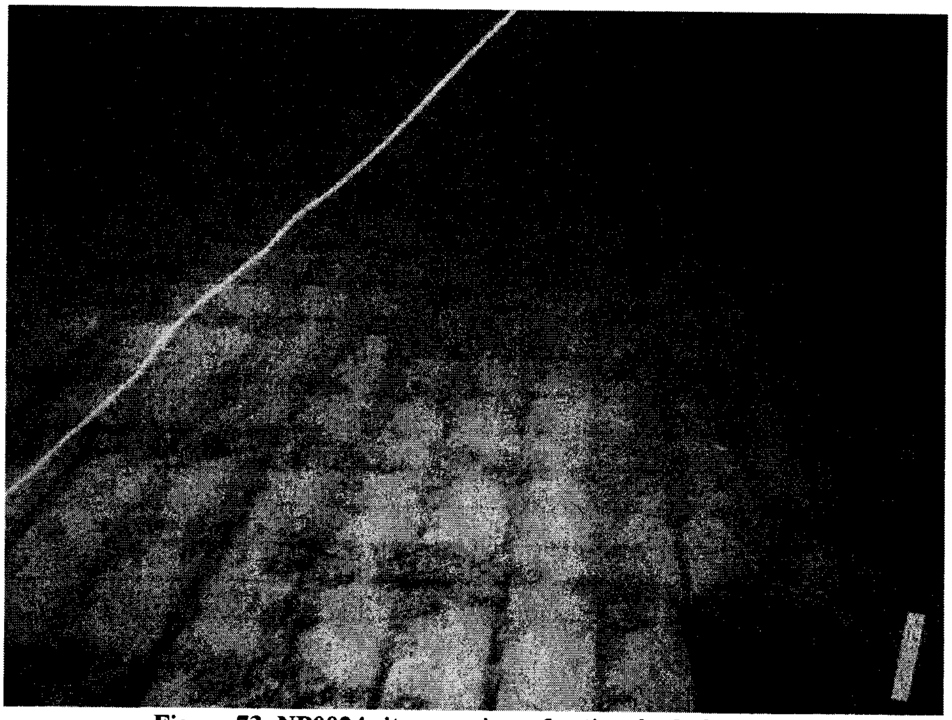


Figure 73. NP0024 site overview of articualted planking.

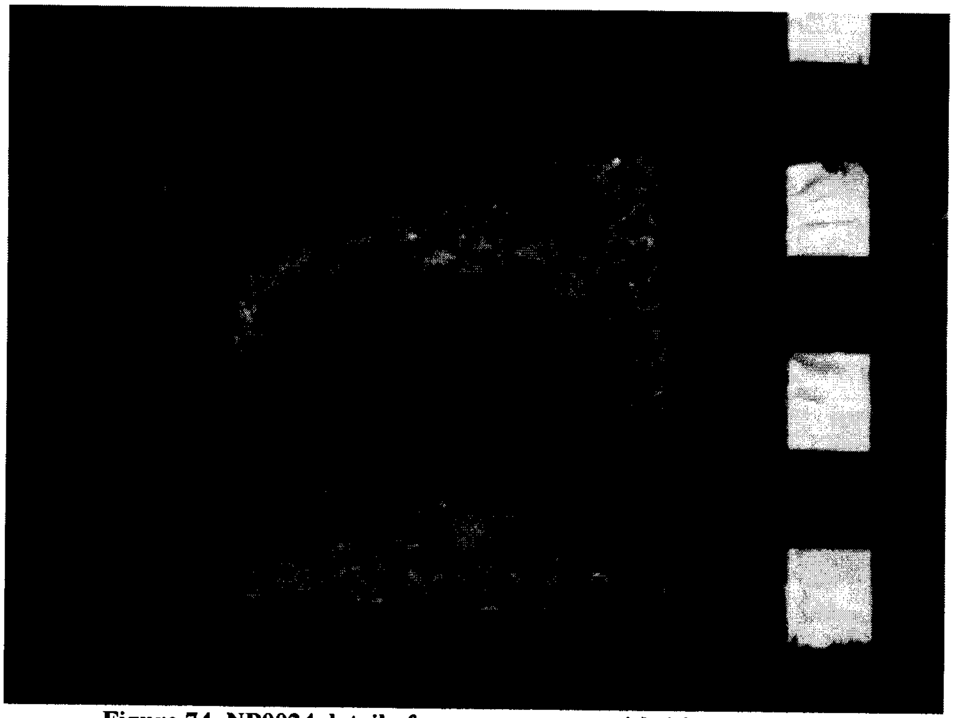


Figure 74. NP0024 detail of copper scupper with 1 inch scale bar.

SITE # NP0025			RECORDER:	none		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:	°		WATER D.:			
Latitude/Longitude	N45 00.735' W83 15.154'					
BOTTOM TYPE:						

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is a 16' long iron bar with a 2.5" diameter and bent end. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0026			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:			
Latitude/Longitude	N45 00.698' W83 15.352'					
BOTTOM TYPE:						
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING						
CEILING PLANKING						
KEELSON						
SISTER KEELSON						
RIDER KEELSON						
FRAMES						
OTHER (NAME)						
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING						
# FRAME SETS (SINGLE)				(DOUBLE)		(TRIPLE)
SITE DESCRIPTION:						
This site consists of undetermined wreckage. A detailed documentation of the remains was not conducted by ECU.						
SKETCHES:						
No site sketch or photographic record was accomplished.						

SITE # NP0027			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	
Latitude/Longitude	N45 00.737 W83 15.318'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This site consists of articulated deadwood with notching for 3 cant frames. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0028		RECORDER:	Dina Bazzill
		Photographer:	Sami K. Seeb
MAX L:	27.2'	MAX BR.	.35'
ORIENTATION:	0°	WATER D.:	15'
Latitude/Longitude	N45 00.703' W83 15.391'		
BOTTOM TYPE:	large and small cobbles		

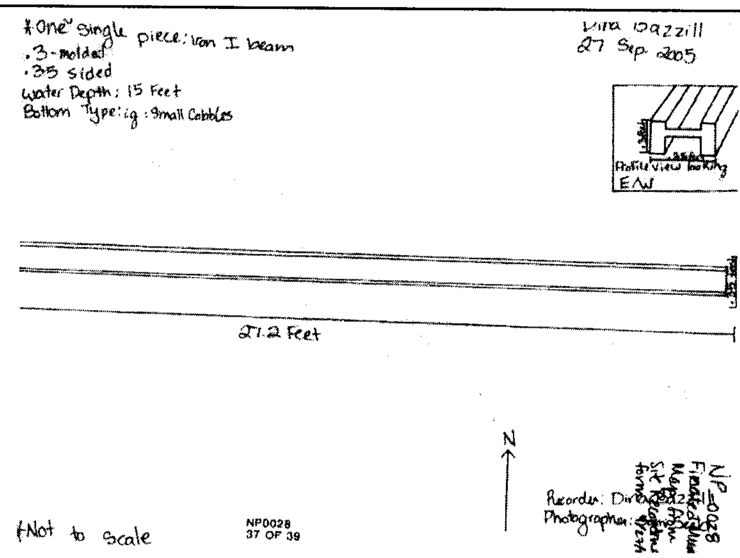
SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING	N/A				
# FRAME SETS (SINGLE)	N/A	(DOUBLE)	N/A	(TRIPLE)	N/A

SITE DESCRIPTION:

This isolated artifact is one of two pieces of rail iron, each 0.3 feet molded and 0.35 feet sided, measuring a total length of 27.2 feet. The existence of rail iron on North Point Reef is significant because, although there is no definitive association, Congress was carrying rail iron at the time it sank near the North Point reef. According to historian Pat Labadie Congress is the only vessel reported to have wrecked on North Point Reef with rail iron as cargo.

SKETCHES:



NP0028
37 OF 39

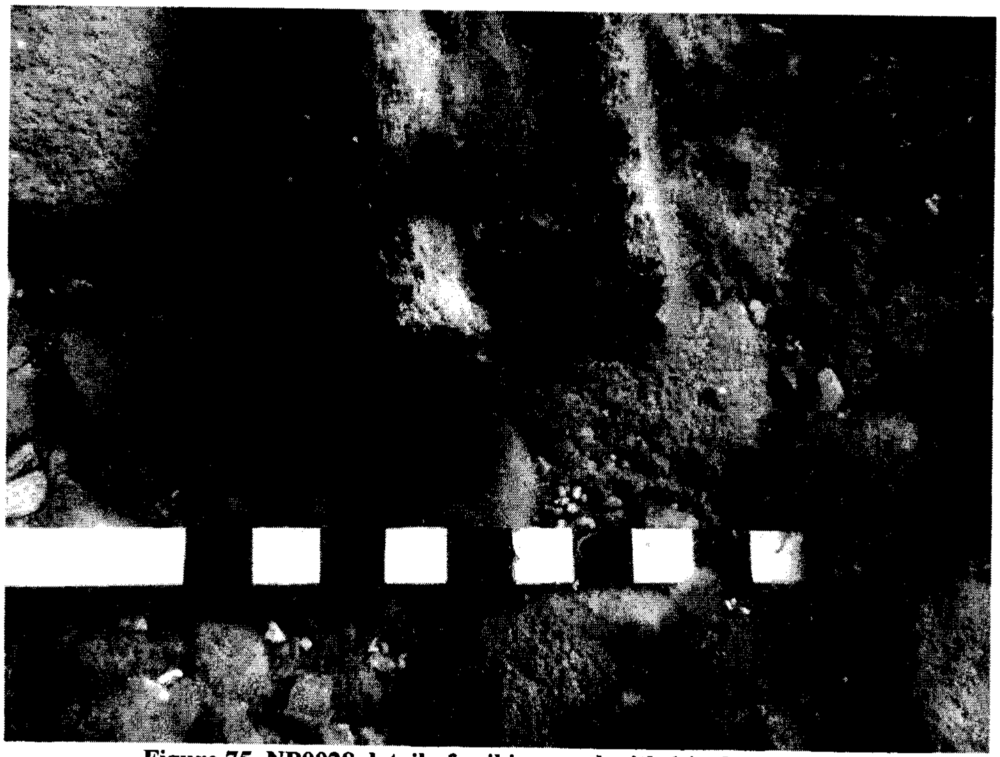


Figure 75. NP0028 detail of rail iron end with 1 inch scale bar.

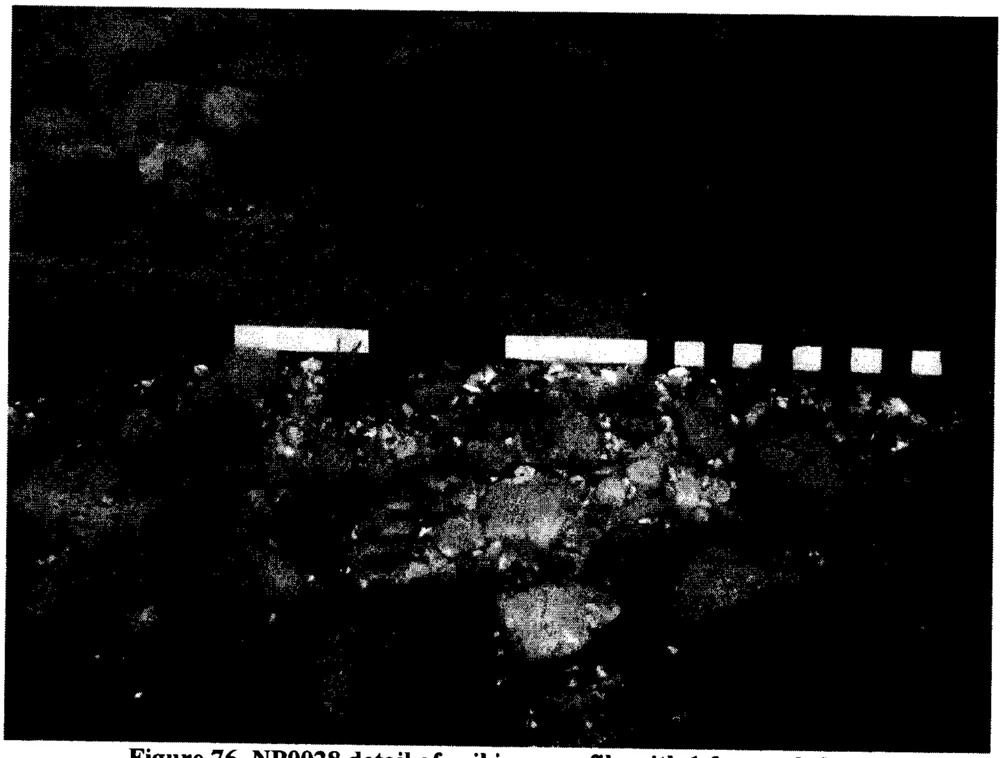
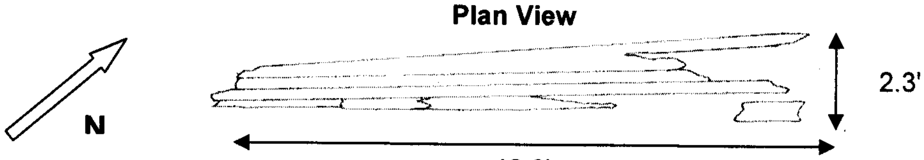


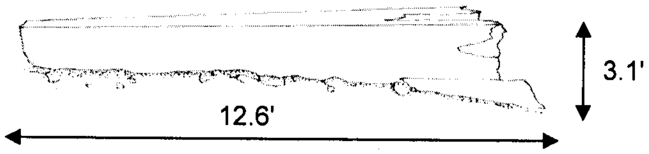
Figure 76. NP0028 detail of rail iron profile with 1 foot scale bar.

SITE # NP0029		**RECORDER:**	Tiffany Pecoraro	
		Photographer:	Brian Diveley	
MAX L:	12.6'	**MAX BR.**	2.3'	
ORIENTATION:	330°	**WATER D.:**	15'	
Latitude/Longitude	N45 00.742' W83 15.405'			
BOTTOM TYPE:	Sandy with cobblestones			
SCANTLING DIMENSIONS		**[MOLDED]**		**[SIDED]**
OUTER PLANKING		N/A		N/A
CEILING PLANKING		N/A		N/A
KEELSON		N/A		N/A
SISTER KEELSON		N/A		N/A
RIDER KEELSON		N/A		N/A
FRAMES		N/A		N/A
OTHER (NAME)		N/A		N/A
SPECIAL FEATURES (NOTE AND DESCRIBE)				
Layer 1 scantlings (x4): molded 1.1' sided 0.25'; Layer 2 : molded 1.1' sided 1.5'; metal sheathing 0.2' thick				
FRAME SPACING				
# FRAME SETS (SINGLE)		**(DOUBLE)**		**(TRIPLE)**
SITE DESCRIPTION:				
This site is comprised of a small section of articulated scantlings that are layered with 0.2 foot thick metal sheathing on one side which appear to compose an internal hogging arch. The piece, measuring 12.3 feet long by 2.3 feet sided and 3.1 feet molded has two main layers of articulated timbers. The first layer has four narrow timbers fasted together with a molded dimension of 1.1 feet and a sided dimension of 0.25 feet. The second layer has a single timber that has an exposed scarph joint on the southeastern end and measures 1.1 feet molded and 1.5 feet sided. The metal sheathing is on the bottom of the piece. It extends the length of the section and is partially buried in the sand. The piece also has iron fasteners placed four feet to six feet apart in no apparent pattern.				
SKETCHES:				

Plan View



Profile View



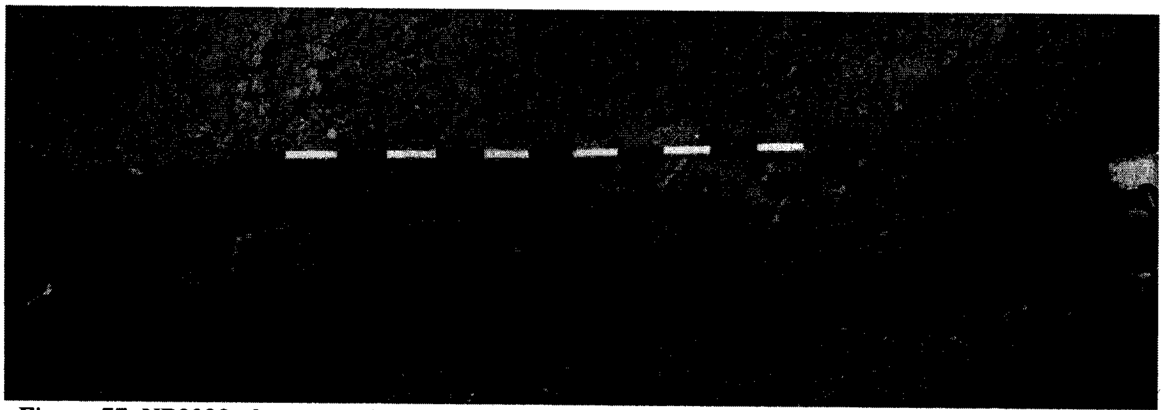


Figure 77. NP0029 photo mosaic of site plan view with 1 foot scale bar (Mosaic by Brian Diveley).

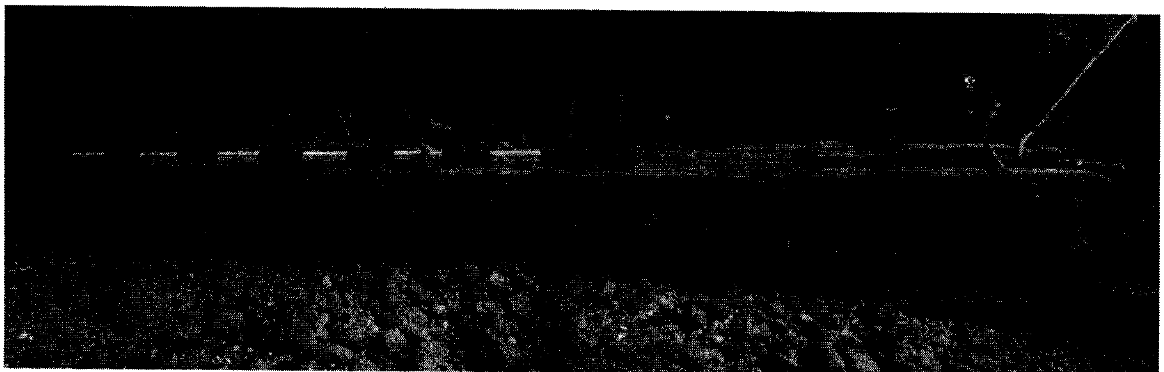


Figure 78. NP0029 photo mosaic of site profile with 1 foot scale bar (Mosaic by Brian Diveley).

SITE # NP0030		RECORDER:	None
		Photographer:	
MAX L:		MAX BR.	
ORIENTATION:	°	WATER D.:	12'
Latitude/Longitude	N45 00.748' W83 15.363'		
BOTTOM TYPE:			

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact appears to be a donkey boiler buried beneath the lake floor. A detailed documentation of the remains was not conducted by ECU. Site NP0044 is a duplicate site recording for this resource.

SKETCHES:

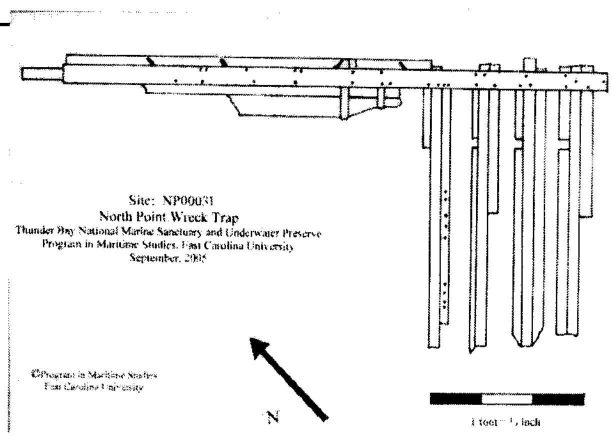
No site sketch or photographic record was accomplished.

SITE # NP0031		RECORDER:	Adam Morrisette/Wayne Lusardi		
		Photographer:	No photographic record made.		
MAX L:	22.75'	MAX BR.	11.2'		
ORIENTATION:	45°	WATER D.:	15'		
Latitude/Longitude	UNKNOWN				
BOTTOM TYPE:	Cobbles				
SCANTLING DIMENSIONS			[MOLDED]		[SIDED]
OUTER PLANKING					.8'
CEILING PLANKING			N/A		N/A
KEELSON			.7'		.7'
SISTER KEELSON			N/A		N/A
RIDER KEELSON			N/A		N/A
FRAMES			.7'		.4'
OTHER (NAME)					
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING	0.4'				
# FRAME SETS (SINGLE)			(DOUBLE)	(TRIPLE)	4

SITE DESCRIPTION:

This site consists of a 22.75 feet long section of hull consisting of keel, keelson, frames, and outer planking. The maximum breadth of the side is 11.2 feet. There are four sets of triple frames at the end of the hull section facing 135 degrees. There are two small pieces of outer hull planking near the center of the vessel remains. The keelson is .7 feet molded and sided. The frames are 0.7 feet molded and 0.4 feet sided.

SKETCHES:



SITE # NP0032-fea.1 (GB0001)		RECORDER:	Tiffany Pecoraro/ Michelle Liss
		Photographer:	
MAX L:	66'	MAX BR.	44'
ORIENTATION:	0°	WATER D.:	12
Latitude/Longitude	N45 00.602' W83 15.134'		
BOTTOM TYPE:	sandy with cobbles and small stones		

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER: engine bed support beams			0.4
SPECIAL FEATURES (NOTE AND DESCRIBE)			

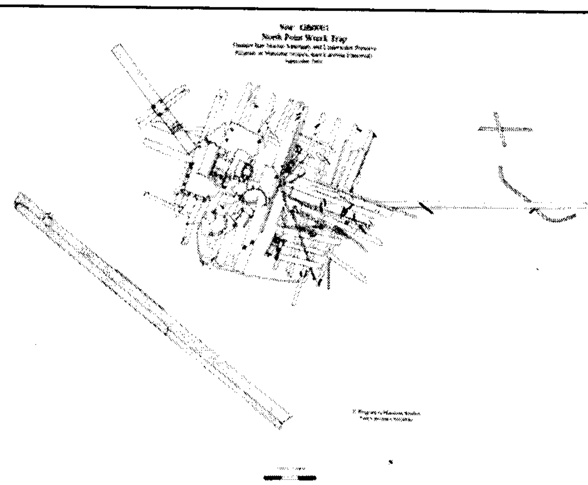
FRAME SPACING	2.2' centers (engine bed supports)				
# FRAME SETS (SINGLE)	2	(DOUBLE)	5	(TRIPLE)	1

SITE DESCRIPTION:

Site NP0032, Feature 1 is comprised of four separate elements. The scatter of debris indicates the remains are from two separate wrecking events. The first two elements of this feature are iron bracing fragments, the third is the framework for a large, articulated engine mount, and the fourth is a length of pipe. One iron bracing fragment commences 24 feet east of the engine bed and terminates beneath the bulk at an undetermined point. The second iron bracing fragment is situated adjacent to the engine bed. It measures 40 feet in length by 2 feet and is located 71 feet to the southwest of the main area of debris.

The engine bed is by far the most complex element of the feature. It measures 30 feet by 22 feet overall and consists of an articulated framework of large scale timbers with intact iron mounting fixtures. Some small scale machinery is also scattered throughout the main feature components, as is lengths of wire rope and metal piping. The fourth element is a length of articulated pipe with an intact coupling. It measures 14 feet in length and has a diameter of 1.0 foot. Located directly adjacent to the engine bed, and might be associated with the missing machinery from the engine mount.

SKETCHES:



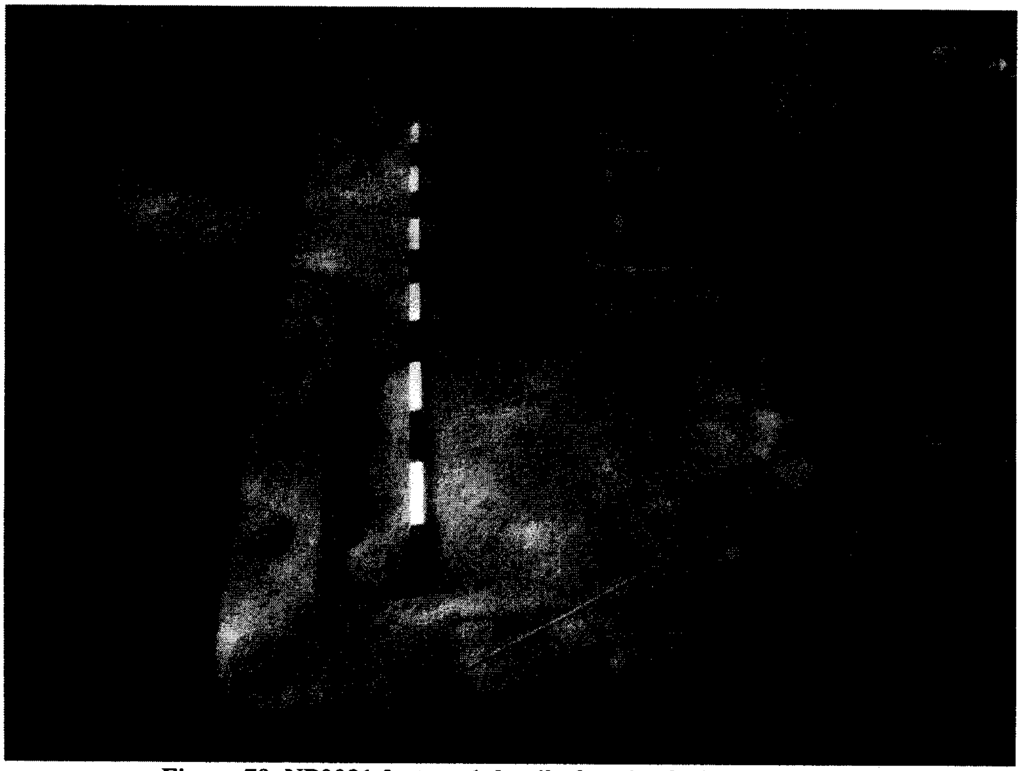


Figure 79. NP0031 feature 1 detail of engine bed components.

Figure 80. NP0032 feature 1 detail of engine bed components.

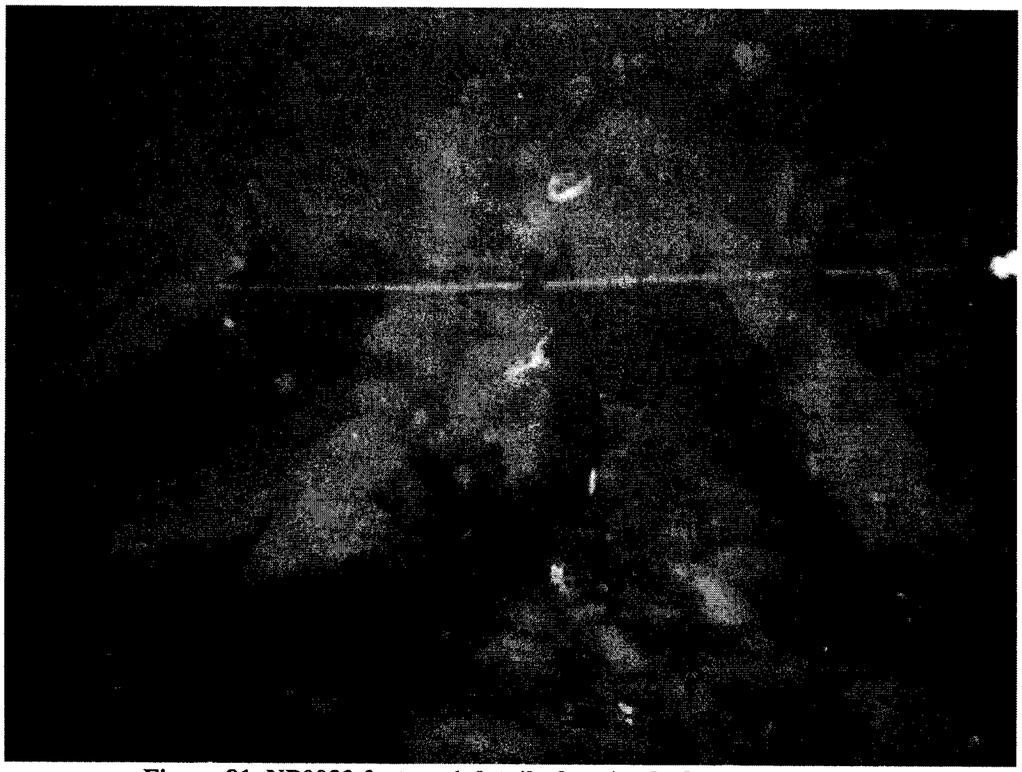


Figure 81. NP0032 feature 1 detail of engine bed support frames.

SITE # NP0032-feature 2 (GB002)		**RECORDER:**	Sami K. Seeb		
		Photographer:	Brian Diveley		
MAX L:	42.2'	**MAX BR.**	9.4'		
ORIENTATION:	0°	**WATER D.:**	12'		
Latitude/Longitude	N45 00.602' W83 15.134'				
BOTTOM TYPE:	small to medium sized stones				
SCANTLING DIMENSIONS		**[MOLDED]**		**[SIDED]**	
OUTER PLANKING		N/A		N/A	
CEILING PLANKING		N/A		N/A	
KEELSON		N/A		N/A	
SISTER KEELSON		N/A		N/A	
RIDER KEELSON		N/A		N/A	
FRAMES		N/A		N/A	
OTHER (NAME)		N/A		N/A	
SPECIAL FEATURES (NOTE AND DESCRIBE)					
Iron beams, eccentric, capstan base					
FRAME SPACING	N/A				
# FRAME SETS (SINGLE)	N/A	**(DOUBLE)**	N/A	**(TRIPLE)**	N/A

SITE DESCRIPTION:

Site NP0032, Feature 2 consists of iron beams, iron plating debris, a possible engine eccentric, and a capstan base. The length of the site consists of two "L-beams" riveted together. There is debris in the space between the beams and additional large beams to the side. At the joints, the primary beams are held together with iron patches fastened with numerous fasteners. On the 180° (south) side of the site, there are two large iron objects. One object looks like a broken piece of an engine eccentric. The other object looks like it might be the base of an iron capstan with the middle being the part that would go through the deck while the three-piece section would sit on top of the deck below the capstan piece.

SKETCHES:

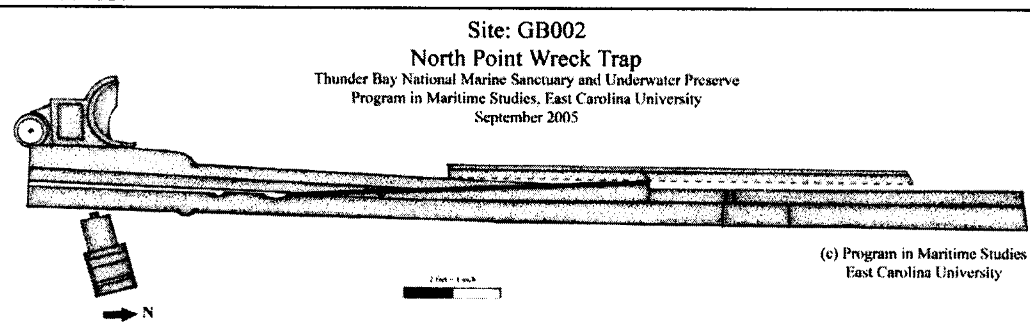


Figure 82. NP0032 feature 2 overview of articulated iron beams.

Figure 83. NP0032 feature 2 detail of potential capstan base.

SITE # NP0032 - fea. 3 (GB0003)		**RECORDER:**	Brian Diveley
		Photographer:	Sami Seeb
MAX L:	23.5'	**MAX BR.**	10.8'
ORIENTATION:	310°	**WATER D.:**	11'
LAT/LONG	N45 00.591' W83 15.169'		
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - (range = .1' - 3.6')		

SCANTLING DIMENSIONS	**[MOLDED]**		**[SIDED]**
OUTER PLANKING	0.3'		.9'
CEILING PLANKING	0.2'		.6'
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.5'		.4'
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

Overall section of the vessel consists of composite paired frames and frame sections disarticulated from hull section in wrecking process. SE section is noted with several single and paired frames, but are not apparent in north section of site. Note: Feature 3 and 5 both have features consistent with one another. Iron bracing and ceiling planking both have measures similar to one another in size and placement.

FRAME SPACING	Unable to delineate				
# FRAME SETS (SINGLE)	0	**(DOUBLE)**	3	**(TRIPLE)**	0

SITE DESCRIPTION:

Site NP0032, Feature 3 consists of 23.5 foot section of articulated ceiling planking with 3 double frame sets, intact outer hull planking, and iron bracing. Frame sets, consisting of composite paired frames, are only located in the southeast section of the feature and are disarticulated from the hull. Associated iron strapping is located on the feature and is as much as 6 feet in length in the shortest section and averages approximately 0.4 feet sided by 0.1' feet molded. Feature three has features consistent with feature five. In both features, iron bracing and ceiling planking are similar to one another in measurement and placement on the hull section.

SKETCHES:

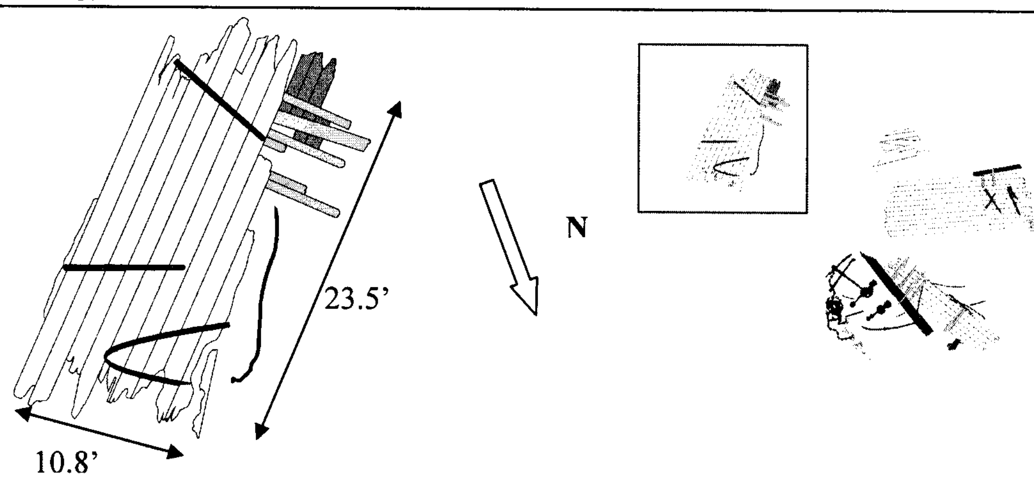


Figure 84. NP0032 feature 3 detail of planking profile with frame ends visible.

SITE # NP0032 - fea. 4 (GB0003)		RECORDER:	Brian Diveley
		Photographer:	Sami Seeb
MAX L:	12'	MAX BR.	8.5'
ORIENTATION:	310°	WATER D.:	11'
LAT/LONG	N45 00.591' W83 15.169'		
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - (range = .1' - 3.6')		

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

Feature 4 is believed to be an articulated portion of deck planking (Lusardi). Portions of this feature continue beneath the sandy surface and is difficult to distinguish boundaries of this site. We are unable to discern the orientation of planking observed from the surface.

FRAME SPACING	N/A				
# FRAME SETS (SINGLE)	0	(DOUBLE)	0	(TRIPLE)	0

SITE DESCRIPTION:

Site NP0032, Feature 4 is a 12 foot articulated portion of deck planking, composed of seven pieces of wood in varying sizes. Three planks are angularly cut and joined adjacent to one another, creating acute angles. Two pieces of this planking have sided dimensions of 1.8 feet. Portions of this feature continue beneath the sandy surface, making it difficult to distinguish the boundaries of this site.

SKETCHES:

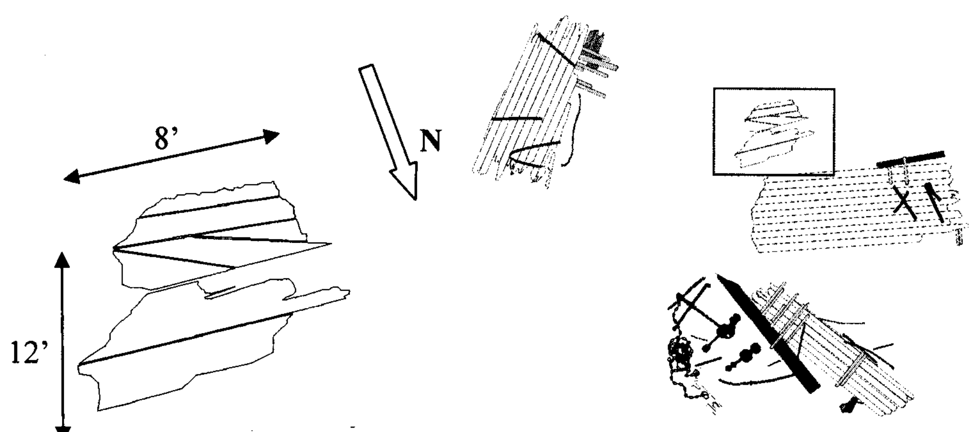


Figure 85. NP0032 feature 4 detail of plank scarphing.

SITE # NP0032 - fea. 5 (GB0003)		RECORDER:	Brian Diveley
		Photographer:	Sami Seeb
MAX L:	33'	MAX BR.	11'
ORIENTATION:	310°	WATER D.:	11'
LAT/LONG	N45 00.591' W83 15.169'		
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - (range = .1' - 3.6')		

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	0.6'		.2'
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.5'		.4'
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

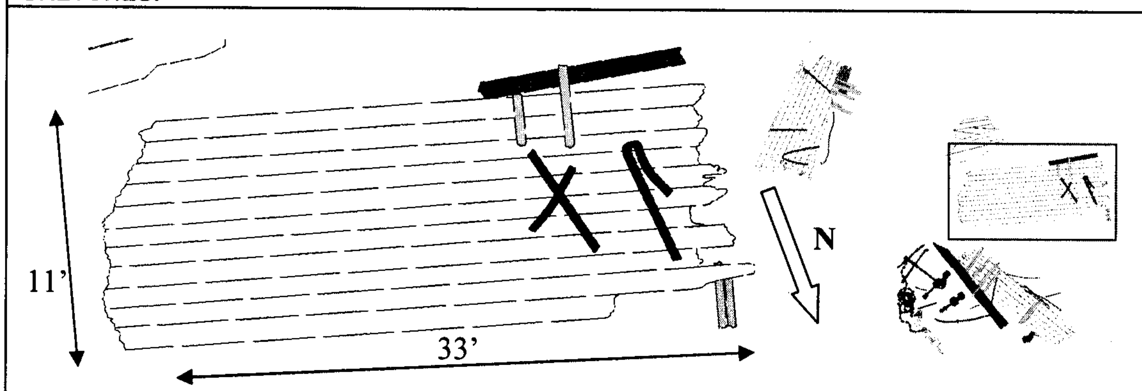
Feature 3 should be noted with a large 'L' iron girder in a East/West orientation to the feature. Two knee supports attached to the ceiling planking are above this girder. Girder length is approx. 11' in length by .8 wide and .6 deep. Note: Feature 3 and 5 both have features consistent with one another. Iron bracing and ceiling planking both have measures similar to one another in size and placement.

FRAME SPACING	Unknown				
# FRAME SETS (SINGLE)	0	(DOUBLE)	1	(TRIPLE)	0

SITE DESCRIPTION:

Site NP0032, Feature 5 consists of a 33 foot section of articulated ceiling planking with one set of double frames almost completely disarticulated from the feature but fastened to one ceiling plank. Iron bracing is smaller in length than on feature 3, but has similar dimensions at 0.4 feet by 0.1 feet in siding and molding. Two small support knees are fastened to the ceiling planking at the southern-most section of the feature near a large 'L' shaped, east/west oriented iron girder. The girder is approximately 11 feet in length by 0.8 feet wide and 0.6 feet in thickness. Ceiling planking throughout the feature is well articulated on the west side of the section, while the east side of the section appears to disappear beneath the sandy surface.

SKETCHES:



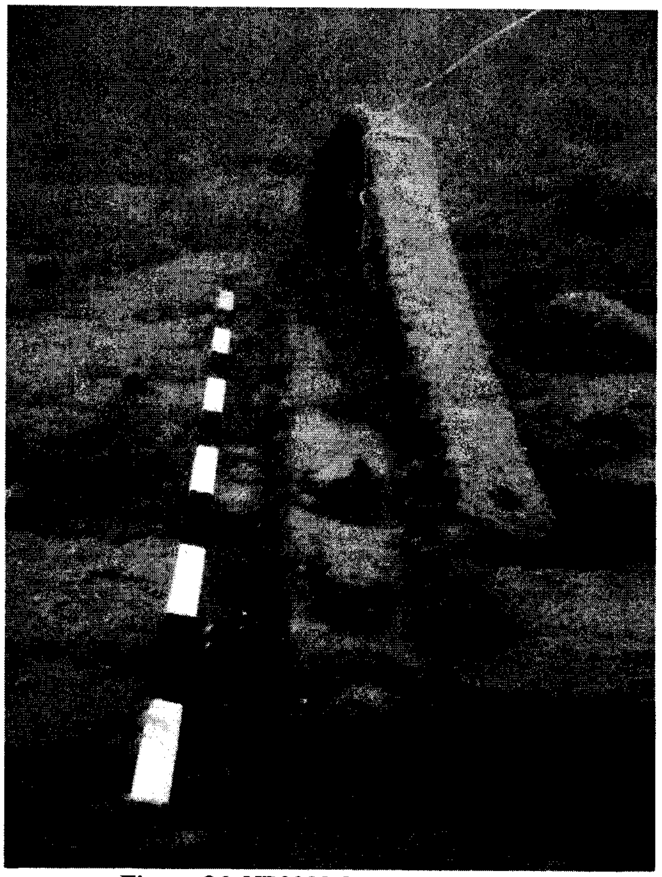


Figure 86. NP0032 feature 5 detail of bent iron cross bracing on hull fragment.

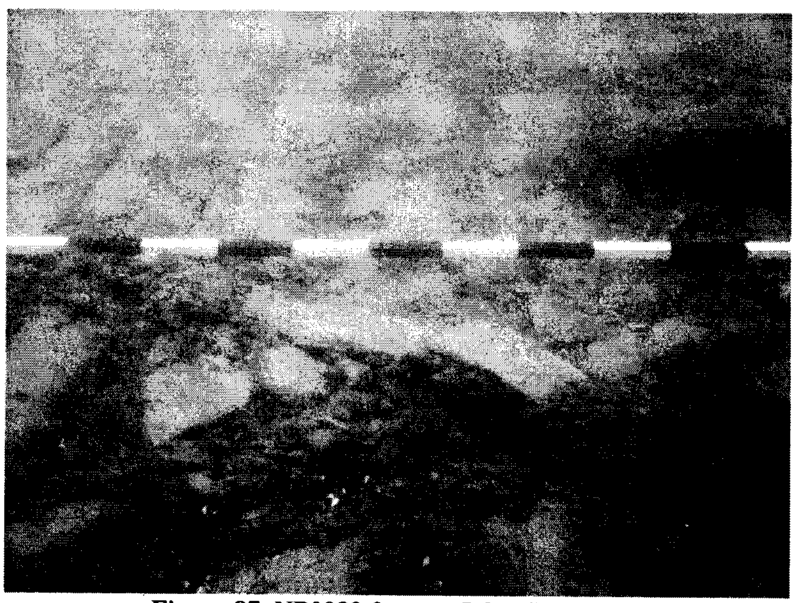


Figure 87. NP0032 feature 5 detail of intact iron cross bracing on exterior hull planking.

SITE # NP0032 - fea. 6 (GB0003)			**RECORDER:**	Brian Diveley	
			Photographer:	Sami Seeb	
MAX L:		29'	**MAX BR.**	9'	
ORIENTATION:		310°	**WATER D.:**	11'	
LAT/LONG	N45 00.591' W83 15.169'				
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - (range = .1' - 3.6')				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	0.2'		.8'
CEILING PLANKING	0.6'		.2'
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	0.5'		.5'
OTHER (NAME)	N/A		N/A

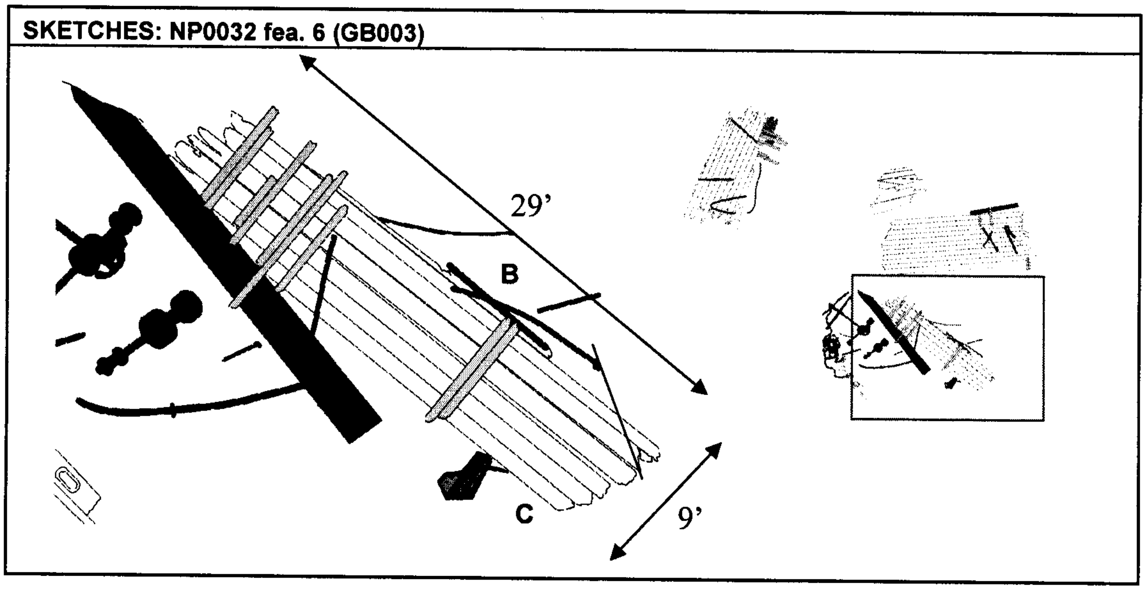
SPECIAL FEATURES (NOTE AND DESCRIBE)

Overall section of the vessel consisted of composite paired frames and frame sections disarticulated from hull section in wrecking process. SE section is noted with several single and paired frames, but are not apparent in north section of site. A - length of 2' x 23' section that disappears into sandy surface on S end of feature. Unable to discern terminus end of this section. B - Steel triangular piece with Looped hole on flared end. Fastener on narrow end runs through this and is bent on outer end. C - Various pieces of iron bracing with terminal end bent in a "U" shape.

FRAME SPACING	1-1.2' spacing between frame sets (4 on NE section)				
# FRAME SETS (SINGLE)	1	**(DOUBLE)**	4	**(TRIPLE)**	0

SITE DESCRIPTION:

Site NP0032, Feature six consists of a 29 foot hull section of ceiling planking with double frame sets, iron bracing, an iron plate or strap, and iron anchor chain loops. The ceiling planking sizes and frame sizes in this section are different than those of features three and five. Iron bracing in feature six is smaller than that of features three and five at 0.3 feet sided by 0.1 foot molded. The frames are composite paired frames and some frame sections appear to be disarticulated from the hull section, possibly due to the wrecking process. The large iron plate or strap measures two feet wide by 23 feet long and disappears into the sand on the south end of the feature. There is also a steel triangular piece, tapered on one end, measuring about 1.6 feet tall and 1.4 feet wide. It has a hole with chain coming out of the flared end and is likely a chain stop. The various pieces of iron bracing are scattered throughout the feature, one with an end bent in a "U" shape.



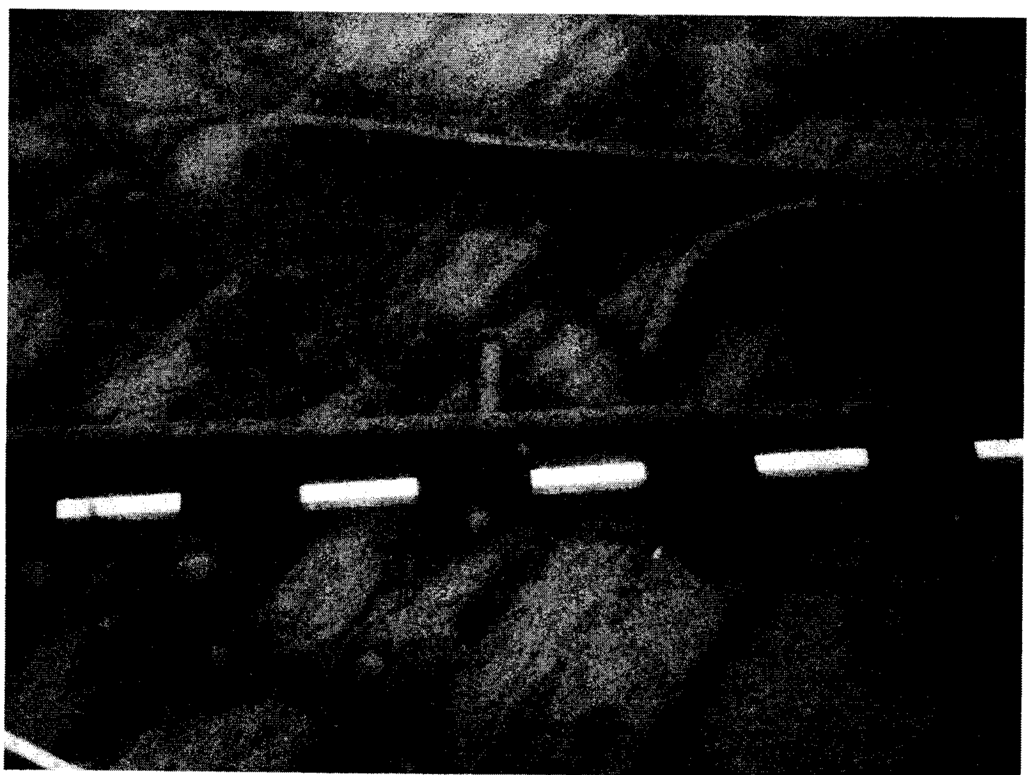


Figure 88. NP0032 feature 6 detail of miscellaneous iron debris scattered on articulated hull remains. One foot scale bar is visible.

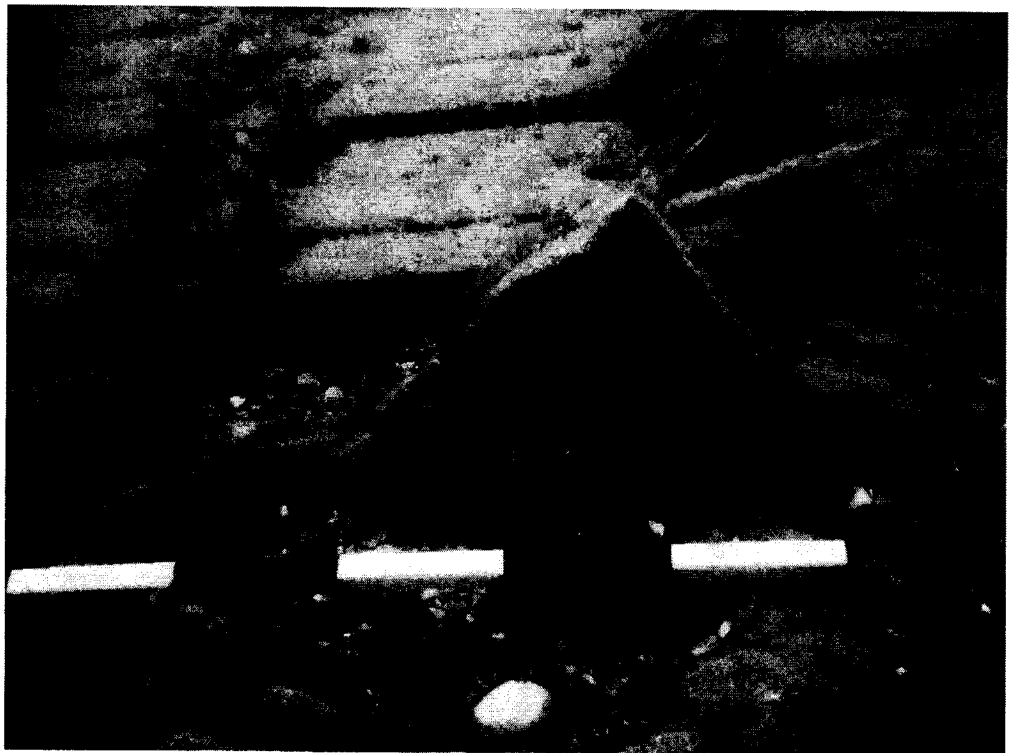


Figure 89. NP0032 feature 6 detail of hull remains and chain plate with 1 foot scale bar.

SITE # NP0032 - fea. 7 (GB0003)			RECORDER:	Brian Diveley
			Photographer:	Sami Seeb
MAX L:		Varies	MAX BR.	Varies
ORIENTATION:		310°	WATER D.:	11'
LAT/LONG	N45 00.591' W83 15.169'			
BOTTOM TYPE:	Sandy, w/limestone rounded cobble of various sizes - (range = .1' - 3.6')			

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING	N/A		N/A
CEILING PLANKING	N/A		N/A
KEELSON	N/A		N/A
SISTER KEELSON	N/A		N/A
RIDER KEELSON	N/A		N/A
FRAMES	N/A		N/A
OTHER (NAME)	N/A		N/A

SPECIAL FEATURES (NOTE AND DESCRIBE)

NOTE: Site features consist of several articulated vessel components. The first, Section A is a large anchor with intact flukes and arms. The fluke is oriented in a vertical position to the surface and wrapped beneath feature B. Both arms combined were 8.8' and the shaft to the fluke was 9.3. The ring was aprox 1' and was still attached to anchor chain. Section B is the remains of a windlass assembly. This is the entire section of metalworks and is approximately 7.3' in total length by 1.5' wide (varies depending on section of machinery for length). This was made of iron and in relatively good condition with moderate concretion. Section C is a capstan mounting with bracketed pinrail at narrow end. This is in good condition with moderate concretion. Section D is piled anchor chain approx. .15' in steel diameter. This is attached to the anchor and with two other ends running to splintered haws holes. Section E is the remains of two haws holes with diameter of .8 round and two oblong holes on disarticulated timber piece.

FRAME SPACING	Not applicable				
# FRAME SETS (SINGLE)	0	(DOUBLE)	0	(TRIPLE)	0

SITE DESCRIPTION:

Site NP0032, Feature seven consists of several components of articulated vessel machinery. The first component is a large anchor with intact flukes and arms. The shank of the anchor rests on a windlass. One fluke is oriented in a vertical position to the surface and the other is lodged underneath the windlass. Both arms combined measure 8.8 feet and the shank to the fluke measures 9.3 feet. The ring, with approximately a one foot diameter, was still attached to the anchor chain. The windlass is entirely intact and measures approximately 7.3 feet in total length by 1.5 feet in width at the widest part. There is also a fully intact capstan. This is in good condition with moderate concretion. There is also a significant amount of anchor chain which is approximately 0.15 feet in diameter. This is attached to the anchor and runs into a hawse hole. The feature also has the remains of two hawse holes on a disarticulated timber. The holes have a diameter of 0.8 feet and are an oblong shape.

SKETCHES:

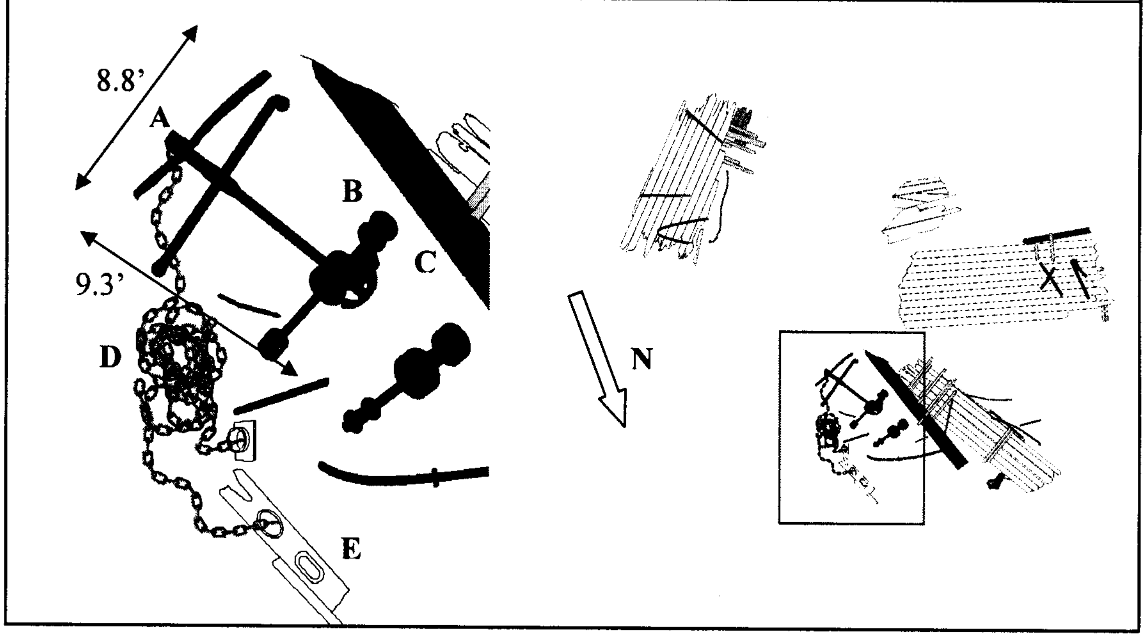


Figure 90. NP0032 feature 7 anchor detail with windlass.

Figure 91. NP0032 feature 7 detail of adjacent capstan.

Figure 92. NP0032 feature 7 detail of hawse hole with threaded anchor chain.

Figure 93. NP0032 feature 7 detail of chain plate with threaded anchor chain.

SITE # NP0033			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	17'
Latitude/Longitude	N45 00.233' W83 15.003'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is an iron cone. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0034			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	23'		
Latitude/Longitude	N45 00.189' W83 14.970'					
BOTTOM TYPE:						

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING				
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)

SITE DESCRIPTION:

This site consists of stone cargo remnants. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0035			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	9'
Latitude/Longitude	N45 00.553' W83 15.145'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is a metal strap fragment. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0036			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	8'
Latitude/Longitude	N45 00.522' W83 15.083'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is an undetermined piece of iron. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0037			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	
Latitude/Longitude	N45 00.291' W83 14.911'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

No site description was recorded for this location and a detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0038			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	
Latitude/Longitude	N45 00.712' W83 15.273'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING				
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)

SITE DESCRIPTION:

No site description was recorded for this location and a detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0039			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	
Latitude/Longitude	N45 00.700' W83 15.364'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

No site description was recorded for this location and a detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0040			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	
Latitude/Longitude	N45 00.710' W83 15.409'			
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is the second of two pieces of rail iron, each 0.3 feet molded and 0.35 feet sided, measuring a total length of 27.2 feet. The existence of rail iron on North Point Reef is significant because, although there is no definitive association, Congress was carrying rail iron at the time it sank near the North Point reef. According to historian Pat Labadie Congress is the only vessel reported to have wrecked on North Point Reef with rail iron as cargo.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0041			RECORDER:	None
			Photographer:	
MAX L:			MAX BR.	
ORIENTATION:		°	WATER D.:	17'
Latitude/Longitude		N45 00.665' W83 15.327'		
BOTTOM TYPE:				

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is a 16' timber. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0042			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	14'		
Latitude/Longitude	N45 00.689' W83 15.324'					
BOTTOM TYPE:						

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is a metal eye. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0043			RECORDER:	None		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	17'		
Latitude/Longitude	N45 00.766' W83 15.444'					
BOTTOM TYPE:						

SCANTLING DIMENSIONS	[MOLDED]		[SIDED]
OUTER PLANKING			
CEILING PLANKING			
KEELSON			
SISTER KEELSON			
RIDER KEELSON			
FRAMES			
OTHER (NAME)			
SPECIAL FEATURES (NOTE AND DESCRIBE)			

FRAME SPACING					
# FRAME SETS (SINGLE)		(DOUBLE)		(TRIPLE)	

SITE DESCRIPTION:

This isolated artifact is an undetermined piece of timber. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

No site sketch or photographic record was accomplished.

SITE # NP0044			RECORDER:	none		
			Photographer:			
MAX L:			MAX BR.			
ORIENTATION:		°	WATER D.:	12'		
Latitude/Longitude	N45 00.748' W83 15.363'					
BOTTOM TYPE:						
SCANTLING DIMENSIONS				[MOLDED]		[SIDED]
OUTER PLANKING						
CEILING PLANKING						
KEELSON						
SISTER KEELSON						
RIDER KEELSON						
FRAMES						
OTHER (NAME)						
SPECIAL FEATURES (NOTE AND DESCRIBE)						
FRAME SPACING						
# FRAME SETS (SINGLE)				(DOUBLE)		(TRIPLE)

SITE DESCRIPTION:

This site record was a duplicate site recording for NP0030 an isolated artifact that appears to be a donkey boiler buried beneath the lake floor. A detailed documentation of the remains was not conducted by ECU.

SKETCHES:

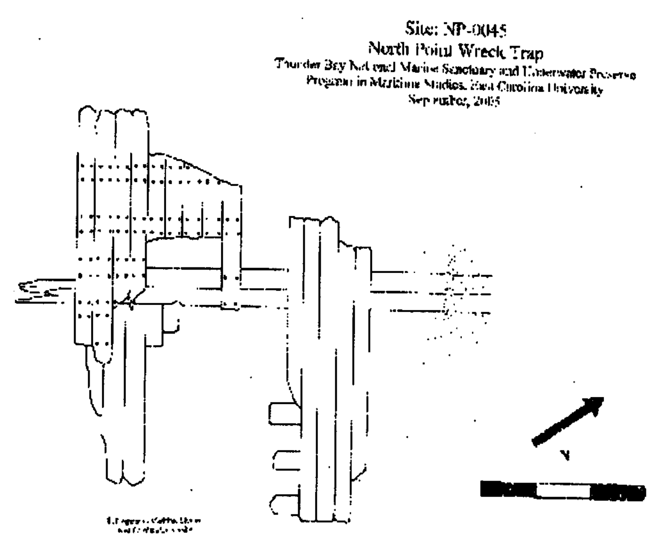
No site sketch or photographic record was accomplished.

SITE # NP0045		RECORDER:	Tiffany Pecoraro and Stephanie Allen		
		Photographer:	None		
MAX L:	18'	MAX BR.	15'		
ORIENTATION:	300°	WATER D.:	12		
Latitude/Longitude	Unknown				
BOTTOM TYPE:	small pebbles and sandy				
SCANTLING DIMENSIONS			[MOLDED]		[SIDED]
OUTER PLANKING					0.8'
CEILING PLANKING					0.6'
KEELSON					
SISTER KEELSON					
RIDER KEELSON					
FRAMES					0.6'
OTHER (NAME)					
SPECIAL FEATURES (NOTE AND DESCRIBE)					
FRAME SPACING					
# FRAME SETS (SINGLE)	3	(DOUBLE)	1	(TRIPLE)	

SITE DESCRIPTION:

This site is a hull fragment consisting of 14 articulated ceiling planks, measuring 0.6 feet sided, with one group of five fastened together and one group of nine fastened together. There is one double frame set and fragments of three single frame sets, all with a sided dimension of 0.6 feet. The site also has five hull strakes with a sided dimension of 0.8 feet. It measures 18 feet in length and 15 feet in breadth.

SKETCHES:



APPENDIX D

HISTORIC NEWSPAPER ARTICLES DEPICTING NORTH POINT SHIP WRECKS AND SALVAGE

Historic Newspaper Articles depicting North Point Ship Wrecks and Salvage

The following list of historic newspaper articles presents a chronology of wrecking events on North Point Reef from 1868 to 1930. The list was initially provided by Michigan State Underwater Archaeologist Wayne Lusardi and additional entries have been added over the course of the current research. While by no means comprehensive of all wrecking events at this location, the articles are intended to confirm the location as a ship trap and demonstrate the widespread utility of maritime salvage. The multiple records of shipwrecks and recoveries clearly illustrate the central role that salvage played in every wrecking event. The regional emphasis on recovery and recycling is reiterated by every account presented. Similarly, the perception of a vessel's commercial significance, wrecked or otherwise, is also demonstrated by the repeated accounts of a vessel's worth and insured price in every article. Ultimately, the list of articles provide detailed information about the nature of a wrecking event at this particular location, as well as supplement the current study's assessment of the social, economic, and environmental factors that contributed to making the location hazardous for historic mariners.

Congress

The propeller *Congress*, with a general cargo from Buffalo to Chicago, was wrecked at North Point, Thunder Bay, o n the 26th inst., and became a total loss. Prior to her final disaster she got ashore on Black River Reef, but after some 12 hours delay was lightered off to meet on the day following with total shipwreck, which ends her career. She had on board a cargo consisting of salt, apples, railroad iron, and stoves. Shortly after getting ashore she took fire, destroying all of her upper works down to the water line. A portion of her cargo, it is possible, may be saved. The crew was all saved, and arrived in this city yesterday. The *Congress* was owned by Captain F.G. Hentig, who also commanded her and is a residence of this place. She was insured, we learn, in the sum of $20,000, in several companies. She was formerly called the Detroit, was built at Cleveland, and came out in 1861, was 398 tons burthen, old style. During the war she was taken to the seaboard, where she remained until 1866, when she returned to the lakes. In the meantime her name was changed to the present one (*Detroit Post* 1868).

Contrary to almost universal prediction, the new wrecking steamer *Monitor* has returned to Detroit from her first expedition, and brings a good report of herself. The boiler and machinery of the steamer *Detroit* were recovered, and also that of the propeller *Congress.* Both of these boats lay in thirty feet of water. In working at the *Congress* a wrecking line was put out from the *Monitor* centered over the wreck steadily, and during all the lifting listed but a trifle. Capt. Snow has been gone with his boat twenty two days and estimates that he has saved property worth $4,500. He offers $1,000 to any person who will place buoys over the sunken steamer *Pewabic*, wrecked off Thunder Bay about seven years ago. It took the *Monitor* just five minutes to raise the boiler of the *Congress.* The heaviest lift weighed forty tons, and was handles with 105 pounds of steam (*Globe* 1875).

Bemis

Tug *Bemis* Burned: Last Saturday morning, about 5 o'clock, the tug *Bemis*, owned by Capt. Harrington, took fire when she was about six miles from this city and near Plough's fishery, and was burned to the water's edge. She was going after a raft of logs when the disaster occurred, and had with her a small boat, in which the Captain, Engineer and Fireman made their escape and returned to this city. The fire broke out under the boiler, and when discovered she was two miles out, but was immediately headed for shore, and sunk about three quarters of a mile out. She was valued at $6,000, insured for $4,000 (*Alpena Weekly Argus* 1872a:3, col. 2).

Galena

Galena Disaster! The Propeller *Galena* a Total Loss, $30,000, Insured $10,000, Sunday Night Gale: Last Tuesday night about 11 o'clock the propeller *Galena*, so favorably known in this port, left here bound for Chicago, loaded with 272,000 feet of lumber. There was at the time she left a strong wind blowing from the southwest, and a heavy sea was rolling, but it was not considered dangerous to venture out, although it would be rather rough rounding North Point, but after that the wind would have been a very favorable one for the proposed trip. Capt. Broadbridge was on duty, and laid his course half a point more to the sea than was usual, for leeway, and was running on his regular time. At about 12 o'clock he felt the boat strike, and found that he was on North Point Reef, about twelve miles from this city. He immediately attempted to back her off, but she had been set on the rocks with such force that all efforts to remove her were fruitless. The heavy sea caused her to commence pounding on the bottom with great violence, and in order to make her lay more easy, the captain ordered her scuttled by opening the sea cocks, and as soon as she filled with water she lay as quite as the waves would allow. All day Wednesday she lay helpless, with the signal of distress flying, while the storm continued, and heavy waves were dashing entirely over her most of the time. The *Wenona* on her down trip passed about a mile away, but could render no assistance. About 2 o'clock Capt. Taylor, of the barque *Erastus Corning*, which had dropped anchor about two miles distant, lowered a boat, and with four men, after an hour of hard pulling, reached *Galena*, and the captain, clerk, 2nd mate, engineer, wheelman, watchman, five passengers, and a trunk containing the boat's papers, etc. started for the shore, but were necessitated to go the lee side of North Point to escape the breakers. In about an hour they reached the shore, somewhat wet, but still alive, and started on foot for this city, arriving here about 2 o'clock Thursday afternoon. The officers returned to the boat that afternoon, and have been since moving furniture, bedding, machinery, etc., and saving everything they could. It is very doubtful whether, having had very rough weather since, she will be good for anything in the future, but we should judge not. She was valued at $30,000, and was insured for $10,000, as near as we can learn (*Alpena Weekly Argus* 1872b:3, col. 2).

The *Magnet* arrived here yesterday, and visited the wreck of the *Galena*, but matters looked rather dubious (*Alpena Weekly Argus* 1872c:3, col.1).

The propeller *Galena* has nearly been stripped and about given up as lost (*Alpena Weekly Argus* 1872d:3, col.1).

The wrecking steamer *Magnet* which set out from Detroit a few days since to rescue the propeller *Galena*, returned to Detroit Friday, having been unsuccessful in her mission. The *Galena* was found to be too much broken up, and in short was almost a complete wreck, and the fragments were not worth recovering (*Toledo Blade* 1872:3, col. 6)

The wrecking tug *Princess* is here for the purpose of raising and securing the boiler, engine and machinery from the wreck of the propeller *Galena,* which went to pieces on North Point last October (*Alpena Weekly Argus* 1873:3, col.1)

S.C. Baldwin

The steam barge *S.C. Baldwin*, during a blinding snowstorm on Saturday morning, went ashore on the reef at North Point. The barge was heavily loaded with iron ore, and went down in a short time. The crew was saved by the lifeboat from the life saving station at Thunder Bay and the little tug *Farrar* (*Port Huron Daily Times* 1877).

The tug *Winslow*, with pumps, etc., has gone to the relief of the steam barge *S.C. Baldwin*, ashore near Thunder Bay light, Lake Huron (*Cleveland Herald* 1877a).

St. Andrew

The officers of the propeller *St. Joseph* report the schooner *St. Andrew* ashore at North Point, Thunder Bay. She lies on the inside of the reef and well out. She is grain laden. The tug *Miller* went to her assistance from Alpena with a lighter Monday noon. She went ashore during the northeaster Sunday night (*Cleveland Herald* 1877b).

The schooner *St. Andrew*, ashore at Alpena, has been released, and is in that port discharging her damaged cargo of corn (*Cleveland Herald* 1877c).

Sunny Side; Empire State; Charles Hinckley

Bad Weather: The weather during the entire fall of 1877 has been very stormy and uncertain, and marine disasters have been more numerous than in many years before. During the past two weeks the mail boats have been obliged to miss several tips on account of the terrible gales, and the Detroit steamers are all off of time. On Thursday night of last week the wind seemed to howl a perfect hurricane, and many unfortunate vessels were caught in the gale and driven ashore, while others were dashed to pieces or sent to the bottom of the lakes. The steamer *Dunlap*, which left port on Thursday afternoon, succeeded in weathering the gale, which Capt. Brown informs us was the most terrific he had ever experienced, until she arrived at Tawas, where she was compelled to stay until Friday night, when she sailed for Bay City. During the same gale, the *Sunny Side*, loaded with coal, was driven ashore at North Point, where she still remains, and is being unloaded by the wrecking tug *Monitor*, not being very much damaged. The schooner *Empire State* also went ashore some distance from the *Sunny Side*, and will prove a total wreck. She is loaded with iron ore, and has broke in two. She has been stripped of her rigging, which is now at this port. The schooner *Chas. Hinkley*, also loaded with ore, is another unfortunate, and lies hard aground in sight of the above two. Her mainmast and fore topmast were carried away, and she sustained other damage. She lied in very fair shape, and can be lightered off (*Alpena Weekly Argus* 1877:3, cols. 3-4).

The yawl boat, sails, and rigging of the schooner *Empire State*, which went to pieces last fall near Thunder Bay, are to be seen at Turner & Co.'s dock. They were brought down by the *St. Paul* on her last trip (*Cleveland Herald* 1878).

The Cargo of the *Empire State*: Yesterday morning the schooner *Three Bells* arrived at the upper end of the city, with a cargo of 300 tons of iron ore, taken from the wreck of the schooner *Empire State*, by the steam wrecking barge *Monitor.* About 100 tons more remain to be secured, which is now being taken out and put on board a small schooner (*Detroit Post and Tribune* 1878).

Tuttle

A Narrow Escape: The steam barge *Tuttle*, laden with coal and bound for Silver Island, Lake Superior, ran ashore at North Point, last Wednesday morning, during the heavy fog that prevailed at that time. Her commander did not know where he had stranded, as he had lost his bearings during the fog. His situation was not a very pleasant one. He might be in a sheltered place, or a few hours' time might witness the destruction of his vessel. He commenced blowing signals of distress, and these were heard by a fishing boat, which came to his assistance, and the captain soon discovered where he was located. A message was sent to this port, asking the harbor tugs to come to his assistance, and the tugs *Ralph* and *Effie L.* went out to see what they could do towards relieving the *Tuttle* from her unpleasant position. When the *Tuttle* was steaming through the fog, she was, of course, running under check, and, consequently, was not very hard on, therefore, after some pulling, the harbor tugs succeeded in getting her afloat, and without throwing overboard any of the cargo. The *Tuttle* came to this port and remained all night. While at this port a diver was obtained and her bottom examined, but no injuries were discovered. She cleared for Lake Superior, Thursday (*Alpena Weekly Argus* 1883:3, col. 6).

J.S. Fay

Propeller *J.S. Fay* on North Point: The propeller *J.S. Fay*, Captain Holmes in command, was out in Lake Huron, when caught by the heavy equinoctial gale of Tuesday of last week. She had in tow the *Rhodes*, but was forced to let go of her. The *Fay* made for Thunder Bay for shelter, and in coming into the bay Wednesday morning, she hugged North Point too close and ran hard on the reef, which is about half a mile from the Point. The steamer *Galena* was wrecked at the same place some years ago. Owing to the heavy rain, Thunder Bay Island light could not be seen, and that was the reason the captain of the *Fay* made a mistake in his reckoning. When daylight came the stranded propeller was discovered by the Thunder Bay Island lifesaving crew, and Captain Persons and his men promptly went to the rescue. They arrived about 7:30 a.m. The surf running at that time was as great as ever seen in the bay. For six hours the crew remained close to the *Fay*, in a cold and blinding spray, being unable on account of the sea to get alongside. About 1 o'clock the sea had so far moderated as to allow the 1^{st} mate of the *Fay* to be lowered to the lifeboat from the end of the fore boom. He was then brought to this city, distant about ten miles, by the life saving crew, and the owner Mr. Bradley, of Cleveland, was notified as soon as a message could be got over the lines. Te lifeboat retuned to the wreck and next day brought to town two women, three children and a Toledo judge who were on the *Fay*. Arrangements were made with F.W. Gilchrist and F.W. Fletcher to rescue the *Fay*. The harbor tugs *Ralph* and *Effie L.*, and the schooners *Provost* and *Consuelo* were taken out to the *Fay* and the work of lightering the stranded vessel commenced. The *Fay* was hard on, being about five feet out forward, and had on board 51,000 bushels of wheat. By noon Friday last some 18,000 bushels of wheat had been taken off the *Fay*, and she was then pulled off the reef. She proved to be uninjured and did not leak. The entire cargo was saved, and Messrs. Gilchrist and Fletcher received $1,500 for their work. Vessel men think the *Fay* got out of her trouble very cheap, and she certainly had a narrow escape from being wrecked. Then *Rhodes* came to anchor off Black River, being all right as far as we are able to learn. The captain of the *Fay* speaks very highly of the Thunder Bay lifesaving crew (*Alpena Weekly Argus* 1885:3, cols.4-5).

Selkirk; Ellsworth

Ashore: The heavy fog here Thursday last, was the cause of two vessels running ashore, the schooner *Selkirk*, loaded with coal having run on the reef near North Point, and the schooner *Ellsworth* having got hard on the reef southeast of Middle Island. The latter had on a cargo of cedar railway ties, from this port. The harbor tugs *Effie L.* and *Ralph* went to the rescue of the *Ellsworth*, and Saturday, after some of the deck load had been thrown overboard, they pulled the stranded vessel off the reef. The ties were then reloaded on the *Ellsworth*. The captain of the *Selkirk* managed to engage the steamer *Golden Eagle* to assist him, and after some pulling his craft was got afloat. Both of the stranded vessels were uninjured, and it was lucky for them that assistance could be found at this port. The lifesaving crews at Middle Island and at Thunder Bay Island, rendered every assistance in their power (*Alpena Weekly Argus* 1887a:3, col.5)

Mineral State

F.W. Gilchrist took the contract of releasing the wrecked schooner *Mineral State*, which has ran ashore at North Point, October 29^{th}, the contract price for delivering her at this port being $1,400. One of Mr. Gilchrist's steam pumps was taken to her and placed aboard. A number of men were engaged and some horses were also taken out, to be used in hauling the barrels of plaster out of the hold. The work commenced on Tuesday of last week, and by Thursday noon the greater part of the cargo has been dumped overboard and the disabled craft pumped out and towed here. While on her way in she had a narrow escape from foundering when outside the bay. The paper that was on the end of the barrels had clogged the pump so that it would not work. As the vessel leaked like a sieve, she began to fill with water very fast. The tug *Ralph,* which had her in charge, was headed for the shore, and everything got in readiness to get away from the schooner in case she should fill before shallow water was reached. Alongside was lashed the schooner *Minnie Davis.* For a short time the scene was an exciting one. At last the pump was freed from the obstructions and again began its work, and the danger was over. The vessel was brought to this port, another pump was placed on board, so that if one gave out, the other would be in readiness, and late Saturday night, the tug *Sumner,* which had just returned from taking the propeller *Arctic* to Detroit, left again for the same place, towing the disabled schooner, as Mr. Gilchrist had taken another contract to deliver the *Mineral State* in Detroit, and successfully completed the contract. The schooner was badly damaged, and her ruder was disabled. Her entire cargo, consisting of several thousand barrels of plaster was ruined, being turned into stone. While here, the citizens had an opportunity to see what a large amount of water the steam pumps would raise out of the vessel (*Alpena Weekly Argus* 1887b:3, col. 5).

Guinair

The schooner *Guinair* ran ashore at North Point on the morning of the 5th. She was loaded with black stone, and was bound from Portage to Hamilton, Ontario (*Alpena Weekly Argus* 1890a:3, col.2)

The work releasing the schooner *Guinair*, ashore at North Point, was taken by Fletcher and Gilchrist. Steam pumps were sent out on the *Fern.* Heavy seas considerably hindered the work. On Monday the propeller *Hall* went out to pull the schooner off (*Alpena Weekly Argus* 1890a; 3:col. 2).

Gilchrist and Fletcher succeeded in releasing the schooner *Guinair* from the reef near North Point last Sunday. In 55 minutes from the time the two were set in operation the schooner was afloat. One pump was not able to free her of water as fast as it leaked in. Par of the stone cargo was thrown overboard. The schooner was towed here and grounded near the Fletcher lumber mill. Good work done by the Thunder Bay Island life saving crew in assisting to release the stranded vessel (*Alpena Weekly Argus* 1890b: 3, col. 3)

E.B. Palmer

The schooner *Palmer*, laden with stone, ran ashore at North Point last week. One of the Gilchrist's steam pumps was placed on board, but owning to heavy seas constantly running, it was not safe to pump he dry. If weather had permitted the wreckers to work she would have been afloat by Monday. It is probable she will be pulled off the beach this week (*Alpena Weekly Argus* 1892a:3, col. 3).

The *E.B. Palmer* was pounded to pieces on Midland Island during Sunday's blow. She was owned by H. Gillet of Marquette. She was originally the Canadian schooner *Norwood*, but was renamed in 1879 (*Port Huron Daily Times*, Tuesday November 15, 1892).

At the time the schooner *Palmer* broke up on the North Point Beach there were three pumps on board. They were thrown into the water, and constant heavy seas have prevented Messrs. Gilchrist and Fletcher from getting them all out. Two of the pumps and one boiler have been recovered (*Alpena Weekly Argus* 1892b:3, col. 3).

Bay City; Alice Richards

Alpena, November 26: The barge *Bay City* that was aground at North Point was released and towed to this city this morning with but slight damages (*Buffalo Enquirer* 1892a).

Port Huron, November 30: The barges *Bay City* and *Alice Richards*, which were on North Point were towed here today and will be placed in dry dock (*Buffalo Enquirer* 1892b).

Enterprise

Total Wreck: There was a heavy storm on Lake Huron last Wednesday night, and vessels in this vicinity, as usual during storms, ran into Thunder Bay for shelter, their captains knowing that the bay affords safe anchorage. About one mile southeast of North Point there is a reef marked by a can buoy, and from that reef to Scarecrow Island, on the south side of the bay, is about eight miles with water from eight to fourteen fathoms deep. Thunder Bay has therefore a safe passage for vessels eight miles wide. That night the propeller *Enterprise*, of St. Catharine's, Ontario, was on her way down the lake, and her captain ran into the bay for shelter. She had loaded at Fort Williams, Lake Superior, with 97,000 bushels of wheat, and was bound for Kingston, Ontario. The weather was thick, owning to the rain, and the captain of the *Enterprise* getting astray in his reckoning, tried to enter the bay near the north shore, and ran hard on the can buoy reef. A heavy sea was running, and as she was the mouth of the bay the boat was in an unfortunate position, with the seas washing over her. Thursday morning she was discovered by the Thunder Bay Island life saving crew, and the lifeboat was soon at the wreck. The seas which broke over the wreck made it impossible for the lifeboat to get alongside, and the crew had to be transferred by means of ropes, being dragged through the water about 40 feet. The crew numbered 18, including a woman. The greatest difficulty was in getting the woman from the wreck, as she naturally did not like jumping into the heavy seas. It looked like sure death to her to plunge into the raging waters of storm tossed Lake Huron, but after a rope had been made fast to her and one end passed to the lifesavers, she was pushed into the foaming water, and was soon safe in the lifeboat. The life saving crew then brought the rescued people to this port, a distance of about nine miles. They had to leave all their clothes and personal effects on the wreck, except what they had on, and the trip to Alpena in their wet clothing, was a cold and dreary one. Friday the tugs *John Owen* and *Ralph*, and schooner *Hawkins* went out to the wreck, as the sea had run down. About 700 bushels of dry wheat was saved, but all the rest of the cargo is a total loss. One of Gilchrist's steam pumps was set up on the wreck and some of the wheat pumped out. It was then discovered that the *Enterprise* had broken in two, so the pump was transferred to the *Hawkins*, and all the moveable effects of the propeller were taken off and the wreckers returned to the city. An attempt will be made to remove the boilers and engine and as these are on deck, the work will be accomplished, providing the wreckers have fair weather (*Alpena Argus* 1894a:3, cols. 5-6).

Smuggling and Piracy: Soon after the Canadian propeller *Enterprise* was wrecked on North Point the dry grain was taken off, all her outfit removed, and the vessel practically abandoned. Many persons in this vicinity believing the wet grain had been abandoned, and it was better to put it to some use instead of letting it rot in the boat, began to help themselves, and about fifty people took from a few bushels each to 100 bushels. The insurance agent now appeared on the scene and ordered the grain restored. The wheat was from a foreign port and liable to duty. Taking grain off the wreck without permission is said to be piracy, and failing to report to the custom office made the act smuggling. Those who took grain now found their condition a serious one, and their boats were liable to be confiscated. Special revenue officers arrived and began investigations, but before any action was taken E.O. Avery purchased the whet and removed considerable of the complications. Finally the revenue officers settle the trouble by allowing the smugglers to pay the duty on what grain they had taken, and the trouble was over. Those implications had a narrow escape, but are now better posted in revenue laws and wrecked vessels than they were before (*Alpena Argus* 1894b:3, col. 5).

A lighter load of wet wheat was brought to the city the early part of last week, from the wrecked propeller *Enterprise*. Scoops are used to take the grain out of the wreck, and as fast as it is removed the rest fills the space made, by swelling. One man interested in the wreck said he believed the 27,000 bushels would swell and make 60,000 bushels. When the wheat had been pumped out divers will examine the wreck, and if her condition warrants it she will be removed from the reef at North Point and brought to this port and converted to a lumber barge (*Alpena Argus* 1894c:3, col. 3).

The tug *Ralph* took out diving apparatus and a diver Monday to the wrecked propeller *Enterprise*, on North Point Reef, for an examination of the hull, and if she can be temporarily parched up, the steam pumps will be taken out and an attempt made to raise her. If the wreckers succeed, the vessel will be brought to this port and Mr. Gilchrist will have her repaired and use her as a steam barge (*Alpena Argus* 1894d:3, cols. 3).

F.W. Gilchrist succeeded in getting the wrecked Canadian propeller *Enterprise* off North Point reef and had her towed to this city Thursday. The vessel is not damaged to a great extent, and one steam pump easily kept her free of water. She was placed in one of the slips at the bay-shore mill of the Minor Lumber Company, and allowed to settle to the bottom. There is considerable wheat yet in her. As the vessel is of foreign build, she cannot get an American register, but it is said by leaving her a wreck for one year she can then be repaired and become an American vessel. She was purchased by Mr. Gilchrist while on the reef, and it is probable he will convert her to a lumber barge (*Alpena Argus* 1894e:3, cols. 3).

The propeller *Enterprise*, while on the reef at North Point, rendered good service as a warning to careless navigators and saved the propeller *Colorado* from going aground. She was headed direct for the shoal when her captain saw the *Enterprise* on the reef, and withdrew from the danger (*Alpena Argus* 1894f:3, cols. 3).

D.M. Wilson

Wreckage strewn from North Point to below Tawas from the *D.M. Wilson*, foundered off Thunder Bay on October 27, 1894 (*Alcona County Review* 1894)

Vienna

The schooner *Vienna*, lumber laden, from Spanish River, went on North Point, on the night of May 26th, and was released next day. The crew had been taken off by the Thunder Bay Island lifesavers (*Alpena Argus* 1902:5, col.3).

B.W. Blanchard; John T. Johnson; Kilderhouse

Three Boats Wrecked: During the blinding snowstorm of Monday night of last week, the propeller *B.W. Blanchard*, barge *John T. Johnson* and schooner *Kilderhouse*, were driven ashore at North Point, and two former are a total loss, while there is some probability that the Kilderhouse may be saved. The Thunder Bay Island lifesaving crew soon arrived at the scene of the wreck and rendered valiant service in rescuing the crews. The vessels were all loaded with lumber, amounting to about 2,000,000 feet, which was consigned to C.W. Kotcher, John Bayster and Sibley Lumber Co., all of Detroit, and was valued at $28,000, covered by insurance. The greater portion of the lumber has been picked up, and the *W.T. Thew* conveyed a portion of the *Kilderhouse* deck load to Detroit. No effort will be made to raise the boilers and machinery of the *Blanchard* this winter. The *Blanchard* was owned by C.W. Kotcher and C.W. Restrich, of Detroit, and was valued at $15,000 covered by insurance. The *Johnson* was owned by W.L. Martin of Cheboygan, and was valued at $8,000 fully insured (*Alpena Argus* 1904:1, col.3).

Steamer *Blanchard*, Boilers and Machinery of Her being Taken Out: The tug *Adele* and wrecking outfit have been in this vicinity for the past two weeks working on the wreck of the steamer *Blanchard* which went to pieces on North Point last November. The wrecking outfit is owned and managed by O.R. Bouquette of Saginaw.

The boiler was raised from the wrecked steamer last week and towed in to the river. It is now resting on the bottom near the Obernauer dock and will be hoisted tomorrow of Friday to be shipped by rail to Bay City. The boiler is in good condition. It weighs 36 tons and was a difficult piece of work. Part of the machinery has also been taken from the *Blanchard* and the hull of the boat will be blown up to secure the remaining portion. The engine is an old style and will be broken up into scrap iron. Mr. Bouquette is an old time diver and is doing most of the submarine work himself. He is assisted by Wm. Lavigne who is also a diver. Mr. Lavigne went down to Havana harbor and assisted in raising dead bodies of the victims of the battleship *Maine* which was blown up in 1898. Mr. Bouquette's outfit also consists of a pile driver and pile putter. Piles will be driven on the dock to erect a gin pole and will be pulled out when the operation is done (*The Alpena Evening News* 1905:5, col.3).

The boiler has been recovered from the propeller *Blanchard*, which was wrecked at North Point last fall. The boiler was towed to the D&M railroad wharf Thursday. It goes to Bay City by rail (*Alpena Argus* 1905a:3, cols. 2-3).

The boiler of the wrecked propeller *Blanchard*, which was recovered from the sunken boat, at North Point, was towed to this city, and hoisted on the wharf of the D. and M. railway, near the 2nd Avenue swing bridge, last summer, has been sold to the Grace Harbor Lumber Co., at Detroit, and will be placed in the steamer *Tempest*. The boiler will soon be shipped to Detroit (*The Alpena Argus* 1906:3, col.3).

Shamrock

The wreckers raised the boiler out of the propeller *Shamrock* last Thursday and it was towed to the D&M railroad wharf, just above the bridge and left alongside the boiler of the propeller *Blanchard* (*Alpena Argus* 1905b:3, col.2).

I.W. Nicholas

Broken Ship *Nicholas* is off Rocks, Two Weeks Wrecking Job one of the Biggest in this Vicinity in Years: The steamer *I.W. Nicholas*, went on the rocks at North Point Thanksgiving morning, November 29, and which broke in two on Sunday, December 7, as successfully released Sunday morning, December 14, by the Reid wrecking tug *Fisher* and the wrecker *Manistique* (*The Alpena Evening News* 1913:1, col. 4).

Among the more important vessels wrecked and later saved through wrecking operations, which will be repaired and go into commission again, are the steamers *I.W. Nicholas,* partly broken in two on the rocks at North Point, Thunder Bay, Lake Huron…(*Beeson's Marine Directory* 1914).

Mitchell

Mitchell on Rocks at North Point, Ship is Pulled out of Course by Currents of Lake Huron, Frees Self and Comes into Bay, Captain Warns other Ship, then Fears He

Himself is Wrong: The big steamer *Mitchell*, bound from Toledo to Green Bay, Wisconsin, with a cargo of coal, went hard aground on the rocks of North Point during the heavy weather Sunday afternoon. She released herself, with considerable effort, and is now anchored in the bay. The unknown quantity in the currents of Lake Huron is believed to have been responsible for the *Mitchell's* difficulty as it has been responsible for that of many other ships. Captain C.W. Willett says he allowed two points for deviation, that is he ran two points to the east of his regular course up Lake Huron, but in spite of this, he was five points to the westward of the course when he ran on the rocks at North Point. The damage to the vessel might have been greater but for a strange happening just before the *Mitchell* hit the rocks. As Captain Willett steamed ahead at regular speed, jut before he struck he noticed another vessel running in a southwesterly direction, so that its path would cross that of his vessel almost at right angles. The other ship was headed into Thunder Bay for shelter, but Captain Willett did not know so at the time. He sounded a warning blast on the *Mitchell's* whistle. Then it occurred to him that the ship might be out of its course while the other might be safe. Instantly he ordered speed slackened and a moment later he sighted the can buoy just off the point. He endeavored to avoid striking, but it was too late then. After releasing itself, the *Mitchell* came into the bay and summoned the tug *Ralph* to its assistance. Temporary repairs are being attempted. Thick, foggy weather and a 42-mile wind, combined with the effect of the current to cause the grounding of the *Mitchell*. The *Mitchell* is leaking badly, but is also able to keep herself clear by means of her own pumps. It is doubtful if she can proceed to Green Bay unless some of the cargo is lightered or jettisoned, and perhaps not then. Captain Willett came in this morning and returned to the *Mitchell* on the tug *Ralph* (*The Alpena Evening News* 1914:1, col.1).

Bertha May

Schooner Founders in Thunder Bay, 5 Saved, Craft Sinks Rapidly in Stormy Sea, Five Men Leave *Bertha May* schooner in Lifeboats, Coast Guards Help Rescue, Bring Men to Safety at Thunder Bay Island Monday: The *Bertha May*, 2-masted schooner owned and commanded by Captain Robert "Bob" Trotter of Alpena, foundered at 4 o'clock Monday afternoon in heavy seas on Thunder Bay with cargo valued at approximately $1,000. The schooner was loaded with four tons of cement, several hundred feet of lumber and other materials to be used in construction of the new Coast Guard station at Thunder Bay Island. Five men including Captain Trotter, aged 82, William Trotter, aged 46, his son; Anthony Skiba, aged 26, Joseph Leski, aged 38, and John Bonczyk, aged 22, Alpena carpenters were on the schooner and all were brought to safety in lifeboats. The craft sank in 12 feet of water one mile from Thunder bay Island and about three miles off North Point. The men in lifeboats were sighted from Thunder Bay Island by John Senesi of Detroit who took over the contract to build the new $15,000 station for the U.S. Government.

Aided by Coast Guards: Coast Guards led by Captain John Liedke immediately went to the scene in lifeboats and brought the five men to Thunder Bay Island, thence to North Point, where they were taken back to Alpena by automobile, arriving here at 8:30 o'clock Monday evening. The Coast Guards figuring in the rescue were G. Richardson,

A. Rouleau, William Steele, Herman Peterson, Herbert Hasse, Raymond Le Fave, Orin Lee, Ralph Knudson, Arden Cripps, and Myrto Vam, all of Alpena. Anthony Skiba, one of the five men on the ill-fated schooner, said that the keel of the *Bertha May* hit the reef in six feet of water, but encountered no trouble in proceeding off the reef. However, Skiba stated, that the schooner began to draw water an hour or so later.

Craft Sinks Quickly: Attempts to pump and bail out water proved futile since the water was coming in too rapidly, the craft sinking with its weighty cargo soon after the men took to lifeboats. It is believed that the schooner, which measures 45 feet in length, foundered as a result of the buffeting heavy seas on the trip, started about 2 o'clock from the river harbor at Alpena. Captain Trotter, veteran marine captain, had owned the *Bertha May* for the past six years, carrying small cargoes about Thunder Bay. No insurance was carried on the boat or the cargo. Attempts to salvage some of the tools and other materials that went down with the craft were abandoned temporarily by Thunder Bay Island Coast Guards because of continued heavy seas today. Another load of cement and lumber was taken to the island today for start of construction on the new station at the island (*The Alpena News* 1930:1, col.5).