ABSTRACT

Dina M. Bazzill. The Missing Link Between Sail and Steam: Steambarges and the *Joys* of Door County, Wisconsin. (Under the Direction of Dr. Bradley A. Rodgers) Department of History, December 2006.

The purpose of this thesis is to explain the development of steambarges, an important nineteenth-century vessel type. Steambarges were different from other contemporary bulk cargo carriers because they accomplished a unique feat: a successful breeding between the carrying capacity of sail powered cargo ships and steam technology. The primary question raised by steambarges is whether or not they are a distinctive vessel type that represents the missing link between sail and steam.

To answer this question, this study first examines the nineteenth century Great Lakes lumber industry. As the economic importance of Great Lakes lumber grew, so did lumbermens' need for a vessel that could ship vast quantities of timber quickly and economically. This was the driving force behind the creation of steambarges. Next, the evolution of the vessel type is explored through a detailed examination of the ships that influenced the conception and design of steambarges: schooners, paddle-wheel steamers, and propellers.

Finally, the archaeological investigation of the Sunset Park Wreck, later identified as the *Joys*, is presented. Analysis of archaeological data revealed a structural link between internal steambarge and schooner construction techniques. This data allowed this study to both provide a working definition for steambarges in the archaeological

record, and demonstrate that steambarges actually do represent the missing link between sail and steam powered cargo transportation on the Great Lakes.

THE MISSING LINK BETWEEN SAIL AND STEAM: STEAMBARGES AND THE *JOYS* OF DOOR COUNTY, WISCONSIN

A Thesis

Presented to

The Faculty of the Department of History

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In Partial Fulfillment

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By Dina M. Bazzill

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DEDICATION

For Matthew-

Thank you for making my dreams your dreams.

And for Joseph-

Without whom this thesis could not have been written.

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No sane person could ever survive something as traumatic as graduate school without the support of good friends. Alanna, Katy, Michelle, and Cassie – thank you all

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CHAPTER 1

INTRODUCTION

Steambarges, single-decked steam-propelled cargo vessels, were an important nineteenth-century vessel type specifically designed to promote the Great Lakes lumber industry. These "lumber hookers" were different from other contemporary vessel types because they accomplished a successful breeding between the carrying capacity of sail powered cargo ships and steam technology. The primary question raised by steambarges is whether or not they are, as suggested by archaeologist Dr. Bradley Rodgers of East Carolina University, a distinctive vessel type that represents the missing link between sail and steam powered cargo ships.[1] Before the development of steambarges, sail and steam vessels played distinctive roles in the Great Lakes maritime economy. Owners of sail powered vessels primarily utilized them for transporting cargo, while steam powered paddle-wheelers primarily transported passengers and limited package freight. The reason for this was simple; the machinery required to power paddle-wheelers took up a significant portion of a vessel's cargo capacity and was expensive to build and operate.[2]

One of the most significant events that facilitated steambarge development was the Panic of 1857. This event wreaked havoc on both the cargo and passenger trades on the Great Lakes. Many schooner owners, whose vessels had shipped vast quantities of commodities necessary for westward expansion, were driven out of business by the

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[1] Rodgers, Bradley A., "Vernacular Craft of the North American Great Lakes: Twenty Years Research in Retrospective," (2006), In press: 13.

[2] William N. Still, Gordon P. Watts, and Bradley Rodgers, "Steam Navigation and the United States," in *The Advent of Steam: The Merchant Ship Before 1900*, ed. Robert Gardiner and Dr. Basil Greenhill (Edison, NJ: Chartwell Books, Inc., 1993), 69.

depression's lower freight rates and an overdeveloped merchant marine.[3] By 1860, however, the economy recovered and Americans resumed westward migration. These pioneers required building materials to feed the machine of civilization.[4] As a result, businesses that survived the Panic of 1857 needed a new vessel type that could combine the carrying capacity of sail with the speed and reliability of steam. This would allow companies to ship large quantities of cargo, especially lumber, quickly and effectively. Great Lakes shipbuilders, who were no strangers to technological adaptation, rose to the challenge and developed the steambarge.[5]

These insightful builders realized that palatial passenger steamers, rendered idle by the Panic of 1857, could be converted into barges and towed in consort by tugs with minimal effort and modification.[6] This was the birth of the Consort System. These converted passenger steamer barges were quickly replaced by schooners because they were found in greater abundance. Tugs were also quickly replaced by steambarges in order to increase carrying capacity.

Westward expansion and post- Civil War reconstruction combined to create a lumber boom on the Great Lakes that helped establish steambarges and their consorts as a profitable and distinctive transportation system. After years of success, and as a direct

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[3]Pat C. Labadie and Charles E. Herdendorf, *Wreck of the Steam Barge* Adventure: *An Archaeological Investigation in Lake Erie at Kelley's Island, Ohio* (Peachman: Great Lakes Historical Society, 2004), 8.
[4] James L. Huston, *The Panic of 1857 and the Coming of the Civil War* (Baton Rouge: Louisiana State University Press, 1987), 24.
[5] John O Jensen, David J. Cooper, Frank J. Cantelas, and David V. Beard, *Archaeological Assessment of Historic Great Lakes Shipwrecks: Survey of the Steamers Niagra and Francis Hinton* (Madison: State Historical Society of Wisconsin, 1995), 32.
[6] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 8.

result of the depletion of the Great Lakes' pine forests, steambarges followed the lumber industry west near the turn of the twentieth century.

Steambarges were economically successful on the Great Lakes because they offered lumber shippers both speed and an immense carrying capacity when utilized in conjunction with the Consort System. It made steambarges cost effective for their owners because each steambarge towed up to six schooners, greatly expanding their carrying capacity and helping merchants maintain their bottom line.[7] By 1899, it was typical for a million and a half to two million feet of lumber to be towed by one steambarge and four to six consorts.[8] As a result, sailing schooners, sloops, and brigs lost the ability to compete in the lumber industry on their own, and few vessel owners wanted to invest in them. Prior to 1890, sailing vessels had dominated the shipping of bulk cargo; by 1900 they were nearly obsolete.[9] Shippers wanted, and came to depend upon, steam vessels that could move cargo quickly from port to port.

Although steambarges and the Consort System made the shipment of lumber and other bulk commodities economical and reliable, the system was not perfect. One major disadvantage of lumber carrying steambarges was that they had to be loaded and unloaded by hand. Not a single inch of cargo space was wasted. Loading and unloading were cumbersome, time-consuming, and expensive tasks that involved completely filling the limited below-decks spaces, driving wedges between the cargo and the deck beams, then piling lumber on deck until it was level with the cabins. Wedges were combined

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[7] *Ibid.*.
[8] J.B. Mansfield, *History of the Great Lakes*, vol. 1, reprint edition (1899; Cleveland: Freshwater Press, 1972), 414.
[9] James P. Barry, *Ships of the Great Lakes: 300 Years of Navigation*, rev. ed. (1973; repr., Holt, MI: Thunder Bay Press, 1973), 143.

with restraining chains to support the cargo carried on deck, which could be stacked as high as twelve feet.[10] The standard length of board was twelve feet, and depth of hold on steambarges did not exceed thirteen feet. This was to allow for the quickest loading and unloading of cargo, saving vessel owners money in wages.[11]

The introduction and adoption of the Consort System also eventually led to decreased vessel and crew quality. Initially, tow barges were equipped with quality masts, sails, and knowledgeable sailors. These crews could set sails to assist escort or to help themselves during times of emergency and foul weather. When the Consort System established itself as an economic success, however, many vessel owners allowed their tow barges to degrade and become unseaworthy as stand alone sailing vessels. Since tow barges were under the control of steambarges, consort crew quality suffered.

By the 1890s, maritime communities and the American and Canadian Federal Life Saving Services began to notice that tow barges were notoriously helpless. For example, undermanned vessels with unskilled crews often signaled Life Saving Service stations for assistance to tie up their vessels, cast anchor, and other tasks that, twenty years before, were common chores easily performed by sailing vessel crews. The worst effect of the decrease in crew quality was tragic loss of life. Vessel owners calculated the risk and knew that if one of their tow barges foundered, financial losses could be easily absorbed.[12] As a result, many sailors lost their lives during storms when tow cables

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[10] Donald F. Richards, "The Glory Days," *Telescope Magazine* (1960): 260.
[11] Barry, *Ships of the Great Lakes*, 149.
[12] *Ibid.*, 164-166.

connecting consort and escort were dropped or parted. Many ran aground or wrecked violently.

Despite the disadvantages associated with the Consort System, its efficiency and profitability made mass shipment of lumber possible, allowing valuable materials to be shipped rapidly throughout Great Lakes ports. Their efficiency, however, played a part in their demise. Rapidly declining freight rates and increased competition greatly reduced profits. The main problem for vessel owners was that the Great Lakes lumber industry could only survive as long as pine forests were abundant. This seemed no problem at mid-century. In fact, in 1852, a Wisconsin Congressman informed his colleagues that there were enough forest resources to last forever.[13] Only seventy years passed before the Congressman was proven wrong; the great forests of pine were depleted and the lumber industry began migrating to the Pacific Coast. This, combined with economic conditions created by the Great Depression of 1929, ensured that steambarges would not survive on the Great Lakes. The lumber boom was over, the industry collapsed, and with it went the glory days of the Great Lakes steambarge.[14] Their descendants, wooden bulk freighters, could safely and profitably carry sufficient quantities of diverse cargos without consorts. By the 1930s many old "lumber hookers" were simply forgotten. Their rotting old bones could be seen abandoned in backwater ports and tributaries.[15]

Despite the importance of steambarges to the Great Lakes economy in the nineteenth century, they have remained an historical and archaeological enigma.

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[13] Charles E. Twining, "The Lumbering Frontier," in *The Great Lakes Forest: An Environmental and Social History*, ed. Susan L. Flader (Minneapolis: University of Minnesota Press, 1983), 124.
[14] Barry, *Ships of the Great Lakes*, 149.
[15] Richards, "The Glory Days", 261.

Information regarding their construction and usage remains abstruse and mostly unpublished. As a result, data concerning their place in the evolutionary chain of Great Lakes vessels is fragmented and obscure. The primary question raised by steambarges is whether or not they are, as suggested by Rodgers, a distinctive vessel type that represents the missing link between sail and steam powered cargo ships.[16] This idea is alluded to in the design of archaeologically documented steambarges because they demonstrate basic schooner hull construction combined with steam machinery. The Sunset Park Wreck, a steambarge investigated by East Carolina University in September, 2005, is the vehicle through which this question will be answered. In depth analysis of steambarges is essential for uncovering facts on the life and times of not only these vessels, but the lumber industry and surrounding shipping culture. This information is also important to the preservation of Great Lakes maritime history, because it places this vessel class in both historical and archaeological contexts.

Research Methodology

During the fall of 2005 East Carolina University, in conjunction with the Wisconsin Historical Society, conducted a Phase II archaeological survey of a steambarge located in Door County, Wisconsin, near Sturgeon Bay. The vessel was later identified as the steambarge *Joys*, thus an investigation and discussion of this vessel's background and identification is warranted. Primary sources, while rare, provide detail on the vessel's typical activities. One source of basic information detailing dimensions, capacity, and ownership are the vessel's enrollments. The most important primary source is Door

[16] Rodgers, Bradley A., "Vernacular Craft", 13.

County's local newspaper, the *Door County Advocate*. This publication's maritime news section frequently reported on *Joys*' crew, cargoes, and destinations. When the vessel sank in 1898, the *Advocate* supplied a detailed account of the incident and an interview with the vessel's captain. *Joys* is also mentioned in a few secondary sources including Paul John Creviere's *Wild Gales and Tattered Sails* (1997), and Elizabeth Cutler and Walter M. Hirthe's *Six Fitzgerald Brothers: Lake Captains All* (1983).

The wreck, referred to as the Sunset Park Wreck for documentation purposes, is well preserved and lies in approximately ten feet of water. The archaeological team mapped and photographed the site over eight working days. After all archaeological work was completed, a detailed site map was produced. The Sunset Park Wreck was not the first vessel investigated in Door County, and site reports from other investigations include: *The 1995 Predisturbance Wreck Site Investigation at Claflin Point, Little Sturgeon Bay, Wisconsin* (1995), *Of Limestone and Labor Shipwrecks of the Stone Trade: The 1999 Bullhead Point Stone Barge Investigation* (2003), *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge* City of Glasgow (2003), and *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (2006). These publications are important because they help place this wreck in a regional context.

Any thorough archaeological study takes previous studies into account. This study is no exception. Although material concerning archaeological investigation of steambarges is limited, some important resources are available. Archaeological sources specifically pertaining to steambarges include Pat Labadie and Charles Herdendorf's,

Wreck of the Steambarge Adventure*: An Archaeological Investigation in Lake Erie at Kelleys Island, Ohio* (2004); Labadie's *Submerged Cultural Resources Study, Pictured Rocks National Lakeshore* (1989); John Jensen et al., *Archaeological Assessment of Historic Great Lakes Shipwrecks: Surveys of the Steamers* Niagara *and* Francis Hinton (1995), Bradley A. Rodgers et al., *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (2006), and David J. Cooper (editor), *By Fire, Storm and Ice: Underwater Archaeological Investigations in the Apostle Islands* (1986). These works represent available sources with sections specifically discussing the origin, evolution, utilization, and archaeological documentation of steambarges. This information can be utilized to uncover what construction features are unique to steambarges.[17] Comparison of these vessels to documented schooners can establish a clear lineage between sail and steam.

Historical Research

Although archaeological analysis is important for defining the place of steambarges in the evolutionary chain of Great Lakes vessels, it is equally important to place these vessels in the historical context in which they belonged. Understanding the

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[17] Bradley A. Rodgers, Samuel M. Blake, Brian S. Jaechke, and James D. Moore III, *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge City of Glasgow* (Greenville, East Carolina University, 2003), 17; Fil Ronca "A Historical and Archaeological Assessment of the Sela Chamberlain, a Transitional Phase Early bulk Carrier" (master's thesis, East Carolina University, 2006), 17-20; Rodgers and others, *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (Greenville, NC: East Carolina University, 2006), 37-40; C. Patrick Labadie, *Submerged Cultural Resources Study: Pictured Rocks National Lakeshore* (Santa Fe: Southwest Cultural Resources Center, 1989), 51-54, 62-67, 146-149; David J. Cooper, ed., *By Fire, Storm and Ice: Underwater Archaeological Investigations in the Apostle Islands* (Madison: State Historical Society of Wisconsin, 1996), 96-101; Jensen and others, *Surveys of the Steamers* Niagara *and* Francis Hinton, 39-44; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 30-35.

economic purposes for which they were built and the era in which they dominated Great Lakes trade can provide valuable clues to decode choices made during design and construction. In addition, understanding the typical working life of steambarges can help archaeologists locate, identify, and preserve these vessels in the archaeological record. Historic newspaper articles, vessel enrollments, site reports, and a variety of secondary sources all offer data that can be examined to provide a detailed history of this class.

Research into the conception, development, and subsequent demise of steambarges on the Great Lakes is, at times, a difficult undertaking because sources are limited. There are, however, several repositories in the Great Lakes region that provide valuable historical data. These include:

- C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan
- Wisconsin Historical Society, Madison, Wisconsin
- Historical Collections of The Great Lakes, Bowling Green State University, Bowling Green, Ohio
- Herman G. Runge Collection, Great Lakes Marine Historical Collection, Milwaukee Public Library, Milwaukee, Wisconsin
- Wisconsin State Maritime Museum Library and Archives at Manitowoc
- Door County Maritime Museum
- Sturgeon Bay Public Library

An investigation of steambarges would be incomplete if not paired with a basic analysis of the economic endeavor that created them: the lumber industry. Classic studies include George Hotchkiss' *History of the Lumber and Forest Industry of the*

Northwest (1898), Susan Flader's *The Great Lakes Forest: An Environmental and Social History* (1983), and William Rector's *Log Transportation in the Lake States Lumber Industry 1840-1918* (1953). Hjalmar Holand's *History of Door County Wisconsin: The County Beautiful* (1917) provides an excellent overview of the port of Sturgeon Bay's history.

In addition, there are a few overall historical studies of Great Lakes ships. These include James P. Barry's *Ships of the Great Lakes: 300 Years of Navigation* (1996), Mansfield's *History of the Great Lakes, Volume One* (1899), James Cook Mills' *Our Inland Seas* (1910), Greenhill's *The Advent of Steam* (1993), and Dr. Jay Martin's Bowling Green University's dissertation, *A Social History of Life Aboard the Commercial Sailing Vessels of the United States and Canada on the Great Lakes, 1813-1930* (1995). These sources discuss steambarges as well as the practice that made them so economically successful; the Consort System.

All of these resources provide valuable data that contribute to the general goals of this study. These include investigating the financial impetus for the creation of steambarges, tracing their developmental influences through sail and steam, defining the general internal construction characteristics of the type, demonstrating how the Sunset Park Wreck fits into the archaeological record, and establishing *Joys* as the identity of the Sunset Park Wreck. In this way, steambarges can satisfactorily be identified pragmatically as the missing link between sail and steam cargo vessels. Before this can be done, however, it is important to establish the relationship between steambarges and the industry for which they were created: the Great Lakes lumber industry.

CHAPTER 2

FROM FOREST TO MILL: THE ASSAULT ON THE GREAT LAKES' PINE FOREST

The absence of trees is the sign of civilization, and their presence indicates barbarity.[1]
--Gustav De Beaumont

Mansions and shanties, churches and saloons, and even the outhouse down on the farm were monuments to the pineries...[2]
--William Gerald Rector

Introduction

The great pine forests of Michigan, Wisconsin, and Minnesota form a specific geographical and environmental region of North America. In the nineteenth century, this region was the undisputed lumbering center of the United States.[3] Without the development and economic success of the Great Lakes lumber industry, there would have been no incentive for the creation of steambarges. These vessels represent a highly specialized technological innovation that effectively transported the products of the lumber industry faster, more effectively, and less expensively than any other valuable bulk cargo. The steambarge became a unique Great Lakes innovation specifically designed to meet the needs of the environment in which it was expected to perform. Before discussing the details of steambarge innovation, however, it is important to take a

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[1] Jeremy W. Kilar, *Michigan Lumber Towns: Lumbermen and Laborers in Saginaw, Bay City, and Muskegon, 1870-1905* (Detroit: Wayne State University Press, 1990), 19.
[2] William Gerald Rector, *Log Transportation in the Lake States Lumber Industry, 1840-1918: The Movement of Logs and Its Relationship to Land Settlement, Waterway Development, Railroad Construction, Lumber Production and Prices* (Glendale, CA: Arthur H. Clark Company, 1953), 57.
[3] Rector, *Log Transportation in the Lake States Lumber Industry*, 45.

detailed look at the history of the lumbering industry, as it is key to understanding the environment that made steambarges necessary.

The Birth of the Great Lakes Lumber Industry

In the seventeenth century, when French and English explorers first traveled into the Great Lakes region, they found a dense forest of hardwoods and conifers bordering Lake Ontario, Lake Erie, Lake Huron, Lake Michigan, and a large portion of Lake Superior. In fact, eighty-five percent of the territory around these lakes was covered in forest.[4] These pioneers practiced a minimal amount of subsistence lumbering to construct trading posts, frontier army posts, and crude shelters. Although a primitive sawmill was erected near the present site of Detroit around 1750, the heyday of Great Lakes lumbering would not occur for nearly a century.[5]

After the War of 1812, a few European settlers began to trickle into the Great Lakes region.[6] Though adventurous and brave, these Americans treated the forest as an enemy and thought of it as a "hideous and desolate wilderness."[7] The forest was home to wild animals and even wilder men, and for many pioneers it proved a formidable adversary. Because the trees represented the dangers of the wilderness, they were burned and destroyed like vermin to create space for homesteads and farms necessary for survival (See Figure 2.1).[8] It was not until the 1830s that an immense flood of immigrants from New York, Pennsylvania, and Maine began migrating westward,

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[4] J.B. Mansfield, *History of the Great Lakes*, vol. 1, reprint edition (1899; Cleveland: Freshwater Press, 1972), 514.
[5] Rector, *Log Transportation in the Lake States Lumber Industry,* 54-55.
[6] *Ibid.,* 55
[7] Charles E. Twining, "The Lumbering Frontier," in *The Great Lakes Forest: An Environmental and Social History*, ed. Susan L. Flader (Minneapolis: University of Minnesota Press, 1983), 123.
[8] Kilar, *Michigan's Lumbertowns*, 19; Flader, *The Great Lakes Forest*, 3.

"inundating the more desirable areas in the lower Lake states and even tentatively licking around the southern and eastern edges of the pine forest."[9]

Figure 2.1: The Julius Koehler family on their farm near Philips, Wisconsin in September, 1895 (Flader, 1983: 14).

This massive increase in immigration is partly due to the opening of the Erie Canal (1825) and the Welland Canal (1829), which allowed immigrants cheaper and easier passage west. Before the opening of the canals, merchants and settlers were forced to travel over roads that were merely dirt paths through the forest. The exorbitant cost of horses and drivers, as well as the limited cargo carrying capacity of carriages, made the cost of transporting cargo prohibitive for most shippers and immigrants..[10] Another factor that ignited the fire of immigration was the Michigan Territory's speculative land boom

[9] Rector, *Log Transportation in the Lake States Lumber Industry*, 55; Jefferson J. Gray, "Fueling the Fire: An Underwater Archaeological Investigation of the Claflin Point Wreck in Little Sturgeon, Wisconsin" (master's thesis, East Carolina University, 1998), 63.
[10] Gray, "Fueling the Fire", 18-19.

that occurred in the 1830s.[11] The east had become overpopulated and many families, who had no land of their own, embraced the opportunity to purchase inexpensive land. Between the years 1832 and 1840 alone the population of the Great Lakes quadrupled.[12] These immigrants created a demand for raw materials to construct their towns and farmsteads. As a result, the Great Lakes lumber industry was born. It is no surprise that the golden age of lumbering (1840-1910) coincided with this period of intense immigration.[13]

The growth of the earliest logging companies would not have been possible without the assistance of skilled lumbermen from New Hampshire, New York, Pennsylvania and, most especially, Maine. Many Maineites had a profound impact on the Great Lakes lumber industry and became prominent Great Lakes lumbermen.[14] To lure skilled workers to the region, mill owners placed advertisements in New England newspapers and passed out literature that guaranteed the profitability of lumbering and high wages for skilled lumbermen. These advertisements, combined with the exhausting of eastern pineries by 1850, enticed many skilled lumbermen to relocate to the Great Lakes.[15] It is ironic that by 1850 the Eastern states, which had previously supplied the lumber needs of the entire United States, began importing large quantities of timber products from the upper lakes region.[16]

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[11] Kilar, *Michigan's Lumbertowns*, 20.
[12] Mansfield, *History of the Great Lakes*, 634.
[13] Rector, *Log Transportation in the Lake States Lumber Industry*, 43.
[14] *Ibid.*, 63.
[15] Robert F. Fries, *Empire In Pine: The Story of Lumbering in Wisconsin* (Madison: State Historical Society of Wisconsin, 1951), 12.
[16] Gray, "Fueling the Fire", 41.

White Pine: Great Lakes Gold

The only species that interested the first serious commercial lumbermen was white pine. The processing of this species was so important that the northern forests came to be known as the "pineries."[17] In fact, from the 1840s to the 1890s, the term "lumbering" referred exclusively to white pine processing. The presence of other species in pine stands actually hindered logging operations and was considered a costly nuisance.[18] It is difficult to ascertain how much commercially valuable timber was present in the forests of the old Northwest. George W. Hotchkiss, one of the first historians to write about lumbering in the Great Lakes, estimated that there was once one trillion feet of timber; half of which he believed was comprised of the coveted white pine trees.[19] This is probably an exaggeration, but it is difficult to prove or disprove his estimate for three reasons: timber resources were not officially surveyed until the mid to late 1800s, many papers and business records kept by the lumbering companies were destroyed by floods and fire, and the estimate assigned to each particular timber stand is relative.[20] According to Great Lakes historian and archaeologist Jeff Gray:

> When analyzing historic lumbering, it is important to understand yields are relative to age of the timber stand: modern white pine provides an average of 45 million board feet per 80 acre at 80 years, while virgin forests' production is estimated around 140 million board feet per acreage.[21]

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[17]Common literature of the time also expressed the notion that the phrase "lumber trade" referred specifically to the transportation of pine products. The transportation of other lumber products, like barrel staves, was considered separate from the lumber trade; Mansfield, *History of the Great Lakes*, 515.
[18] Rector, *Log Transportation in the Lake States Lumber Industry*, 53.
[19] Flader, *The Great Lakes Forest*, 125.
[20] *Ibid.*, 127.
[21] Gray, "It Grows in Trees: Wisconsin Lumber Industry, Part I," *Wisconsin's Underwater Heritage* 10 (2000): 8.

This estimate does, however, sufficiently demonstrate the extent of northern forests before lumber production reached its peak. It was not until these vast white pine resources were exhausted that lumbermen were forced to exploit other species.

White pine, or *Pinus strobus*, was prized for two reasons: it is hearty and easy to work with. This robust species has wide geological amplitude, and is ideally suited for the Great Lakes' natural environment. Thousands of years ago a massive glacier covered much of the Great Lakes region. This glacier pulverized the rocks and soil into the sand upon which white pine thrives best.[22] Although this species thrives on sandy soil, it can grow in almost any soil type. Pine trees can also produce more wood than most other species with less food and moisture.[23]

Perhaps most importantly, white pine has several characteristics that made it the ideal building material for several important nineteenth-century industries. Pine planks generally have a straight grain that can be easily worked with a broad axe instead of a rip saw. According to historian William Gerlad Rector, "...it was often said that a carpenter could split a plank with his ax and the resulting finish would equal the product of saw and plane."[24] This characteristic is produced in the natural environment because pine drops its lower limbs as it grows, resulting in wood that is knot free (See Figure 2.2).[25] Other characteristics that made white pine products desirable to nineteenth-century craftsmen were lightness, strength, durability, and the ease in which it took and retained paint.[26]

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[22] Fries, *Empire In Pine*, 7.
[23] Gray, "It Grows in Trees", 8.
[24] Rector, *Log Transportation in the Lake States Lumber Industry*, 45.
[25] Gray, "It Grows in Trees", 9.
[26] George W. Hotchkiss, *History of the Lumber and Forest Industry of the Northwest* (Chicago: G.W. Hotchkiss, 1898), 752.

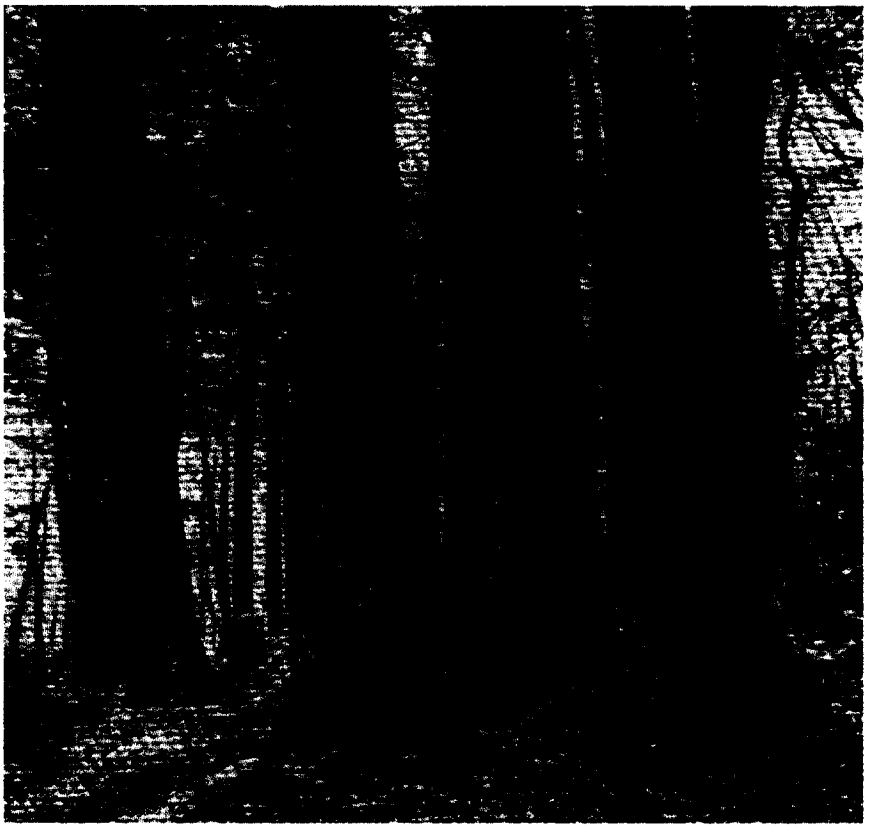

Figure 2.2: White Pine (Flader, 1983: 16).

Unfortunately for the first Great Lakes lumbermen, choosing the most profitable and marketable species of wood to harvest and obtaining enough skilled labor to harvest it was only necessary if they could obtain ownership of the pine forests. Early lumbering attempts were hindered by Native American tribes' ownership of the best areas of pine forest. Fierce competition for the pine lands between white settlers and Native Americans led to bitter conflicts such as the Black Hawk War of 1832. In less than twenty years, however, the United States government deprived the Lakes' indigenous people of all their lands except a few square miles of reservation area.[27] When the Native

[27] Fries, *Empire In Pine*, 10.

Americans were mostly removed from the Great Lakes region, lumbering efforts began in earnest.

Another challenge the lumbering industry faced was a series of laws passed by the government. In 1817 and in 1822 Congress passed laws that gave the United States Navy control over live oak and red cedar on federal lands in order to protect the Navy's supply. Obviously, this law did not alleviate the Navy's concerns because, in 1831, a more extensive act was passed that made all timber cutting on federal property a felony.[28] The first serious commercial lumbermen, however, were really only interested in harvesting one species: white pine. In response to this, the Supreme Court case of *U.S. v. Briggs* insured that all timber on federal lands was protected under the act of 1831.[29] This left lumbermen with three options for obtaining lumber: purchasing previously cut logs, purchasing stumpage, or purchasing timberlands outright.[30]

Much like other banned items, lumber cut on federal lands soon became a coveted black market commodity. The penalties for illegal harvesting of federal timber were too minimal to deter poachers, especially considering the immense potential profit that could be made in just one season. The solicitor of the treasury was originally responsible for

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[28] A.H. Mechlin to Secretary A.H.H. Stuart, 19 January 1853. Misc. Letters Received, Department of Interior, National Archives, Washington, D.C. (hereafter cited as Mechlin to Stuart, 19 Jan., 1853), quoted in Bradley A. Rodgers, *Guardian of the Great Lakes: The U.S. Paddle Frigate* Michigan (Ann Arbor, MI: The University of Michigan Press, 1996), 43.

[29] Mechlin to Stuart, 19 Jan., 1853.

[30] "Purchasing stumpage" means buying the rights to cut trees on certain land; Bradley A. Rodgers, *Guardian of the Great Lakes: The U.S. Paddle Frigate* Michigan (Ann Arbor: The University of Michigan Press, 1996), 44.

enforcing timber laws, but proved too feeble and ineffective. Poachers capitalized on this weakness as an opportunity to acquire wealth and power.[31]

In 1851, responsibility fell to the Department of the Interior, and agents began cracking down on the illicit lumber trade.[32] What ensued was a violent battle for the forest fought between poachers and agents. The problem got so out of control that the U.S. Navy's only Great Lakes military vessel, the iron paddle-wheeler USS *Michigan*, was drawn into the action and nearly sunk as a result.[33] With the aid of this vessel, timber agents and U.S. Marshals were able to round up several outlaws and, "knocked the wind out of the timber revolt."[34] Unfortunately for the US Navy, victory was short lived. In 1854 the timber pirates stopped using violence and started using their wealth and power as tools to influence Congress. This new method proved a success: Congress disbanded the Timber Agencies and the powerless land officers were once again charged with the responsibility of protecting federal timber lands.[35] As a result, the illicit timber trade resumed unabated and did not stop until all of the Great Lakes' forests were gone.[36]

The Boom Years

The lumbering industry on the Great Lakes was characterized by cycles of boom and bust. Drought years, when the streams were lower and log delivery via the streams and rivers was slow or non-existent, created high demands for timber and high prices to

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[31] Rodgers, *Guardian of the Great Lakes*, 56.
[32] *Ibid.*, 44.
[33] J.C. Dobbin to A. Bigelow, 18 August 1853. Letters and Other Communication, National Archives, Washington, D.C., quoted in Bradley A. Rodgers, *Guardian of the Great Lakes: The U.S. Paddle Frigate* Michigan (Ann Arbor, MI: The University of Michigan Press, 1996), 43.
[33] Mechlin to Stuart, 19 Jan., 1853.
[34] Rodgers, *Guardian of the Great Lakes*, 54.
[35] *Ibid.*, 56.
[36] *Ibid.*, 57.

any lumbermen that could get logs to the mill. The years following droughts were typically characterized by overproduction and saturated markets that were ideal for buyers. Despite the challenges of weather, unpredictable markets, and dishonesty and lawlessness of the men engaged in lumbering, there were some incredible success stories during the early days of the industry. These stories became legends that encouraged many small businessmen to try their luck at lumbering.

Once lumbering was established in the lakes region, mills began churning out products for regional consumption. It was not, however, until the opening of the United States' great prairie in the 1850s that the Great Lakes' white pine stands became gold mines. By the mid 1850s present day states such as Illinois and Iowa were well on their way to being settled.[37] As the populations of these treeless areas grew, their demand for building materials became almost insatiable. Almost immediately they were forced to import materials from the lumber-rich areas of Wisconsin, Michigan, and Minnesota. This stimulated the Great Lakes' economy and provided lumbermen with a market where they could sell their products for a good price. Fortunately, mill owners were able to keep pace with increased demand because of technological developments in sawmill machinery. These developments included overshot wheels, steam power, circular saws, and upright saws.[38]

Chicago benefited most from the settlement of the American prairie. The lumber trade in Chicago began around 1830 and was greatly aided by the dredging of the Chicago River, as well as the completion of a canal connecting Chicago to the Illinois

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[37] Rector, *Log Transportation in the Lake States Lumber Industry*, 58.
[38] *Ibid.*, 57.

River.[39] By the 1850s Chicago based wholesalers were doing an impressive amount of business. According to Great Lakes historian William Rector, "By 1856 Chicago had supplanted Albany, New York, as the primary lumber wholesale center in the United States."[40] A Chicago based newspaper noted that, "...those great lumber piles tower up to a height sufficient to excite the wonder and admiration of people not in the lumber business."[41] The lumber wealth flowing into Chicago helped it become the thriving and influential metropolis it is today.

The lumbermen of the 1870s through the mid 1880s saw the Great Lakes lumbering industry transform from small locally owned operations to a booming industry run by big business. Between 1869 and 1899, lumbering became the most economically important activity in the region. This lumber boom can be attributed to three factors: continued expansion west, the great Chicago and Peshtigo fires, and post-Civil War reconstruction.[42] All of these factors created a prodigious demand for building materials in America. According to historian Randall E. Rohe:

> It [lumbering] not only changed the face of the land, but also influenced settlement, urban development, population, place names, transportation routes, migrations and other geographic elements and patterns. The importance becomes obvious when one realizes that between 1869 and 1898 three Lakes states [Michigan, Wisconsin, and Minnesota] were the primary sources of lumber for the nation and that the lumber produced in these states well surpassed in value the gold mined in California. In fact...the value of lumber produced in just Michigan exceeded the value of gold production in California by more than a billion dollars, even at the

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[39] Theadore S. Charney, "Chicago Harbor a Century Ago," *Sea History* 47 (1988), 13-14.
[40] Rector, *Log Transportation in the Lake States Lumber Industry*, 58.
[41] Gray, "It Grows in Trees", 11.
[42] These two events took place between October 8 and 10, 1871; Randall E. Rohe, "The Upper Great Lakes Lumber Era," *Inland Seas* 40 (1984): 19.

> incredibly low valuation of thirteen dollars per thousand board feet, the average wholesale price of lumber for the period 1847-1897.[43]

Although lumber exports declined to 108,459,000 board feet during the years 1873-1879, because of the recession caused by the Panic of 1873, the opening of the improved Welland Canal in 1882 caused this number to double.[44] The Panic only served to drive the last few small business owners in the lumber industry to extinction, which presented the surviving big businesses with an opportunity to make better profits.

The mills that opened in the antebellum decade were crude compared to the large-scale lumbering operations that were constructed in the 1870s and 1880s.[45] Big business required bigger and more long-term investments of capital because of increased production, longer hauls to market, and more expensive stumpage. Only corporations, the independently wealthy, or those with extensive credit could afford to participate in Great Lakes lumbering.[46] Big businesses with lots of capital were finally able to take on the biggest and most expensive problem in the lumbering industry: transportation.

From Forest to Mill

The most important factor that influenced the Great Lakes lumber industry was transportation. The problem of transportation was taken very seriously because mismanagement or bad luck in this area of business often caused mill owners to go into debt or bankruptcy.[47] "Regardless of time, place, or type of operation," wrote William Rector, "the transportation of logs was a major pivot point around which the entire

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[43]Rohe, "The Upper Great Lakes Lumber Era", 16.
[44] Richard F. Palmer, "Oswego: Lumber Trade Capital of the U.S.," *Inland Seas* 40 (1984): 37.
[45] Kilar, *Michigan's Lumbertowns*, 50.
[46] Rector, *Log Transportation in the Lake States Lumber Industry*, 59.
[47] *Ibid.*, 15-16.

manufacturing process was forced to revolve."[48] A study of Great Lakes lumbering analyzed the cost of transportation between 1870 and 1901 and found that log transportation accounted for an incredible fifty-two to seventy-three percent of the total cost of logs.[49] No matter how well suited for industry a product is, its value is speculative if it cannot be transported to market. In the lumber industry companies had to deal with transportation of their product in two distinct phases. Getting their finished product to market was only the second half of their problem. Their first priority was getting cut logs to the mill for processing.

In the nineteenth century, timber was an inexpensive commodity without a large profit margin. Transportation costs could easily eat up profits. For this reason, most early logging activities were seasonal operations that took place during winter months.[50] This allowed lumbermen to move logs out of the forest through the most inexpensive available methods, either by skidding or sleighing. Until the 1880s this was accomplished by securing logs onto sleds, which were bound with chains. These sleds were hooked to a team of oxen or horses, and then pulled across the frozen land to the waterways (See Figures 2.3 and 2.4).[51] Eventually the teams of oxen were supplanted by steam technology in the form of drag lines.[52]

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[48] *Ibid.*, 20.
[49] *Ibid.*, 23.
[50] Kilar, *Michigan's Lumbertowns*, 25.
[51] Fries, *Empire In Pine*, 31.
[52] *Ibid.*, 33.

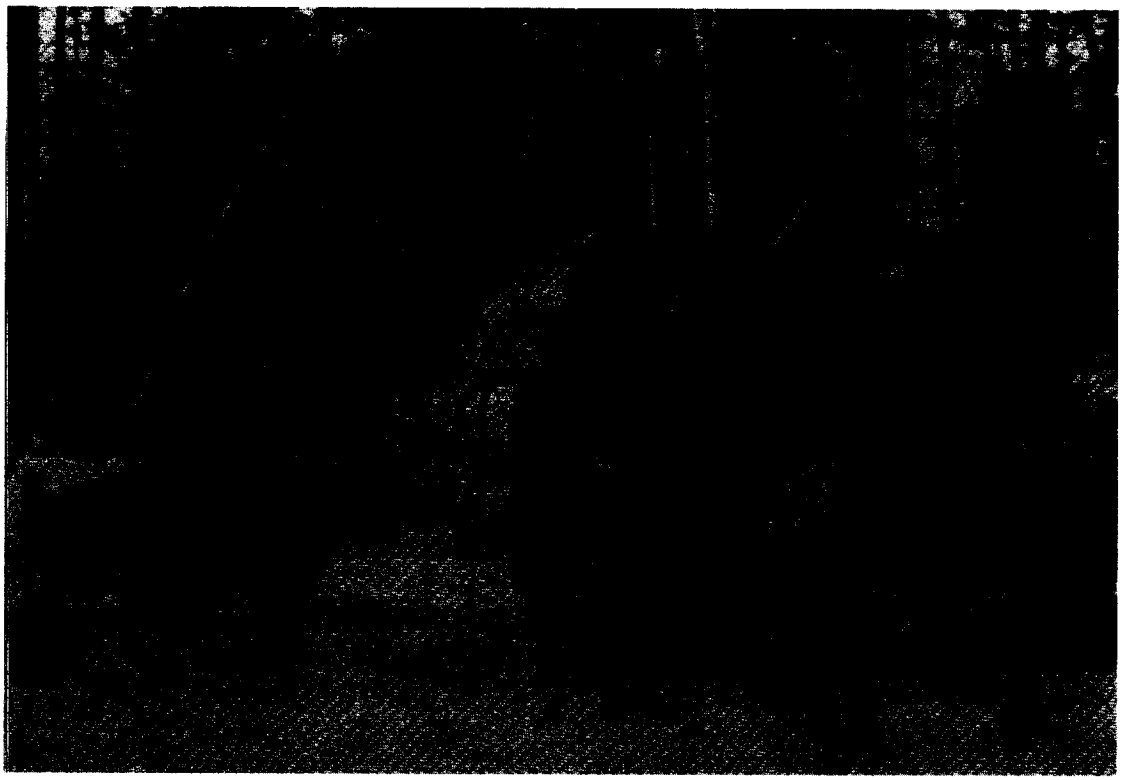

Figure 2.3: Wood Sleigh on its way to a river (Flader, 1983: 12).

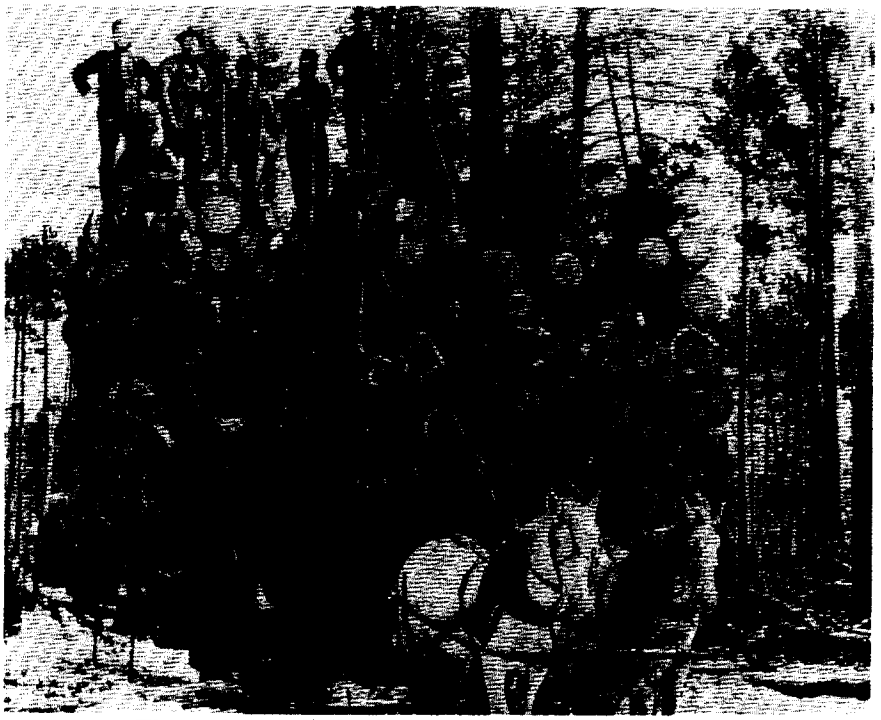

Figure 2.4: Fully loaded wood sleigh (Wilde, 1976: 9).

Great Lakes mills had the help of local geology in the form of the regions' rivers and streams, which were used to transport cut logs downstream from the forest to the mill. Because pine has such a low density, it was more easily transported by water than other prevalent Great Lakes species.[53] The Great Lakes pineries were connected to several major waterways that became "superhighways". They enabled lumbermen to ship their products to cities along the lake shores, in Canada, all along the Atlantic coast, and via the Mississippi, Platt, Missouri, and Red Rivers to prairie farmlands.[54] The Saginaw Basin alone boasted an estimated 864 miles of rivers suitable for log driving.[55]

In the spring, loggers broke the cut logs from the rollaways and let them fall into the streams, where they were carried downstream to the mill. River men, or "river hogs" as they were sometimes called, were responsible for clearing the streams, pushing the logs downstream to the mills, and keeping the river free from jams and obstructions (See Figure 2.5).[56]

The waterways determined the placement of mills because the most logical and economical place to put a mill was near a river mouth. This location allowed them to be downstream from the forest, where the logs could be caught and held safely, and also accessible to the Great Lakes, which provided the means for shipping the finished product to distribution centers.[57]

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[53] Rohe, "The Upper Great Lakes Lumber Era", 18.
[54] Rector, *Log Transportation in the Lake States Lumber Industry*, 45.
[55] *Ibid.*, 48.
[56] Kilar, *Michigan's Lumbertowns*, 24.
[57] *Ibid.*, 24-25; Flader, *The Great Lakes Forest*, 131.

Figure 2.5: Log Driving on the River (Rohe, 1984: 21).

As time went by, the most accessible timber was cut down. Those mill owners who could not place their mill in an ideal location had to utilize log rafts, a more expensive method of log shipment. Log rafts, often referred to as "booms", were developed in Bay City, Michigan, by Captain Benjamin Boutell in 1885. Booms were actually short logs (sixteen feet long and three to four feet in diameter) chained together end to end to make up the perimeter of the raft structure. These "bags" were filled with loose logs and then towed by a steamer (See Figures 2.6 and 2.7).[58] This method was more expensive because the owner of the steamer was typically an independent contractor.[59] These contractors often had to be paid at the time their services were rendered rather than after the timber was sold.

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[58] James P. Barry, *Ships of the Great Lakes: 300 Years of Navigation*, rev. ed. (1973; repr., Holt, MI: Thunder Bay Press, 1973), 16.

[59] Rector, *Log Transportation in the Lake States Lumber Industry*, 272.

Figure 2.6: A log raft that has been bundled together in a long and narrow configuration so it would fit through the channels (Barry, 1973, 160).

Figure 2.7: Log raft being formed at the mouth of a river on the northern shore of Lake Superior (Barry, 1973, 161).

Log rafts were incredibly dangerous to other vessels. They were typically poorly marked and could be immense in size, which proved to be hazardous obstacles in poor visibility. In addition, loose logs that escaped from bags tended to float freely on the lakes until they met an unsuspecting vessel.[60] Any ship that had a surprise encounter with loose logs faced potential hull damage or worse. As a result, regular patrols known as "log pickers" were arranged to wrangle loose logs. These men arranged logs by owners marks stamped on their ends, made them into new rafts, and returned them to their owners.[61] Log rafts were so dangerous that the Lake Carriers' Association finally filed a formal protest with Congress in 1893. This led to regulations such as limitations on size and the construction materials that could be utilized to build rafts.[62]

No matter what transportation method was used to transport timber from the forest to the mill, once it got there it was stored in holding ponds. There it could be moved inside the mills by conveyor belts and cut at the owner's convenience. In this way, companies were able to turn a cumbersome, bulky, and inexpensive product into a profit.

Full to the Guntline: Lumber Shovers and the Loading of Lumber Carriers

One element of transportation expenses lumbermen were powerless to fight, and one of the most overlooked aspects of lumbering, was the loading and unloading of finished products into schooners and steambarges for transportation to distribution centers. While steambarges and the Consort System, which will be discussed in more

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[60] Gray, "Fueling the Fire", 47.
[61] Barry, *Ships of the Great Lakes*, 16.
[62] *Ibid.*

detail in Chapter 3, made the shipment of lumber and other bulk commodities economical and reliable, they were not completely efficient. One major disadvantage of steambarges was that they had to be loaded by hand. This aspect of transportation became expensive because lots of manpower was required to load and unload vessels that transported lumber to markets. In 1885, an estimated 14,479 people were employed in the Wisconsin lumber industry alone. Hundreds of these individuals were engaged in the business of loading and unloading lumber carriers. To put this figure into perspective, consider that the next largest employer of Wisconsin's citizens, founders and machinists, reported only 1,431 employees in 1885.[63] The job of hand loading lumber was physically demanding and dangerous, thus workers were paid a premium wage.[64]

Lumber shoving, as the process of loading and unloading lumber from ships was called, was a difficult task that was hard on both ships and men. A lumber shover's day began before sun-up when the mate passed out canvas aprons and harvest mitts, to help protect the men from splinters. Then the men, working in pairs, would begin removing freshly cut pine boards from rectangular crags overhanging the dock (See Figure 2.8).

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[63] Jody Krejcarek, "The Knights of Labor and the Lumber Industry in Northeast Wisconsin, 1885-1887", *Voyageur* 13(1996): 16.
[64] Palmer, "Oswego: Lumber Trade Capital of the U.S.", 34.

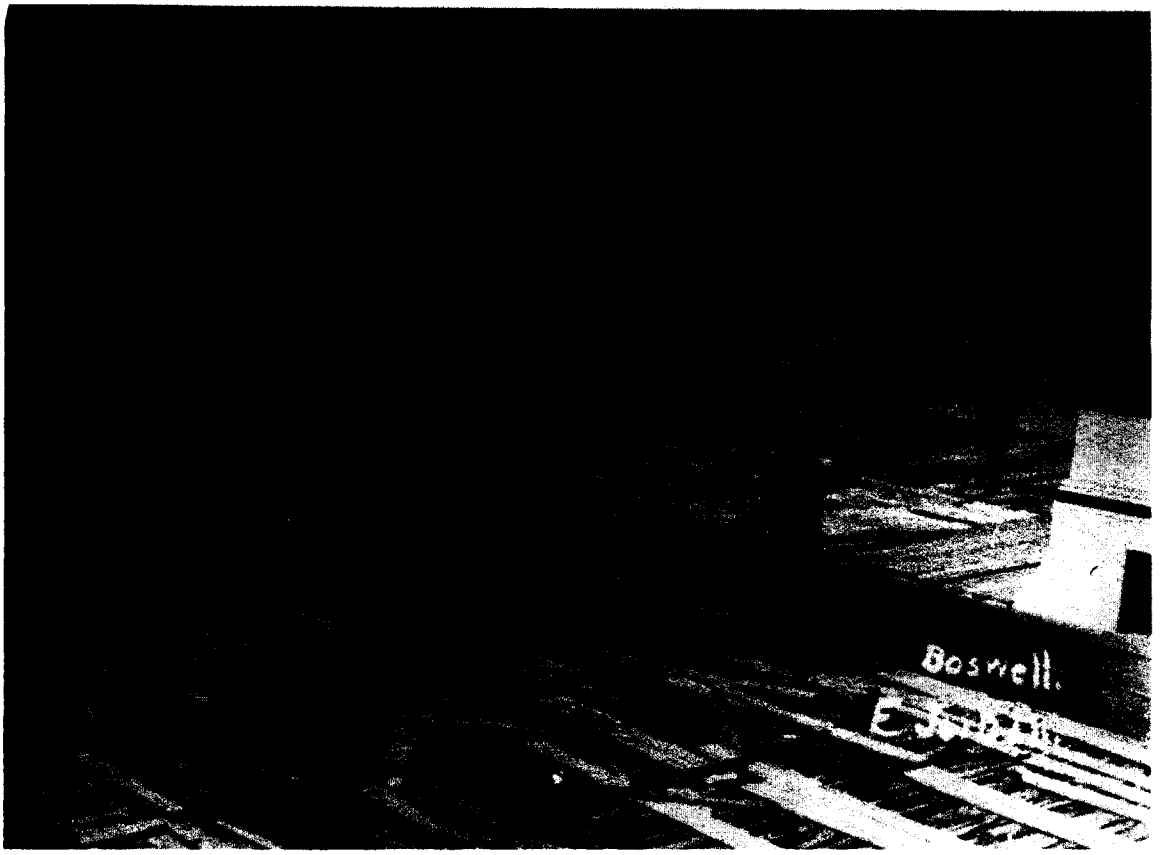

Figure 2.8: Lumber shovers passing lumber from the woodpile to the ship's deck (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

Men standing on the piles passed lumber down to the ship's deck, and then it was carried to the hatches and passed into the hold one board at a time (See Figure 2.9). The limited below-decks spaces were filled first by placing lumber in neat rows on the ceiling, starting at the bilges and sides. According to Great Lakes historian James P. Barry, "...the standard length of board was twelve feet, and the thirteen-foot depth provided for the easiest and quickest handling of the cargo. If a ship were deeper, more handling was required, and that cost more money."[65]

[65] Barry, *Ships of the Great Lakes*, 149.

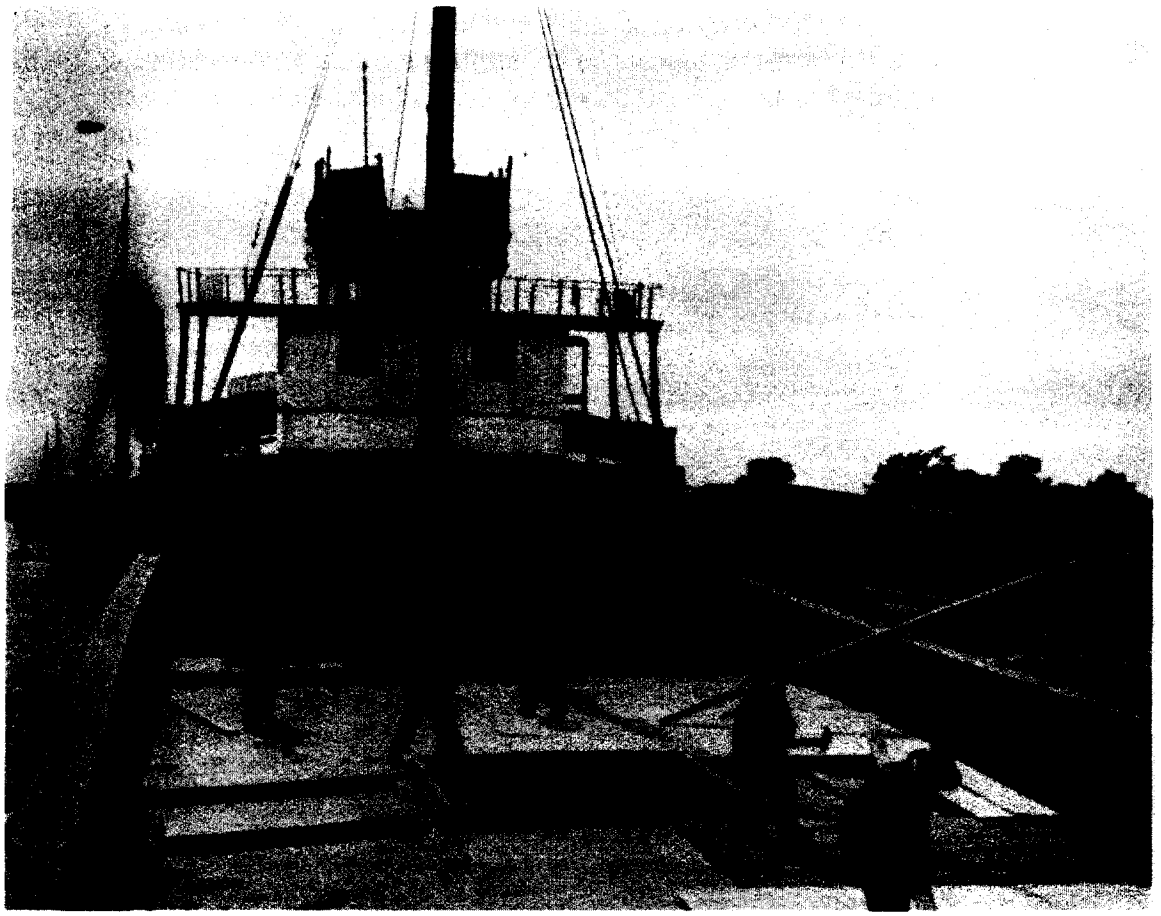

Figure 2.9: Lumber shovers filling the hold of a steambarge (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

Loading continued until the lumber level was "full to the guntline", meaning mounted up to the deckbeams.[66] After this, boards and wedges were driven between the cargo and deck beams to keep the cargo from shifting, and to give the main deck added support. After the hold was full, the men began loading the deck (See Figure 2.10). According to Palmer:

> Upended planks inside the bulwarks enabled them to pile the lumber from five to ten feet high above deck, until it smothered the cabin top and

[66] Palmer, "Oswego: Lumber Trade Capital of the U.S.", 35.

overhung the forecastle.[67] Chains were then toggled from rail to rail, to keep this mountain from shifting. Wells would be left to get at the steering wheel and cabin companionway, the centerboard winch and the pumps.[68]

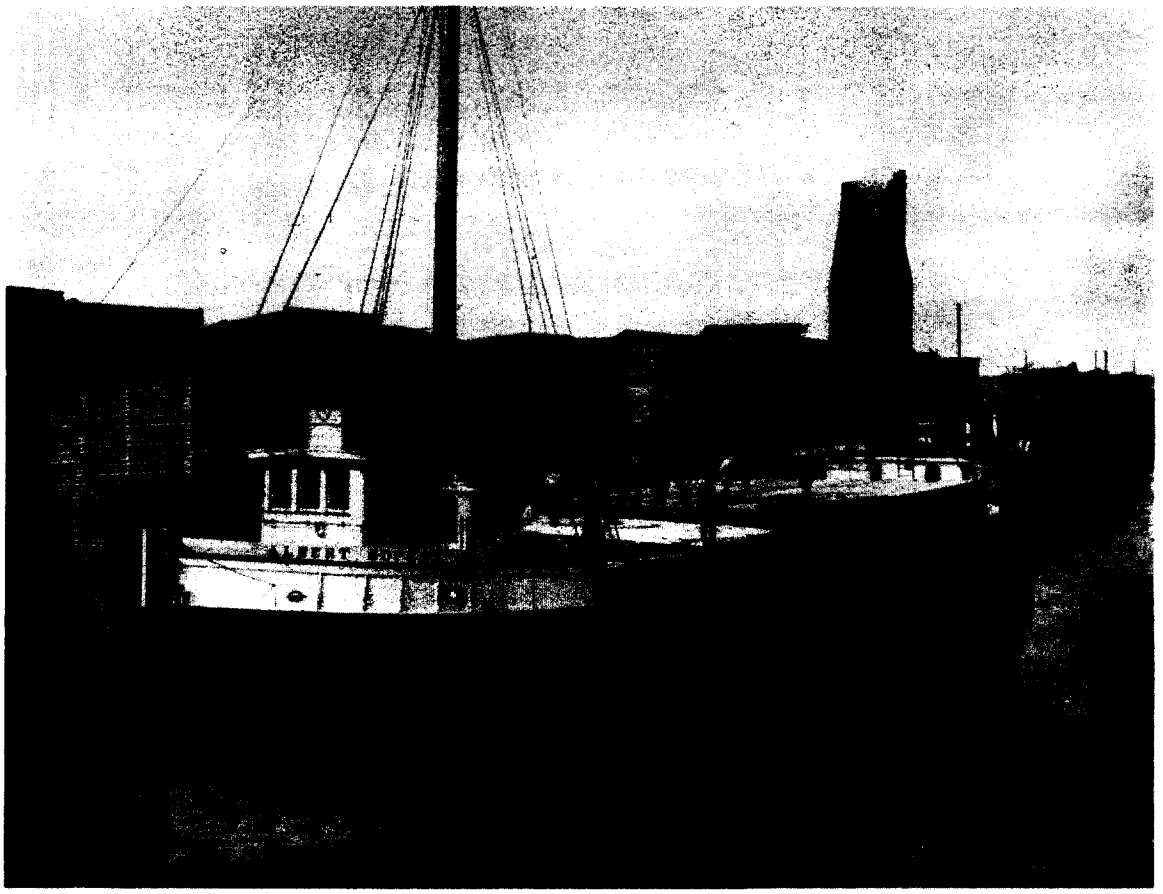

Figure 2.10: Lumber Shovers at work. Note how high the cargo is loaded above the deck (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

Work continued until the vessels were fully loaded (See Figure 2.11). If the weather was good the vessels could cast off at once and the shovers would begin the process of loading another vessel.

[67] Other historical sources, such as Richards and Barry, actually state that the deck load could be as high as twelve feet; Donald F. Richards, "The Glory Days," *Telescope Magazine* (1960): 260.
[68] This process is the same for vessels without centerboards; Palmer, "Oswego: Lumber Trade Capital of the U.S.", 35.

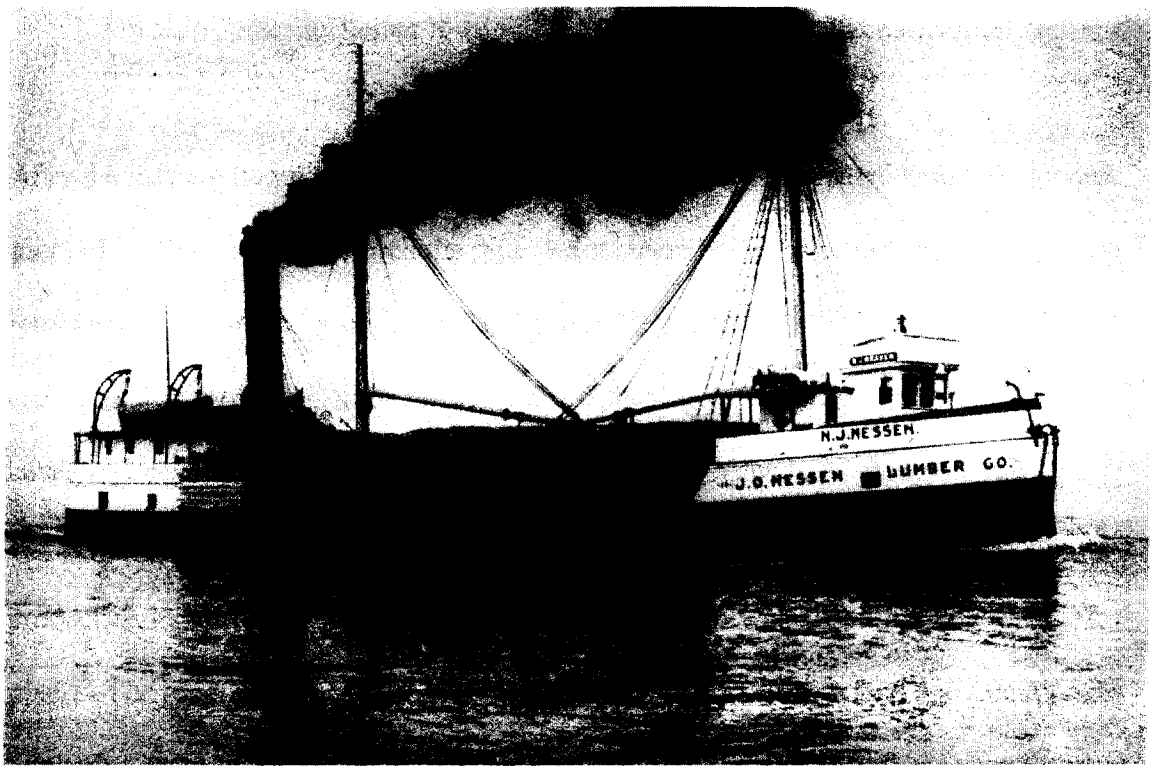

Figure 2.11: The *N.J. Messen* fully loaded (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

The grueling grind was repeated again and again until sundown, when the lumber shover's workday was finally over.

Timber Famine: The Death of the Great Pine Empire

The most obvious problem mill owners faced in the late 1800s was that the lumber boom could only survive as long as the Great Lakes pine forests were abundant. This seemed no problem at mid-century. In fact, in 1852, a Wisconsin Congressman informed his colleagues that:

> Upon the Rivers which are tributary to the Mississippi, and also upon those which empty themselves into Lake Michigan, there are interminable

> forests of pine, sufficient to supply all the wants of the citizens...for all time to come.[69]

After the logging boom of the 1850s, the pine forests were decimated at an accelerated pace. By 1876 the rate at which the pine forests were being consumed started alarming journalists from several prominent Great Lakes newspapers.[70] In 1898, lumbermen estimated that there were three million acres of land in Wisconsin alone without forest cover, and several million more acres were hosts only to dead and dying stumps.[71] Between the years 1899 and 1920 the Congressman was finally proven wrong, lumber production had dropped from six billion board feet to only a half billion board feet of pine.[72] The great forests of pine had been turned into a vast wasteland and Great Lakes lumbering quickly became a dying industry. The only remaining timber resources were located in remote areas that were not cost effective to transport to mill.[73] The passage of the McKinley Tariff Act on October 1, 1890 did not help matters. Wood and wood manufacturers were taxed between ten to thirteen percent, an additional expense they could not bear.[74] One by one the mills that depended upon the great northern forests were dismantled, burned, or abandoned.[75]

Despite the damage caused by intensive logging of the Great Lakes forests, historical hindsight shows that it was not the physical act of over-harvesting alone that destroyed the timber industry. Logging did destroy virgin white pine stands, but it was

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[69] Flader, *The Great Lakes Forest: An Environmental and Social History*, 124.
[70] Mansfield, *History of the Great Lakes*, 516.
[71] Rohe, "The Upper Great Lakes Lumber Era", 19.
[72] Rector, *Log Transportation in the Lake States Lumber Industry*, 61.
[73] *Ibid.*, 284.
[74] Palmer, "Oswego: Lumber Trade Capital of the U.S.", 37.
[75] Mansfield, *History of the Great Lakes*, 517.

not merely through the process of cutting trees. Rather, it was the *methods* the loggers used that invited the forests' worst enemy, fire. Irresponsible logging practices resulted in acres of forest floor littered with piles of branches and tree tops that were susceptible to fire.[76] According to Eric A. Bourdo Jr.:

> It was the repeated fire in the aftermath of logging which was the harshest on the white pine forest. These fires killed seedlings that could have regenerated the stands...hot fires virtually sterilized the sites.[77]

It is ironic that the Chicago and Peshtigo fires created a destructive lumber boom because both the boom and the fire turned millions of acres of forest land into a barren, desolate, and ultimately unprofitable wasteland. Unbelievably, residents of the Great Lakes states who had migrated to the great pine forests in the 1830s saw it vanish before their very eyes in the course of their lifetimes. Historian Charles E. Twining summarized the situation best when he stated, "The Great Lakes forest could have only been saved had it been the last forest".[78]

After the plains were settled Americans kept pushing on to the new frontier, the Northwest Pacific Coast. Unsurprisingly, the lumber industry went with them. It is no coincidence that the successful Weyerhaeuser Company, which had maintained its headquarters in St. Paul, Minnesota, relocated to Tacoma, Washington, in 1890.[79] Great Lakes white pine was replaced by fir and redwood shingles from Oregon and yellow pine from the South.[80] Much like the pine regions of the East, including Maine, Pennsylvania,

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[76] Rohe, "The Upper Great Lakes Lumber Era", 19.
[77] Flader, *The Great Lakes Forest*, 14.
[78] *Ibid.*, 131.
[79] *Ibid.*, 131.
[80] Rector, *Log Transportation in the Lake States Lumber Industry*, 284.

and New York, the Lake states lost the lumbering industry to a new frontier with virgin forests. Those lumbermen who maintained the tools, capital, and industrial skill necessary to harvest the forest moved with the industry. The destruction of the forest was so complete that by 1920 the Great Lakes, once America's proud pine empire, was importing most of its lumber.[81]

Conclusion

The lumbermens' assault on the Northern forests was both a blessing and a curse. The lumbering industry was the most important economic activity in the Great Lakes region during the nineteenth century, and directly influenced the settlement of America's wilderness. Without Great Lakes lumber, the settlement of the timberless regions of the plains would have been exceedingly difficult, if not impossible, at least until the invention of alternative building materials such as cement and steel. Lakes lumber built railroads, ships, barns, stores, and homes. The steamboats and railroads that carried settlers, provisions, and equipment deep into the west also depended upon Great Lakes lumber for hulls and rail ties.[82] Lumber made the Great Lakes a wealthy region and boosted the United States' economy. Great Lakes pine was, in fact, *more* valuable than California gold by more than a billion dollars.[83] Unfortunately, economic success came at a great cost; logging scarred the natural face of the Great Lakes region forever. No one alive today has ever seen the sea of green that awed America's first pioneers.

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[81] Rohe, "The Upper Great Lakes Lumber Era", 19.
[82] Annalies Corbin, "Steamboat *Montana* (1879-1884)-Leviathan of the American Plans," *The International Journal of Nautical Archaeology* 35, no. 3 (2006): 2-3.
[83] Rohe, "The Upper Great Lakes Lumber Era", 16.

Transportation was the lumbermen's biggest overhead cost and, thus, his biggest enemy. Transportation was also a two-fold problem. Although lumbermen figured out a reliable and economic solution for getting their products from forest to mill, it was not until a reliable system was developed to transport processed goods from the mill to the market that the lumber industry became dominant in the Great Lakes economy. The solution to this transportation problem would require the invention of a whole new vessel class, and an entirely new system of shipping products: steambarges and the consort system.

CHAPTER 3:

THE EVOLUTION OF GREAT LAKES STEAMBARGES: THE MISSING LINK BETWEEN SAIL AND STEAM POWERED CARGO VESSELS

Introduction

Great Lakes vessels have been undergoing a continuous process of evolution powered by experimentation, adaptation, design, and innovation since the first hull slid into the lakes in the 1600s.[1] The hull types that have evolved on the Lakes have been necessarily distinct from ocean-going classes because the Lakes represent a unique geographic area. Lakes shipwrights have:

> ...taken the best of contemporary French, British, and Yankee shipbuilding traditions and adapted them to the needs of the Lakes' environment, within the limitations imposed by local availability of raw materials.[2]

Each new vessel type has given rise to yet another, and even the ancestors of today's giant steel bulk carriers can be traced through a family tree of vessel types starting with the schooner. No other vessel type influenced the internal design of steambarges more than schooners. Internal steambarge construction is characterized by both sail and steam design components including heavy keelson assemblies and longitudinal ceiling planking similar to sailing schooners, combined with steam components including engines, boilers, propellers, heavy stern framing, and bilge keelsons. Externally, steambarges resemble

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[1] C. Patrick Labadie, *Submerged Cultural Resources Study: Pictured Rocks National Lakeshore* (Santa Fe: Southwest Cultural Resources Center, 1989), 17.
[2] Labadie, *Pictured Rocks*, 17.

typical Great Lakes freighter profiles including a high length to beam ratio, as well as pilot houses and crew quarters located at either end with an open deck in between.[3]

In order to trace the evolution of sail powered cargo vessels to steam powered cargo vessels, it is necessary to understand what components of steambarge predecessors actually manifest in steambarge design and construction. Therefore, a brief synopsis of the influence of schooner, passenger steamer, and propeller development is provided. This data illuminates the origin of these components and shows how they were combined by shipwrights to form the first successful commercial steam powered bulk cargo carrier, the steambarge.

The purpose of this chapter is two-fold. First, it traces the technological development of the steambarge by demonstrating how innovation was the result of shipwrights' experiments with other vessel classes including schooners, steamers, and propellers. Second, it explores the reasons steambarge development was crucial to the Great Lakes economy, and why the technology became obsolete.

Schooners

The first vessels to sail the Great Lakes were dugouts and "pirogues", or birch bark canoes, utilized by indigenous tribes to travel the tributaries and shores of the Great Lakes.[4] This remained the primary means of boat transportation until after the arrival of the French in 1615.[5] At that time, the Lakes region was an untouched paradise filled with

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[3] James P. Barry, *Ships of the Great Lakes: 300 Years of Navigation*, rev. ed. (1973; repr., Holt, MI: Thunder Bay Press, 1973), 149.
[4] James Cooke Mills, *Our Inland Seas: Their Shipping & Commerce for Three Centuries* (Chicago: A. C. McClurg & Company, 1976), 28.
[5] David J. Cooper, *Survey of Submerged Cultural Resources in Northern Door County* (Madison: State Historical Society of Wisconsin), 1989.

a plethora of natural resources, but the French were only interested in harvesting fur. Originally, French fur traders utilized the native pirogue to transport furs, but within sixty-five years they had improved upon the canoe's design and constructed the very first Euro-American-built boat, the "bateau". Bateaus boosted the fur trade because traders needed vessels with a larger capacity for transporting goods.[6] Explorers who wished to journey further west by boat than the rapids of the St. Lawrence and Niagara Rivers were forced to build new types of ships, because these waters proved too powerful and difficult to cross via pirogues and bateaus. The construction of these early vessels was based upon transplanted European ship designs, however, it should be noted that shipwrights did not choose deep-draft ocean-going vessels as their models. Rather, they selected shallow-draft designs that had proven worthy in the shallow and unprotected waters of the North Sea. The reason for this is simple: nearly all early lakes navigation took place along the shoreline.[7] The first ship to sail the Great Lakes above Niagara was the *Griffon*, a small French-designed galleot built by LaSalle for the fur trade in 1679 (See Figure 3.1). Unfortunately this vessel did not survive its maiden voyage, and the fur trade, which continued to grow in importance, would not stimulate the production of another large sail powered ship for fifty years. [8] As lakes commerce grew, however, so did merchants' demands for larger and more efficient cargo vessels.

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[6] This type of boat was used for military operations and later for the fur trade; Barry, *Ships of the Great Lakes*; 30.
[7] Labadie, *Pictured Rocks*, 17.
[8] Barry, *Ships of the Great Lakes*, 12-15; Mills, *Our Inland Seas*, 63.

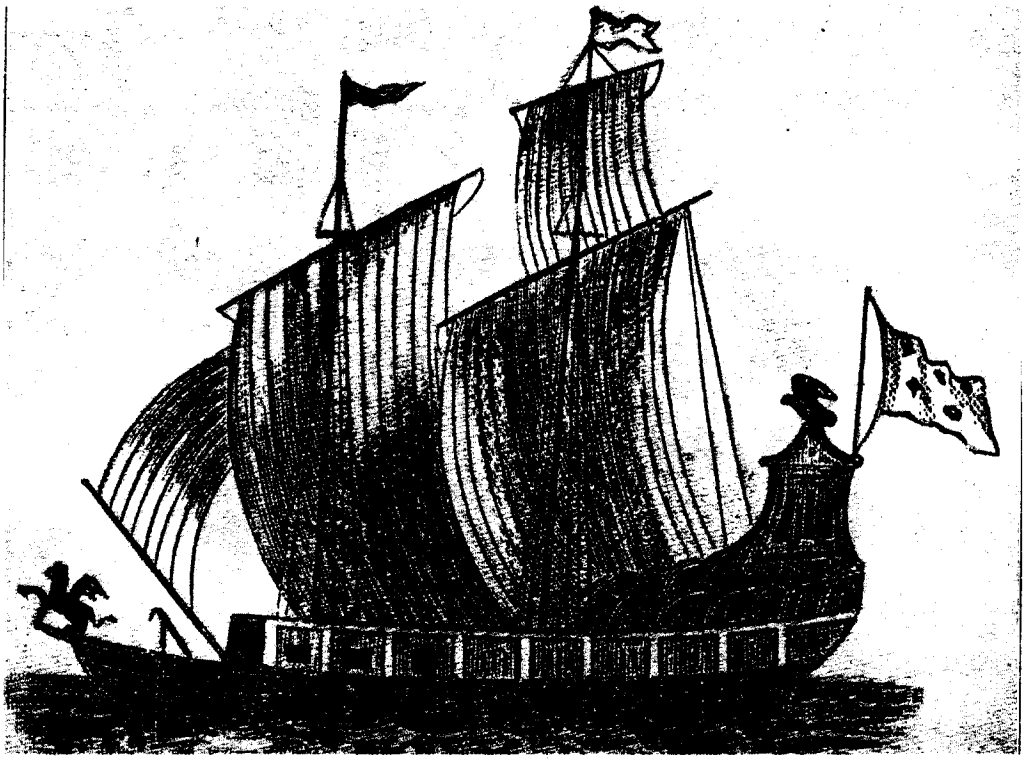

Figure 3.1: The *Griffon* as depicted in an old wood cut in Detroit Public Library (Mills, 1910: 3).

Schooners made their American debut along the East coast in the early 1700s, and were given the label "schooner" in 1717. Before long merchants, sailors, and shipwrights discovered that vessels with a schooner rig were the most efficient commercial craft. Not surprisingly, shipwrights again drew from European concepts when designing the first American vessels with schooner rigs. Their design may have been influenced by two separate European rigging design traditions. Schooners with square topsails were probably influenced by small square rigged vessels, and those without were probably influence by two-masted shallops carrying only sprit sails, gaff

sails, or triangular sails.[9] These sail configurations allowed the vessels to be very dependable in various weather conditions and could be handled by smaller crews.[10]

Schooner hulls developed separately from rigging. Although eighteenth-century American ships usually used the same narrow hull type, they sailed, as mentioned, with different rigs. Merchants valued economically advantageous narrow hulls because, "when two vessels had the same capacity or displacement, the one with the narrower hull would be faster."[11] During the French and Indian War (1754-1763) schooners made their debut on the Great Lakes.[12] These flat-bottomed shallow-draft ships were discovered to be the best solution for retaining speed and efficiency despite the Lakes' shallow waters and twisting channels.

After 1800, merchant schooners, combining narrow hulls with schooner rigging, appeared on the Lakes in considerable numbers (See Figure 3.2). They became an integral part of the Lakes' commerce because vessel owners began to establish packet lines to carry both passengers and freight.[13] Once vessel owners entered the packet trade, "speed, capacity, seaworthiness, and the ability to sail on schedule year-round with any available cargo" were of the utmost importance. Fast, efficient vessels with a large cargo capacity became an even bigger economic boon with the construction of two major canals: the Erie Canal (1825), which connected the Great Lakes with the east coast, and

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[9] Basil Greenhill, *Schooners* (Annapolis: Naval Institute Press, 1980), 19.
[10] Daniel J. Lenihan, ed., *Submerged Cultural Resources Study: Shipwrecks of Isle Royale National Park* (Santa Fe: Southwest Cultural Resources Center, 1994), 47.
[11] Lenihan, *Isle Royale National Park,* 47.
[12] Mills, *Our Inland Seas*, 64.
[13] Labadie, *Pictured Rocks*, 19-20.

the Welland Canal (1829), which connected Lake Erie and Lake Ontario. These two canals opened four of the five Great Lakes to continuous navigation.[14]

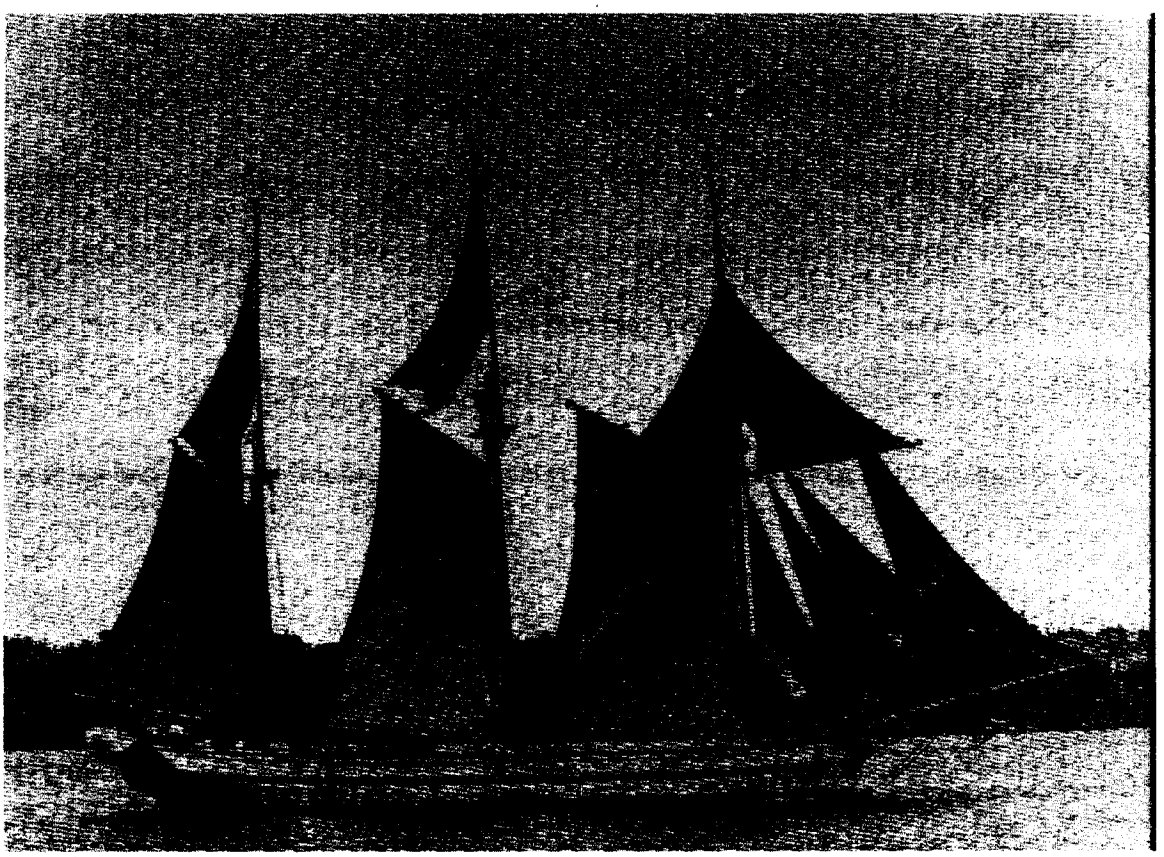

Figure 3.2: *Emma L. Nielsen* (1883), a typical three-masted Great Lakes Schooner (Thompson, 1991: 32).

Despite the obvious benefits of schooners, the earliest vessels tended to be poor sailors that drifted with the wind, or "to the lee", because of the shallowness of their hulls. This technological problem was not corrected until the introduction of

[14] William N. Still, Gordon P. Watts, and Bradley Rodgers, "Steam Navigation and the United States," in *The Advent of Steam: The Merchant Ship Before 1900*, ed. Robert Gardiner and Dr. Basil Greenhill (Edison, NJ: Chartwell Books, Inc., 1993), 69.

centerboards.[15] Centerboards are typically wooden devices typically located in the center of a vessel, contained within a watertight case, or trunk, and originally situated to the side of a vessel's keel/keelson backbone (See Figure 3.3). After 1860, vessels were built with centerboards that passed directly through the keel.[16] Centerboards protrude through the bottom of a ship's hull and can be lowered or raised from inside the vessel to prevent leeway. Vessels with centerboards are more effective sailors because they maneuver well at all loads and drafts.[17] Although there is some confusion about the introduction of centerboards on the Great Lakes, it seems that they were a common occurrence after about 1825.[18] By 1845 centerboards were being utilized in larger commercial craft, such as barks and steamers (including steambarges by 1848), to control drift when running light.[19]

Canal schooners, grain schooners, and scow schooners were three unique Great Lakes schooner varieties that moved most of the important nineteenth-century bulk cargo.[20] Without the important and valuable cargoes that Great Lakes schooners transported, westward migration in the United States would have been exceedingly

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[15] Barkhausen, *Focusing on the Centerboard* (Manitowoc, WI: Manitowoc Maritime Museum, 1990), 8.
[16] There is some confusion over who invented the first centerboard, although Lieutenant Schank, an English naval officer, is generally acknowledged as the inventor. A sixty-five foot cutter was built under his supervision with a drop keel in 1790. There is even greater confusion concerning the introduction of centerboards in the United States. Between 1817 and 1820 Captain Augustus Walker observed in his writings that most vessels were built with centerboards. Centerboards are also referred to as a "leeboards", "slip keels", "sliding keels", or "drop keels", depending on their construction. For a more detailed overview of centerboard history, see Henry N. Barkhausen, *Focusing on the Centerboard*; Howard I. Chapelle, *The Search for Speed Under Sail: 1700-1855* (New York: W.W. Norton & Company, 1967), 280; Bradley R. Rodgers, "Vernacular Craft of the North American Great Lakes: Twenty Years Research in Retrospective," (unpublished article, Program in Maritime Studies, East Carolina University, 2006), 12.
[17] Chapelle, *The Search for Speed Under Sail*, 279.
[18] Labadie, *Pictured Rocks*, 20.
[19] *Ibid.*, 20.
[20] Between about 1830 and 1870, most timber products reached the market via sailing vessels; Rodgers, "Vernacular Craft", 8.

difficult, if not impossible. Schooners, however, depended on the wind which could at times be unpredictable and unreliable. It was also time consuming to load and unload schooners by hand, although the introduction of an on-deck steam engine and boiler, called "donkey engines" and "donkey boilers", sped up the process. This system facilitated cargo loading because they could be used to power deck machinery, such as cargo winches.[21] Although the introduction of mechanized loading equipment in the nineteenth century made cargo handling less expensive, schooner technology began a gradual downward spiral toward the end of the century due to the introduction and success of steam powered vessels.

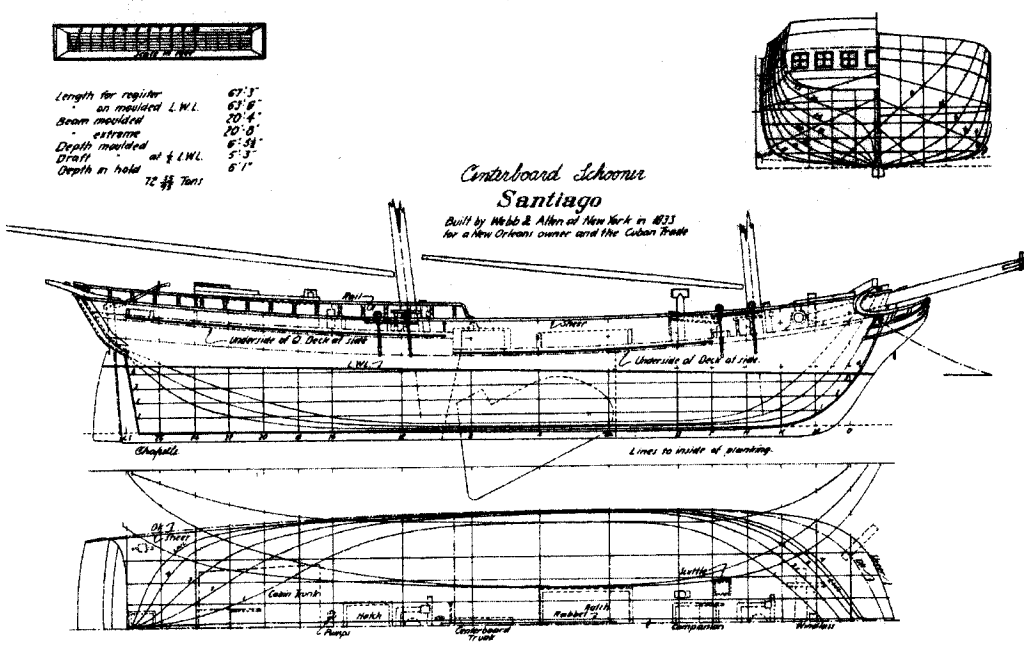

Figure 3.3: Lines of the centerboard schooner *Santiago* show the location of the centerboard (Chapelle, 1967: 282).

[21] Peter Kemp, ed., *The Oxford Companion to Ships and the Sea*, (Oxford: Oxford University Press, 1976), 259.

Heating up the Competition: The Debut of Steam on the Great Lakes

Combining steam technology with ships was an inventive process that involved several different countries and inventors.[22] As in most cases, however, the first man to pull it all together and make a profit received the credit; this is the case with Robert Fulton. In 1803 Fulton, an American with a passion for mechanics, formed a partnership with Robert R. Livingston, the U.S. Minster to France, and began testing several different vessel propulsion theories.[23] After two failed attempts in Europe, Fulton returned to the United States to construct the *Steam Boat* in 1806 (See Figure 3.4).[24]

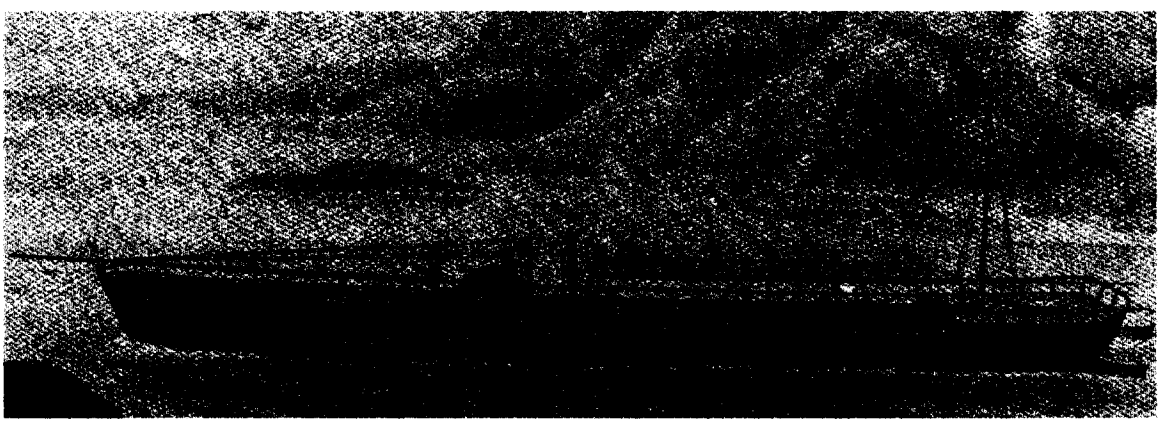

Figure 3.4: *Steam Boat* (Gardiner and Greenhill, 1993: 45).

In September 1807 Fulton's vessel made its famous trip from New York to Albany.[25] With this successful venture Fulton and Livingston proved that propelling a vessel with steam was possible and, most importantly, quite profitable for transporting passengers.

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[22] James Cooke Mills points out that attempts to propel a boat by steam power were conducted as early as the 1550s and continued for about the next 250 years; Mills, *Our Inland Seas*, 76.
[23] Ibid., 84.
[24] Fulton's first vessel if often called the *Clermont*, but it was actually originally named *Steam Boat*. The name of the vessel was not changed until 1809 when it became the *North River Steam Boat*. It was never named *Clermont*.; Still, Watts, and Rodgers, "Steam Navigation", 44.
[25] *Ibid.*

In this light, passenger steamboat technology made its debut on the lower Great Lakes in 1816 with the *Ontario* and the *Frontenac*, followed by the 1818 debut of the *Walk-in-the-Water*.[26] The benefits of steam-powered Great Lakes paddle-wheelers over sail powered ships included faster turn-around times, predictable delivery, increased reliability, and added comfort. Despite the benefits of steamers, they were not entirely efficient. Their deficiencies included lack of cargo capacity, expensive operation costs, and the bottleneck effect of the Welland Canal.[27]

The cost of operating a steamboat made it impossible for the vessel owners to make a profit transporting relatively low value bulk commodities such as grain, coal, and lumber. The large inefficient low-pressure engines, boilers, and fuel source took up too much valuable cargo space, and were expensive to maintain and operate.[28] Any steamer that was large enough to have a carrying capacity equal to that of sailing vessels was too big to fit through the one hundred foot locks of the Welland Canal.[29]

In addition, paddle-wheelers were constructed with one or two decks of cabins that stretched from stem to stern. Any bulk cargo could not be loaded through convenient deck hatches such as those found on schooners. Loading bulk cargo, or any cargo at all, on a paddle-wheeler was an expensive and time consuming process that required several crew members and dock workers using wheelbarrows.[30] Therefore, steamboat owners

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[26] George Rodgers Taylor, *The Transportation Revolution 1815-1860* (New York: Rinehart & Company, Inc., 1951), 61.
[27] It is important to note that "steamer" in Great Lakes parlance refers specifically to paddle-wheel steamers; Harlan Hatcher, *The Great Lakes* (New York: Oxford University Press, 1944), 121.
[28] Still, Watts, and Rodgers, "Steam Navigation", 69.
[29] Hatcher, *The Great Lakes*, 121.
[30] Mark L. Thompson, *Steamboats and Sailors of the Great Lakes* (Detroit: Wayne State University Press, 1991), 31.

and operators focused almost all of their economic efforts on transporting packaged manufactured goods and passengers in grand style. Schooners were able to maintain a separate economic niche by transporting the Lakes' bulk cargo. The promise of future potential profits, however, encouraged shipwrights to actively begin the process of combining the bulk cargo capacity of sailing ships with the predictability, efficiency, speed, and profitability of steam. This could not, however, be accomplished until builders could figure a way to downsize paddle-wheelers' bulky machinery, therefore, reducing steamers' size in general, while maintaining a large cargo capacity.

The Vandalia*: The First Great Lakes Propeller*

In 1841, in Oswego, New York, merchants praying for a faster way to deliver goods westward via steam were blessed with the launching of the *Vandalia*, an exceptional example of Great Lakes craftsmanship. *Vandalia* was the first Great Lakes vessel to have its machinery all the way aft and the first steam powered, screw propeller-driven commercial ship in the world.[31] Without the implementation of screw propellers, the transportation of bulk cargo via steam would have been impossible. The commercial adoption of the screw propeller was made possible by the efforts of two different men, Francis Pettit Smith, a farmer, and John Ericsson, a Swedish inventor.[32] Smith became interested in screw propulsion in 1835. He constructed a two foot long experimental model boat with a two inch diameter wooden screw that he tested on his farm pond. The success of his experiment encouraged him to approach a wealthy banker, named Mr. Wright, for financial backing. Wright agreed and, as a result, financed the production of

[31] Thompson, *Steamboats and Sailors of the Great Lakes*, 36; Barry, *Ships of the Great Lakes,* 52.
[32] Barry, *Ships of the Great Lakes,* 52.

an experimental launch and a larger vessel, *Archimedes*.[33] Both vessels were a success, and Smith's design was adopted by the British Royal Navy.[34]

Ericsson was not so fortunate in England. In 1836, on the Thames River, Ericsson demonstrated that a forty foot long vessel with a double screw propeller could successfully propel itself at a speed of ten miles an hour. His design, however, lost out to Smith's in head to head competition for Royal Navy contracts. Despite this setback, Ericsson believed in his invention and, in 1839, he traveled to America with high hopes of interesting the U.S. Navy. While in the United States, Ericsson met Captain James Van Cleve who supported him in his belief that propeller technology would revolutionize ship propulsion.[35] Van Cleve agreed to form a company to finance a screw-propelled vessel, and Ericsson agreed to pay Van Cleve one-half of the interest from the resulting patent. After securing shipwright Sylvester Doolittle and constructing an engine based on Ericsson's design, the *Vandalia* was finally launched in 1841.[36] *Vandalia* was a moderate 138 tons burden, 91 feet long, 20.17 feet in beam, with an 8.25 foot depth of hold. The ship's hull is remarkably similar to that of a sailing vessel, with the exception of a small smoke stack for the boiler, located in the stern (See Figures 3.5 and 3.6). Internally, the ship was powered by two high-pressure, vertical inverted cylinder direct acting engines (See Figure 3.7).[37]

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[33] E.C.B. Corlett, "The Screw Propeller and Merchant Shipping 1840-1865", in *The Advent of Steam: The Merchant Ship Before 1900*, ed. Robert Gardiner and Dr. Basil Greenhill (Edison, NJ: Chartwell Books, Inc., 1993), 85.
[34] E.C.B. Corlett, "The Screw Propeller", 87.
[35] Barry, *Ships of the Great Lakes,* 52.
[36] *Ibid.*
[37] Still, Watts, and Rodgers, "Steam Navigation", 71; Barry, *Ships of the Great Lakes,* 52.

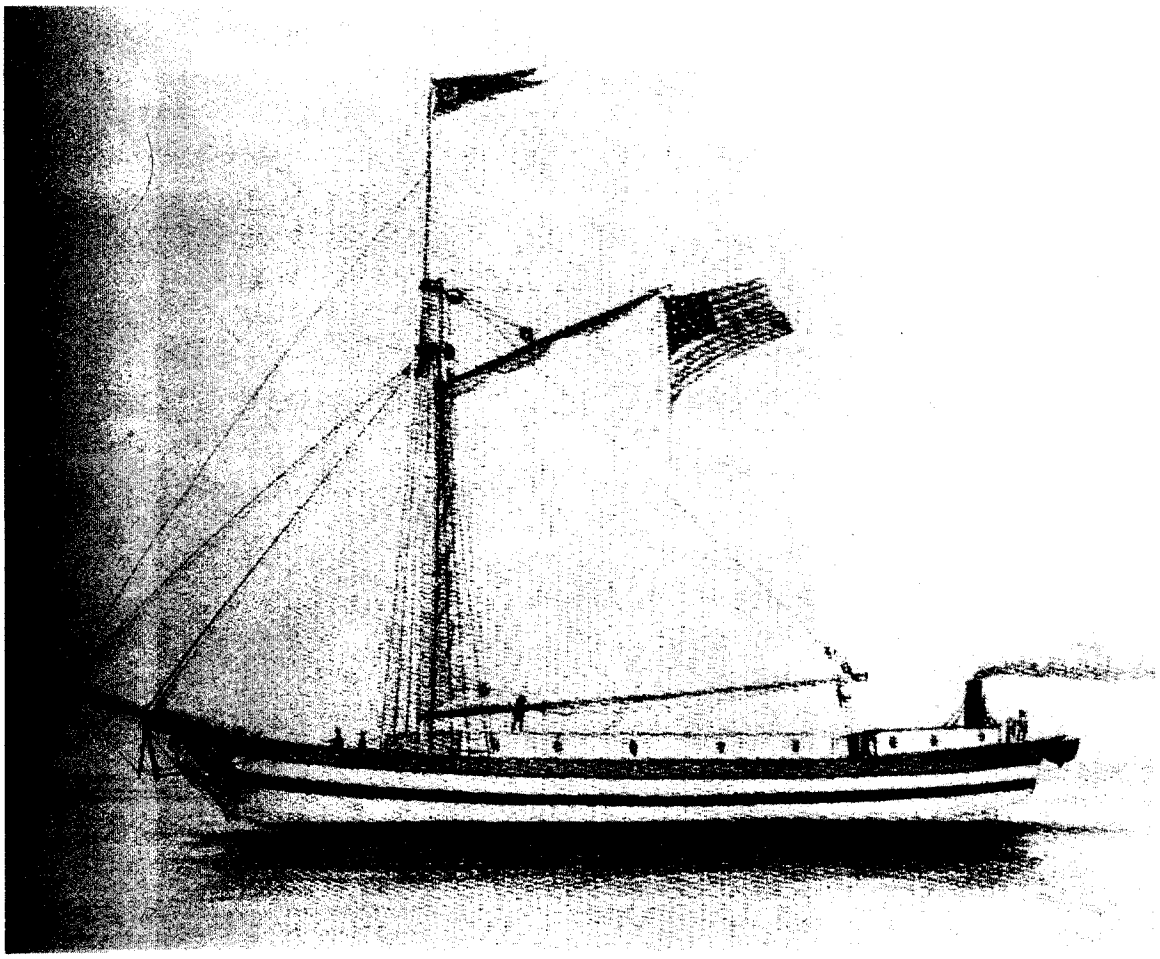

Figure 3.5: *Vandalia* (Barry, 1973: 53).

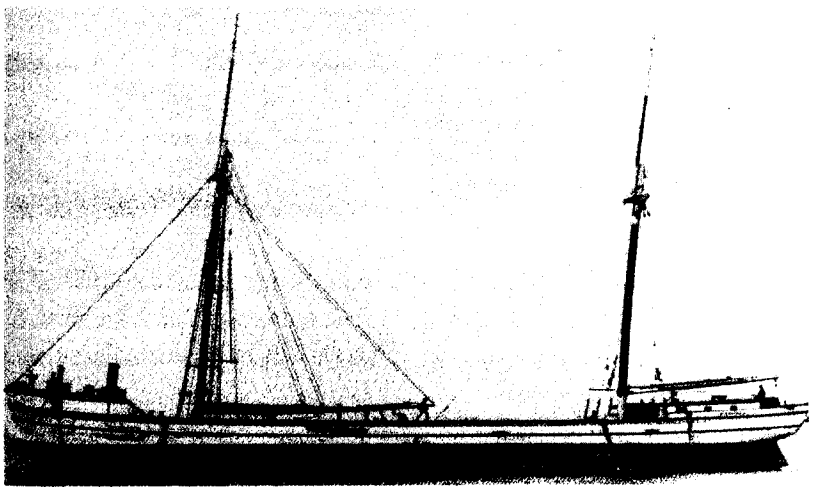

Figure 3.6: *Harvey Bissell*, a typical late century Great Lakes schooner with a profile not unlike *Vandalia* (Hirthe and Hirthe, 1986: 73).

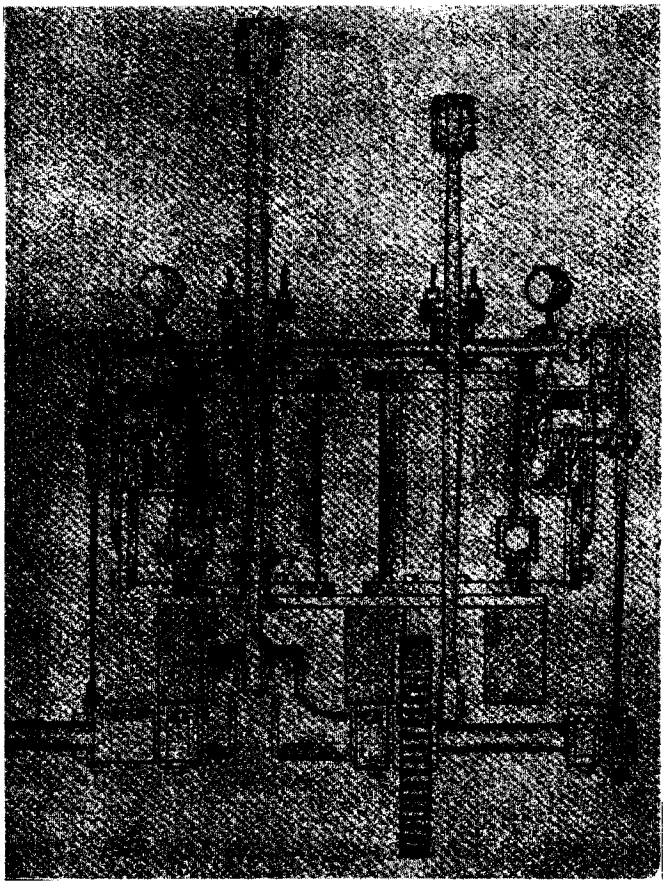

Figure 3.7: Facsimile of the original sketch of *Vandalia's* engines (Mills, 1910: 129).

The most unique feature of *Vandalia* was that it combined the operation of contemporary steam and sail powered vessels by carrying passengers, package freight, and occasionally bulk cargo. Amazingly, *Vandalia* could:

> ...carry fifty passengers at less cost than could the large paddle-wheelers because her main stock was package freight moving to the West and rolling and bulk freight to the East.[38]

[38] Still, Watts, and Rodgers, "Steam Navigation", 71.

The most important advantage *Vandalia* had over steamers was that it could easily pass through the narrow locks of the Welland Canal.[39] This is because *Vandalia* was constructed with the same full boxy lines as a Welland Canal schooner. This allowed the ship to pass through the Welland Canal with a maximum cargo capacity, something that paddle-wheelers could not do. An additional advantage propellers had over steamers was that propeller engines weighed a meager fifteen tons compared with the sixty to ninety tons of paddle-wheeler engines.[40] Their position in the aft end of the ship freed up room for more cargo and, thus, allowed vessel owners to maximize the profitability of their cargo space. Propellers were also cheaper to build, outfit, and run than paddle-wheelers. The most obvious advantage of propellers over sail was predictable delivery times. All of these characteristics allowed propellers to offer freight rates somewhere between those of sailing craft and paddle-wheelers.[41]

Vandalia was an unprecedented success and became a prototype for all other propeller steamers designed and built on the Great Lakes, and is clearly the first structural hybrid between cargo carrying sail and steam. According to the *Submerged Cultural Resources Study: Isle Royale National Park*:

> Contemporary newspaper accounts describe *Vandalia* as a sloop, and several other of the first propellers as "steam schooners." It is clear that they were all built as sailing craft, with boilers, engines, and screw-propellers introduced after their completion, sometimes at ports quite distant from the shipyards where they were constructed.[42]

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[39] Lenihan, *Isle Royale*, 51.
[40] Still, Watts, and Rodgers, "Steam Navigation", 71.
[41] Labadie, *Pictured Rocks*, 23.
[42] Lenihan, *Isle Royale*, 51.

Arguably, however, *Vandalia* was not a *functional* link between sail and steam because it was designed to carry only passengers and package freight, but not bulk cargo as most sailing vessels did. It seems likely that the success and future potential marketability of *Vandalia's* design planted the seed for the development of steambarges, and gave the lumber industry a model for answering their most pressing problem: transporting a low value bulk commodity quickly, efficiently, and profitably. The first all bulk commodity hybrid between sail and steam was still to come in the form of the steambarge. It was not until the debut of this new ship type that vessel owners successfully maximized the potential of this technological innovation and created the first true link between sail and steam; a vessel that combined the design and carrying capacity of Great Lakes schooners with the power and reliability of steam.

Steambarges and the Consort System

The success of passenger and package freight propellers on the Great Lakes encouraged shipwrights to begin experimenting with a new vessel type that could combine the carrying capacity of sail powered ships with the speed and reliability of steam ships. The result was the steambarge. Not surprisingly, these vessels were often referred to as propellers in vessel enrollments and contemporary newspaper articles. The first vessel specifically built as a steambarge to sail on the Great Lakes was *Petrel.* This

ship was built at Port Huron, Ohio, by Joshua W. Kelsey and enrolled as a propeller.[43] According to an article in the *Detroit Free Press*:

> ...The first steam barge [sic] came out in 1848, and was got up for lumber freighting at Vicksburg on the St. Clair River. She was named the Petrel [sic], commanded by Captain J.W. Wesley, recently deceased. The profits of carrying lumber fell short of her running expenses, and she was soon changed to a different trade.[44]

Petrel was followed by a few other steambarges including *Pacific* (1853), *Illinois* (1853), *Reciprocity* (1853), *Ross* (1854), *Coaster* (1854), and *Cleveland* (1860).[45] Although these ships were all ideally suited for the lumber trade, there was too little demand for lumber during the 1840s and 1850s to make them profitable. Steambarge owners were forced to mitigate financial losses by converting the vessels into package freighters, passenger/package freight propellers, or employ the vessels in carrying more cost effective bulk cargoes such as coal, grain, stone, or ice.[46]

The re-introduction of steambarges and their utilization in conjunction with the Consort System on the Great Lakes was, like all technological innovation, driven by necessity. The 1860s and 1870s brought about a new era that Mark Twain described as "the Gilded Age" and Andrew Carnegie called the "Triumph of Democracy." The most significant event that facilitated the development of steambarges and the Consort System was the financial Panic of 1857. Many schooner owners, whose vessels had shipped vast

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[43] Ship Information and Data Record: *Petrel*, The David Swayze Great Lakes Shipwreck File, Center for Archival Collections, Bowling Green State University.

[44] *Detroit Free Press*, 15 May 1873; Ship Information and Data Record: *Petrel*, The C. Patrick Labadie Collection, Alpena Public Library.

[45] Comprehensive Steambarge Data Record: *Steambarges,* The C. Patrick Labadie Collection, Alpena Public Library.

[46] *Cleveland* is a prime example of the typical career of an early Great Lake steambarge. For more information on this vessel, see Rodgers and others, *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (Greenville, NC: East Carolina University, 2006), 25-27.

quantities of commodities necessary for westward expansion, were driven out of business by the depression's lower freight rates and an overdeveloped merchant marine.[47] Lack of credit prohibited both shippers and receivers from financing the cost of transportation.[48]

By the mid-1860s the economy, stimulated by the Civil War and reconstruction, managed to recover. Americans resumed westward migration and needed building materials to feed the machine of civilization.[49] As a result, businesses that survived the Panic of 1857 needed a way to ship large quantities of bulk commodities, most especially lumber, quickly and effectively. In fact, in 1864 the *Detroit Free Press* reported that the:

> ...class of vessels most earnestly sought are those best adapted for the lumber trade. Nearly all of our spare vessels in this locality have been disposed of, and...a dozen more would meet with ready sale.[50]

While the Panic of 1857 forced merchant vessel owners to struggle or go out of business, it completely devastated the package freight and passenger businesses. This left many of the palatial paddle-wheel passenger steamers idle within a decade of their construction.[51] In 1861 Mr. Noyes (no first name given), a ship owner from Buffalo engaged in the lumber trade, decided to convert two side-wheelers into barges that could be towed by tug boats (See Figure 3.8). These idle and rotting vessels, named *Empire* and *Sultana*, were purchased at a small fraction of their original value and modified with

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[47] C. Pat Labadie and Charles E. Herdendorf, *Wreck of the Steam Barge Adventure: An Archaeological Investigation in Lake Erie at Kelley's Island, Ohio* (Peachman: Great Lakes Historical Society, 2004), 8.
[48] James L. Huston, *The Panic of 1857 and the Coming of the Civil War* (Baton Rouge: Louisiana State University Press, 1987), 14.
[49] Huston, *The Panic of 1857*, 24.
[50] Jefferson J. Gray, "It Grows in Trees: Wisconsin Lumber Industry, Part I," *Wisconsin's Underwater Heritage* 10 (2000): 11; Lenihan, *Isle Royale*, 55.
[51] J.B. Mansfield, *History of the Great Lakes*, vol. 1, reprint edition (1899; Cleveland: Freshwater Press, 1972), 403.

minimal effort.[52] Noyes had the tug *Reindeer* tow these barges up the Saginaw River to load pine lumber. The barges were found to have an enormous carrying capacity; five times that of contemporary propellers![53] Thus the Consort System was born, resulting in sharply decreased shipping costs for lumber and bulk commodities.[54] Noyes' system proved so successful that towing increased rapidly and, between 1861 and 1870, dozens of old passenger craft were transformed into lumber barges. Some vessels that were designed to look like schooners were built from the keel up as barges.[55]

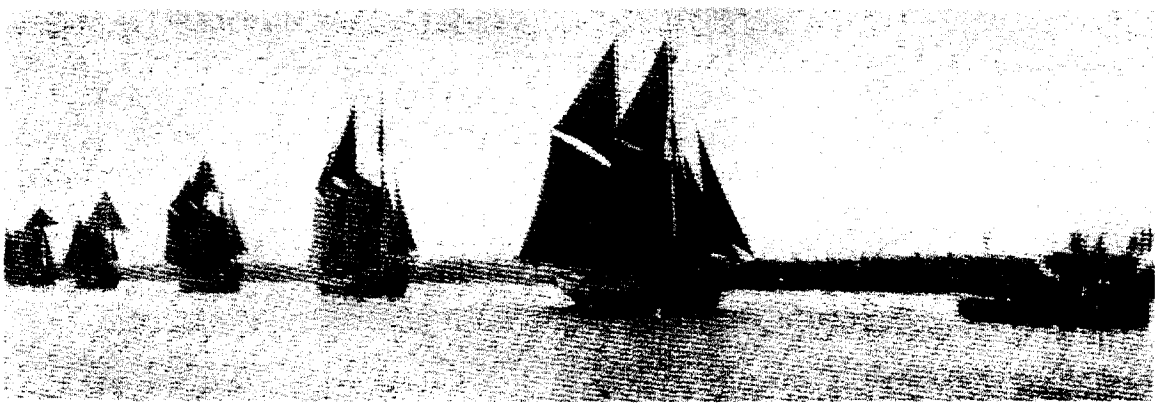

Figure 3.8: Tug *Joseph Goldsmith* (1881-1903) towing six schooner consorts (Rodgers and Corbin, 2003: 214).

The Consort System proved an ingenious solution to the lumber shortage problem, but it was not until the introduction of the steambarge that the system reached its full potential and capacity. Before the introduction of the steambarge, vessel owners attempted to employ propellers of any type as lumber carriers. Their profits from these ventures were small because these vessels were not well suited to carry lumber. Steambarges, which

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[52] The conversion of the *Empire* and the *Sultana* was followed by the conversion of the *St. Lawrence* in 1862; Mansfield, *History of the Great Lakes*, 403.
[53] Lenihan, *Isle Royale*, 56.
[54] Mansfield, *History of the Great Lakes*, 414 and 520; Lenihan, *Isle Royale*, 56.
[55] Labadie, *Pictured Rocks*, 25.

were sometimes referred to as "lumber hookers" or "steam-schooners" on the West coast, proved to be a profitable solution, and were designed especially with the particular needs of the lumber industry in mind.[56]

In 1865 steambarges were successfully re-introduced to the lumber trade with the *Trader*.[57] The 115 foot *Trader* was built by Philip Rice at Newport, Michigan and had a capacity of 250,000 feet of lumber [58] The suitability of the vessel's design for hauling lumber and towing barges became immediately obvious. The *Trader* helped make steambarges, with their increased capacity, an immediate success and by 1866 the local media took notice.[59] On June 26, 1866, the *Detroit Free Press* stated, "A new arrangement is being inaugurated for the transportation of lumber, consisting of the use of propellers especially adapted for the purpose...Several are now running."[60]

Steambarges are generally characterized as wooden, single decked vessels with typical Great Lakes freighter profiles; pilot house and crew quarters located at either end with an open deck in between.[61] The earliest steambarges had their cabins aft, and only after 1880 were most constructed with their pilothouse and some of their cabins on a raised forecastle at the bow (See Figures 3.9 and 3.10). According to Great Lakes historian C. Patrick Labadie, "...this feature was advantageous in larger craft since it

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[56] Rodgers, "Vernacular Craft", 13-14, Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 8.
[57] Labadie, *Pictured Rocks*, 26.
[58] The *Trader* was enrolled as a propeller with one deck, no masts, a plain head, round stern, 22.5 feet of beam, 8.6 feet in depth of hold, and 150.76 gross tons. The vessel was abandoned in 1883. Ship Information and Data Record: *Trader*, The C. Patrick Labadie Collection, Alpena Public Library.
[59] Ship Information and Data Record: *Trader*, The C. Patrick Labadie Collection, Alpena Public Library.
[60] Forty-five steambarges were built before 1870, and twenty passenger and freight propellers were converted for the same use; Lenihan, *Isle Royale*, 56-57.
[61] Barry, *Ships of the Great Lakes,* 149.

improved visibility for the master and wheelsman."[62] Another change in steambarge construction that occurred around 1880 was the replacement of external hogging arches and trusses with internal bracing. Prior to 1880 steambarges often featured bridge-like hogging arches, hogging-chains, or iron rods.[63] It should, however, be noted that not all vessels in a particular class adhere to specific design characteristics established for their type. Variations can exist depending on specific builder choices and whether or not the vessel was converted from some other type.

Cargo was stored below decks, as discussed in Chapter 2, but steambarges were particularly well suited for products that could be exposed to the weather and piled high in the empty deck space.[64] This open deck space was especially crucial for maximizing cargo capacities in the transportation of lumber products, such as cut lumber, shingles, cedar posts, logs, and railroad ties.[65] Loads of lumber were often stacked as high as twelve to fifteen feet above the deck (See Figure 3.11).[66] Most steambarges had a depth of hold of about thirteen feet, which provided for the easiest and quickest handling of cargo since the standard length of board was twelve feet.[67] Labadie also states that most steambarges were, "between 90 and 175 feet long with capacities between 150,000 and 1,000,000 board feet (up to 800 tons) of lumber."[68] These dimensions enabled the ships

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[62] Early steambarges also had a tall mast near the bow where they usually spread a single gaff-rigged sail and a job, but the large boats built after 1880 often had two or three masts; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 8.
[63] Lenihan, *Isle Royale*, 57.
[64] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 8.
[65] Lenihan, *Isle Royale*, 57.
[66] Rodgers, "Vernacular Craft", 14.
[67] Barry, *Ships of the Great Lakes*, 149.
[68] After 1880 the typical size of steambarges grew to between 160 and 180 feet; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 8.

to pass through canals, and also allowed them to enter many of the unimproved ports and harbors around the Lakes.

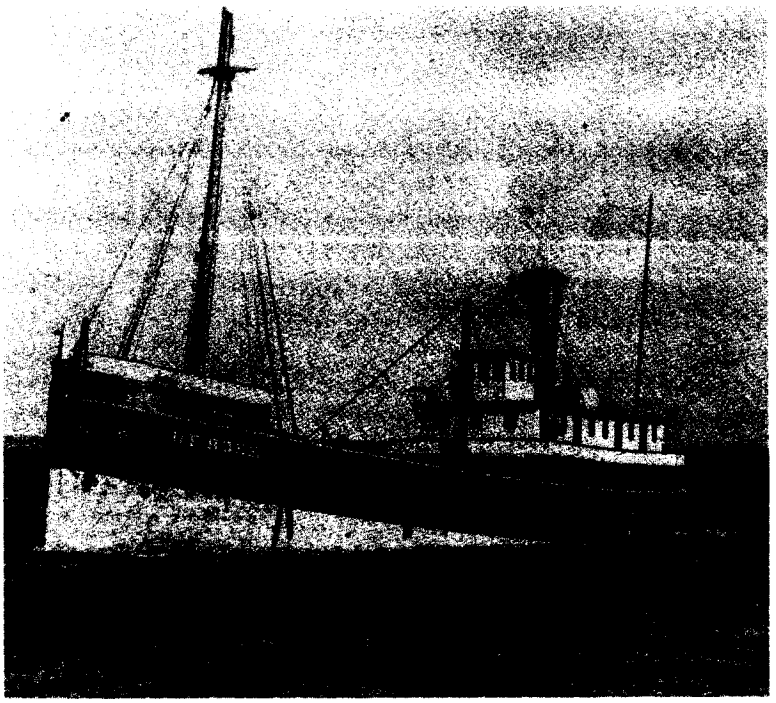

Figure 3.9: *D.F. Rose*, an early Great Lakes steambarge. Note the location of the pilothouse in the aft section of the vessel (Labadie, 1989: 24).

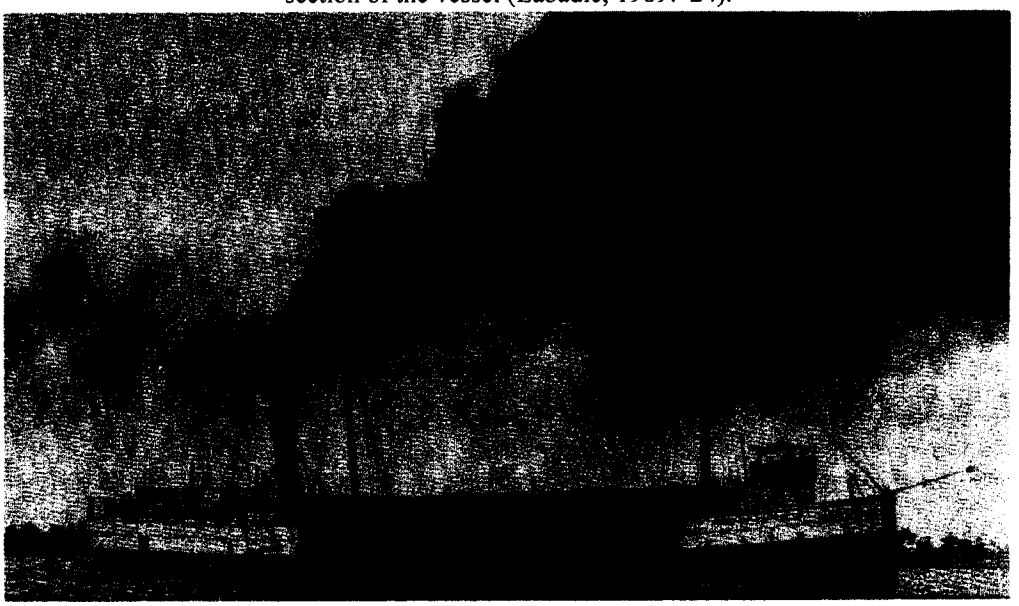

Figure 3.10: Post 1880 steambarge with the pilothouse located forward on a raised "forecastle" (Labadie, 1989: 24).

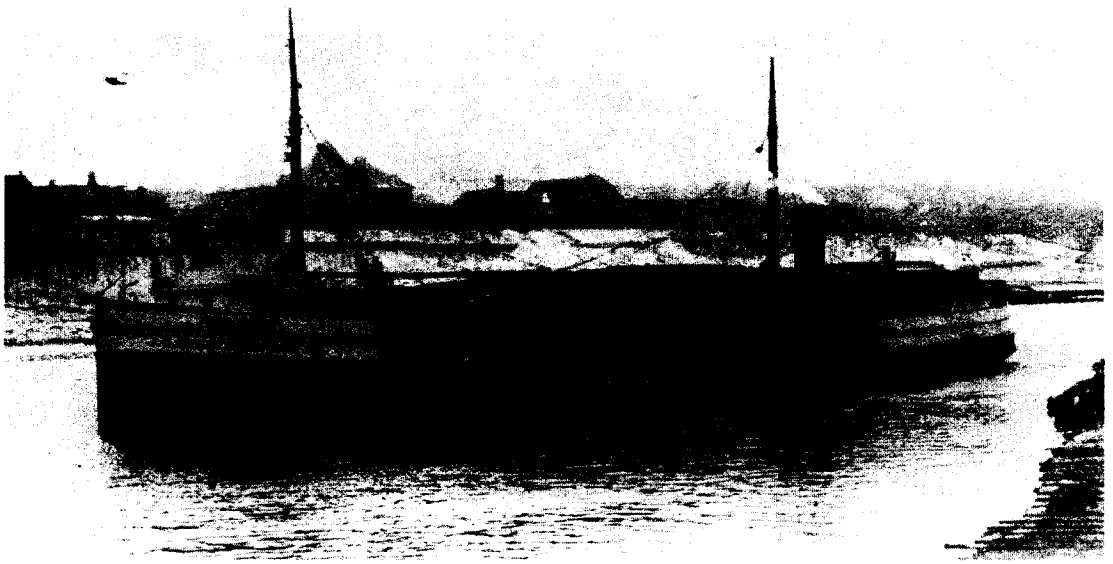

Figure 3.11: Steambarge *James Dempsey* fully loaded (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

Externally, steambarges look very much like wooden bulk carriers, a vessel type that began to appear on the Great Lakes after the 1869 debut of Eli Peck's *R.J. Hackett* (See Figure 3.12).[69] Bulk carriers revolutionized the carrying trades of bulk commodities such as iron ore, coal, and grain. They were constructed with evenly spaced deck hatches that enabled them to take advantage of new loading and unloading technologies, such as the pocket dock, which steambarges could not do. To load a bulk carrier, the vessel was positioned beneath the dock and the deck hatches lined up with spillways of a hopper loader. The spillway was then opened and gravity did most of the work loading the ship.[70] This enabled bulk carriers to occupy a separate economic niche than steambarges,

[69] Barry, *Ships of the Great Lakes*, 107.
[70] Rodgers, *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge* City of Glasgow (Greenville, NC: East Carolina University, 2003), 8.

although steambarges occasionally carried bulk cargo and bulk carriers occasionally carried lumber.

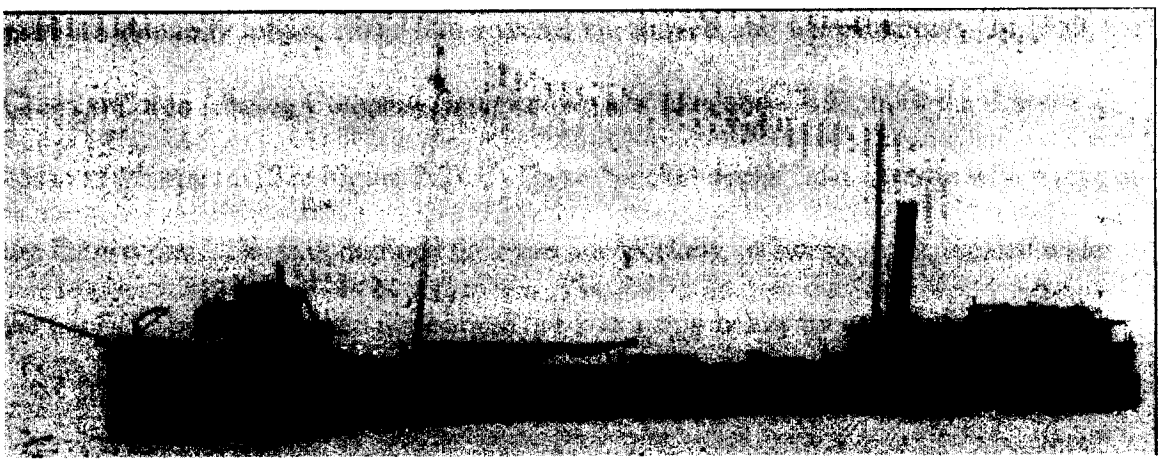

Figure 3.12: *R.J. Hackett* (Courtesy of C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

The external similarities of the two vessel types led to much confusion in contemporary maritime literature (See Figures 3.11 and 3.13). It also seems that the term "bulk carrier" does not show up until the 1880s, leading contemporary writers to use the term "steambarge" to describe both vessel types. Each type was often mistaken for the other, especially steambarges and transitional phase single deck bulk carriers.[71]

Examination of the internal structure of both vessel types, however, reveals that they differed dramatically in their flooring systems. Wooden bulk carriers, since they were designed specifically to transport heavy bulk commodities, generally exhibited a double set of athwartship ceiling planks and many longitudinal stringers in their holds

[71] *For a more detailed analysis of the confusion between steambarges and bulk carriers, see Fil Ronca "A* Historical and Archaeological Assessment of the *Sela Chamberlain*, a Transitional Phase Early bulk Carrier" (master's thesis, East Carolina University, 2006), 17-20.

(See Figure 3.14).[72] This enabled vessel owners to save time and money on timber replacement when planks were inevitably damaged during the loading and unloading of heavy bulk commodities.[73] Steambarges, on the other hand, retained the fore and aft ceiling of their schooner predecessors.

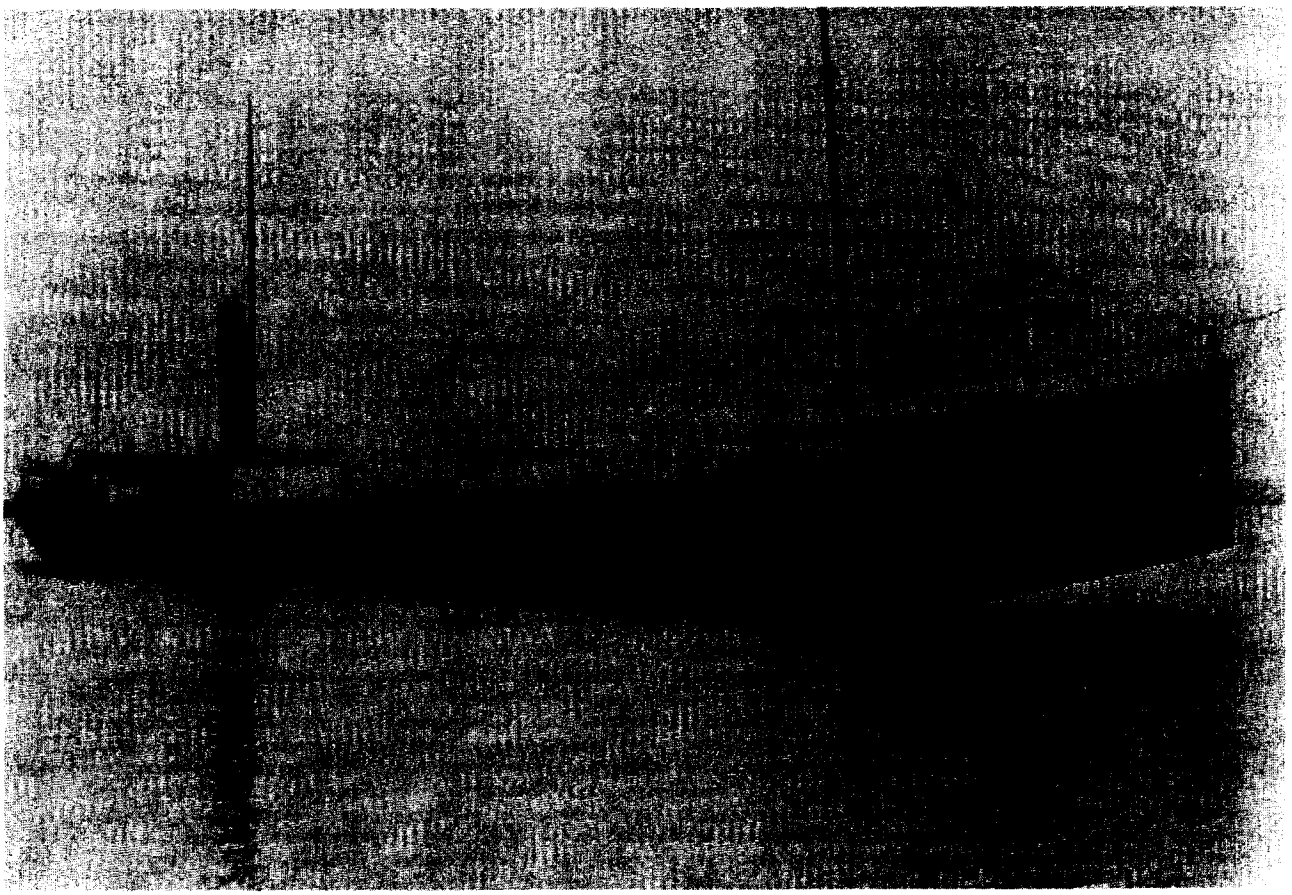

Figure 3.13: *City of Glasgow*, a typical Great Lakes bulk carrier (Courtesy of the Program in Maritime Studies, East Carolina University).

[72] Rodgers, "Vernacular Craft", 15.
[73] *Ibid.*, 15-16.

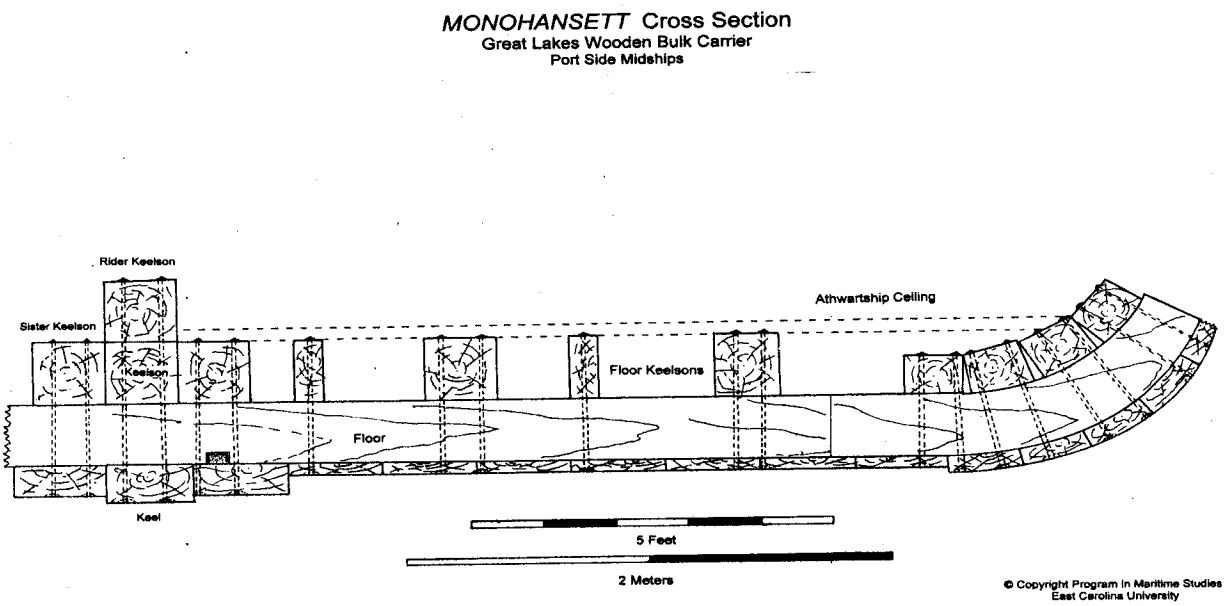

Figure 3.14: *Monohansett* Cross Section. Note the presence of several floor keelsons with overlaid athwartship ceiling (Courtesy of the Program in Maritime Studies, East Carolina University).

Internal steambarge construction, however, was actually quite similar to typical nineteenth-century schooner construction, except steambarges contained all of the necessary equipment to make the vessel self-propelled. This equipment included boilers and engines, usually the inverted direct acting cylinder type. These engines were later replaced by compound engines.[74] Internal schooner construction is characterized by a heavy centerline keelson assembly, double-frames, and longitudinally planked ceiling timbers, all of which are demonstrated in the ship plans and archaeological remains of steambarges (See Figures 3.15, 31.6, 3.17, 31.8, and 3.19).[75]

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[74] *Ibid.*, 14.

[75] For schooners, see David J. Cooper, *1986-1987 Archaeological Survey of the Schooner* Fleetwing *site, 47 DR168, Garrett Bay, Wisconsin* (Greenville, NC: East Carolina University, 1988); James D. Moore III, *Return to the Stone Age: The Maritime History and Nautical Archaeology of Sturgeon Bay, Wisconsin's Dolomite Industry* (master's thesis, East Carolina University, 2003), 120-126; Bradley A. Rodgers and Russell T. Green, *Of Limestone and Labor, Shipwrecks of the Stone Trade: The 1999 Bullhead Point Stone*

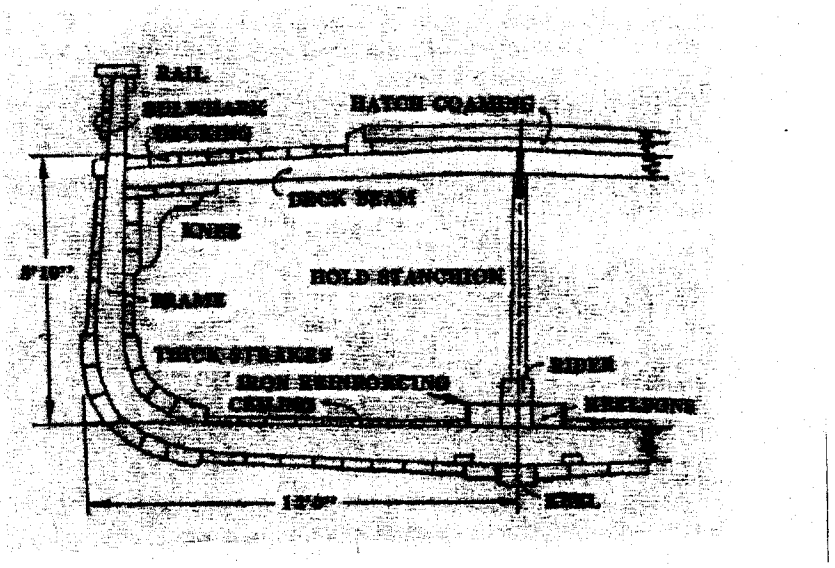


Figure 3.15: Steambarge *Adventure* cross section. Note the heavy keelson complex (Labadie and Herdendorf, 2004: 32).

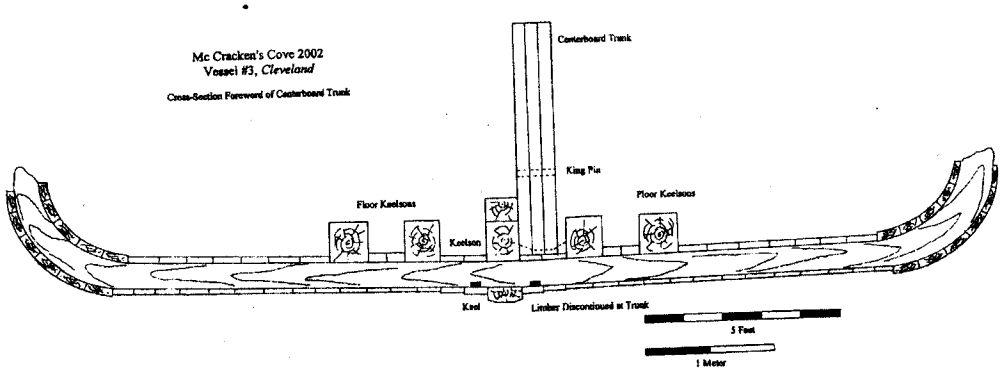


Figure 3.16: Steambarge *Cleveland* cross section. Note the centerboard and bilge keelsons (Courtesy of the Program in Maritime Studies, East Carolina University)

Barge Investigation (Greenville, NC: East Carolina University, 2003), 32-41. For steambarges, see Rodgers and others, *From Quarry to Quay*, 37-40; Labadie, *Pictured Rocks*, 51-54, 62-67, 146-149; David J. Cooper, ed., *By Fire, Storm and Ice: Underwater Archaeological Investigations in the Apostle Islands* (Madison: State Historical Society of Wisconsin, 1996), 96-101; John O. Jensen and others, *Archaeological Assessment of Historic Great Lakes Shipwrecks: Surveys of the Steamers* Niagara *and* Francis Hinton (Madison: State Historical Society of Wisconsin, 1995), 39-44; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 30-35.

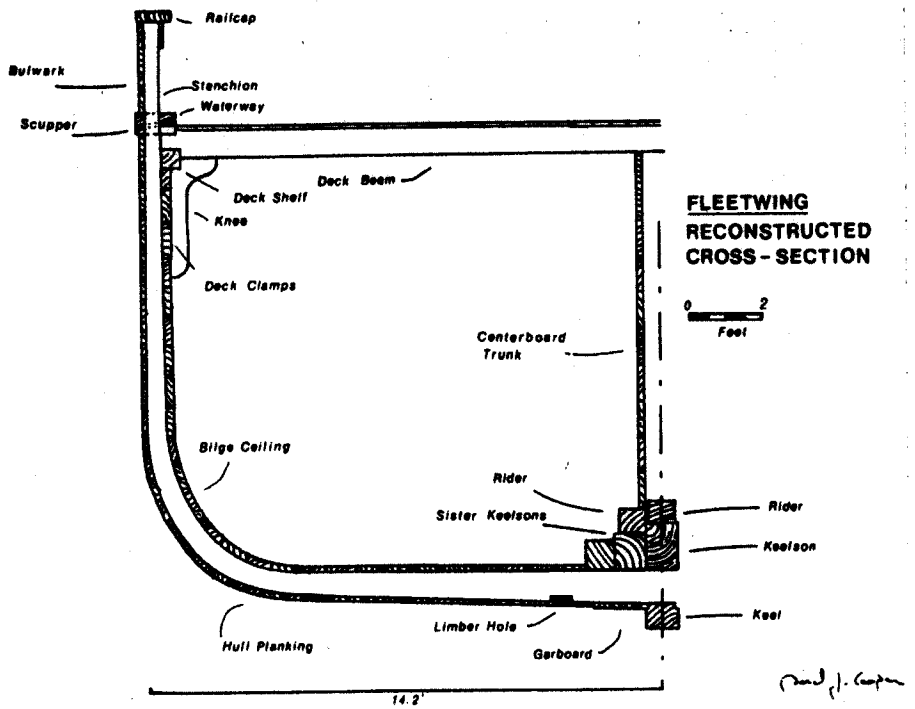
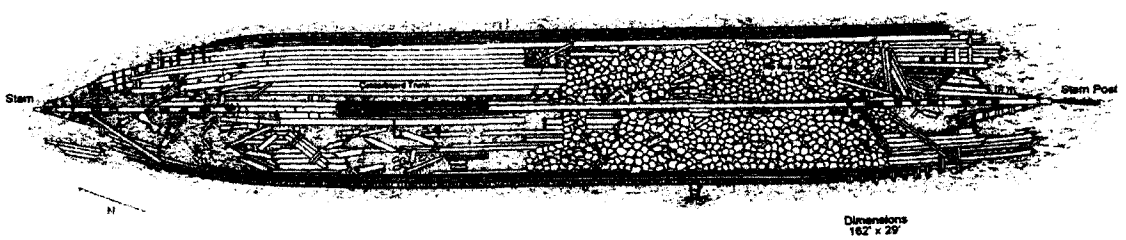


Figure 3.17: Cross section of the *Fleetwing*, a typical Great Lakes schooner. Note the similarities to the steambarge *Adventure's* cross section (Cooper, 1988: 120).



Bullhead Point Wreck Site
Oak Leaf (vessel 1)

Figure 3.18: Site plan of the *Oak Leaf*, a typical Great Lakes schooner. Note the longitudinal planking (Rodgers and Green, 2003: 33).

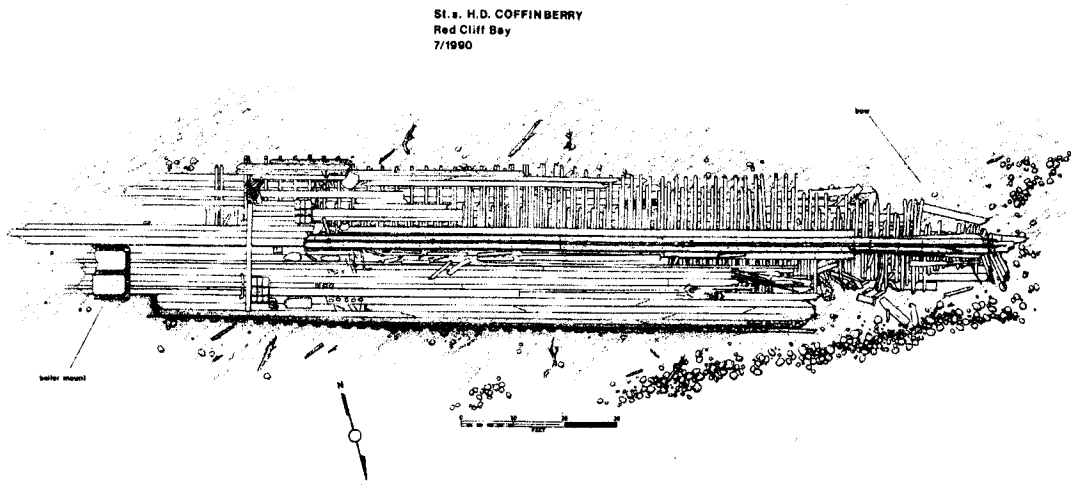


Figure 3.19: Site plan for the steambarge *H.D. Coffinberry*. Note similarities to the *Oak Leaf's* construction including longitudinal planking (Cooper, 1996: 95).

Internal steambarge construction differs from schooner construction in that steambarges do not always contain a centerboard, although many of the earliest steambarges, schooners that were converted to steambarges, and a few late steambarges do (See Figure 3.20).[76] Steambarges also typically have bilge keelsons (no more than two per side) that help support the weight of engines and boilers.[77]

Despite the historic ambiguity between steambarges and bulk carriers, the introduction of propeller-driven steambarges placed the final nail in sail's coffin on the Great Lakes. Steambarges were so successful that, between 1865 and 1910, 800 were built on the Great Lakes. They did not, however, reach maximum efficiency until they were utilized in conjunction with the Consort System.[78] This "new" Consort System

[76] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 30-35; Rodgers and others, *From Quarry to Quay*, 37-40
[77] Rodgers, "Vernacular Craft", 14.
[78] Comprehensive Steambarge Data Record: *Steambarges,* The C. Patrick Labadie Collection, Alpena Public Library.

made steambarges cost effective for their owners because they could carry and tow vast amounts of lumber at consistent speeds of six to eight miles an hour in almost any weather condition (See Figures 3.21 and 3.22).[79] This helped merchants maintain their bottom line by allowing them to move more cargo, thus earn more profits.

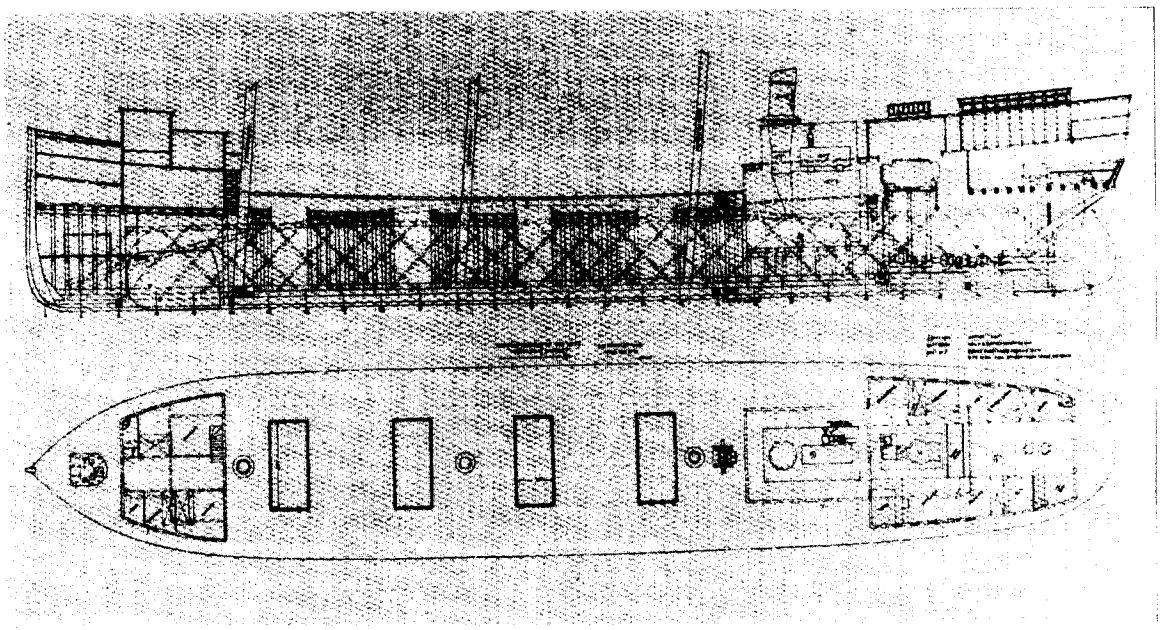


Figure 3.20: Deck plans for the steambarge *Charles H. Bradley* (1890). Note the centerboard located in the forward section of the vessel under the deckhouse (Barry, 1996: 148).

By 1870, the most popular choice for consorts were schooners. Through the Consort System, sailing craft successfully transitioned into the steam age as tow barges. After 1870, most vessels that were called schooners were actually tow barges with their tophampers cut away, main masts removed, and bowsprits cut short.[80] After 1890, a number of so-called schooners were actually built as tows.[81] These vessels were never intended to be self -propelled and spent most of their working lives at the ends of cables

[79] Labadie, *Pictured Rocks*, 22.
[80] Mills, *Our Inland Seas*, 187.
[81] Lenihan, *Isle Royale*, 59-60.

behind steambarges. Typically, these vessels were built with, "a straight steamer bow and a schooner hull; the stays from the foremast led directly to the bow, with no bowsprit to get in the way."[82]

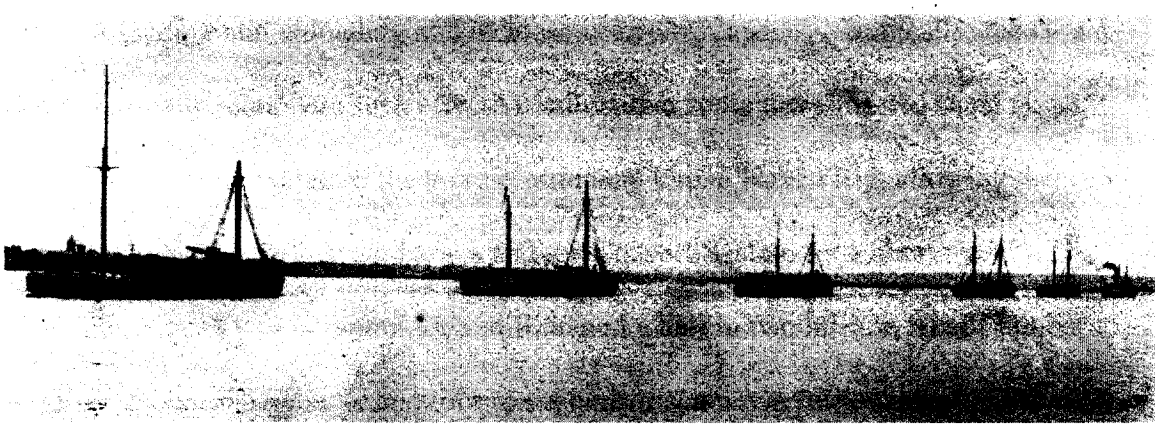


Figure 3.21: *Robert Holland* fully loaded towing five fully loaded barges (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

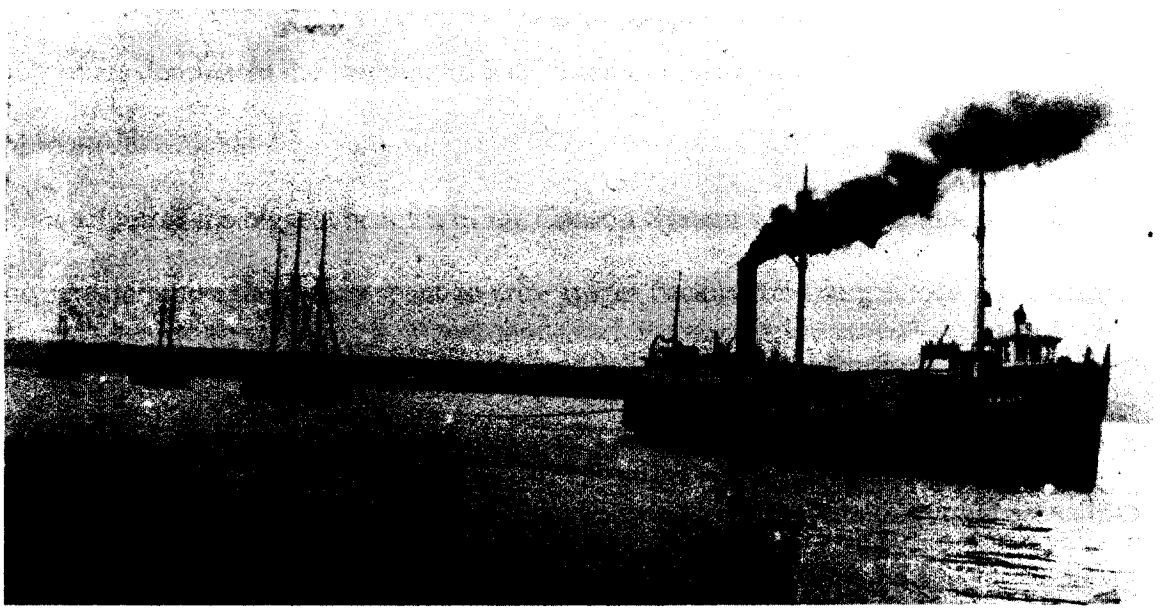


Figure 3.22: *N. Mills* fully loaded towing three fully loaded barges (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

[82] Barry, *Ships of the Great Lakes*, 148-149.

The typical rig for a tow barge was the Grand Haven Rig, which consisted of two gaff-rigged masts placed at the extreme ends of the bow and stern. This left most of the amidships area clear for loading, unloading, and deck cargo. This rig also helped reduce costs for loading and unloading and increased carrying capacity. Ironically, the Grand Haven rig made schooners such effective sailors that some three-masted stand alone schooners were converted to the more economical Grand Haven Rig, allowing them to remain competitive with steambarges and the Consort System for a short time.[83] By 1899, however, it was common for a million and a half to two million feet of lumber to be towed by one steambarge and four to six consorts, a powerful testament to the success of the system.[84] As a result, schooners, sloops, and brigs lost the ability to compete, and after 1890, no vessel owners wanted to invest in them. At the beginning of the 1870s schooners dominated the shipping of bulk commodities: by 1890 they were almost obsolete.[85]

One of the biggest benefits of the Consort System was that it helped vessel owners minimize the money spent on crew wages because tow barges required a small crew. While this system was economical and reliable, it was not entirely efficient. Adoption of the consort system reduced vessel and crew quality. Initially, tow barges were equipped with quality masts, sails, and knowledgeable sailors that could set sails to assist escorts or help themselves during times of emergency and foul weather. When the Consort System established itself as an economic success, however, many vessel owners

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[83] Jay C. Martin, "The Grand Haven Rig: A Great Lakes Phenomena", *American Neptune* 51(1991): 195-201.
[84] Mansfield, *History of the Great Lakes*, 414.
[85] The last fully rigged schooner was built in 1889, and by the 1930s only three were left in use-the only survivors out of 20,000; Labadie, *Pictured Rocks*, 22; Barry, *Ships of the Great Lakes*, 143.

allowed their tow barges to degrade and become unseaworthy as stand alone sailing ships. Also, since tow barges were usually intended to be under the control of a steambarge, crew quality suffered. Good sailors became hard to find because tow barge crews were often paid lower wages.[86] In response, seamen organized a union in 1880 that forced ship owners to pay tow barge crews an extra twenty-five cents a day if sails were set. As a result, masts rotted, sails wore out, and typically neither was replaced.[87] Eventually, tow barge crews were regarded as "undesirables" or "underclass", and skilled sailors that could handle a vessel under sail became less abundant. In order to recruit full crews and save money, vessel owners eventually hired smaller crews consisting of elderly seamen, inexperienced hands, teenagers, the sickly, and other individuals that made up the, "dregs of the shoreside laboring class."[88]

By the 1890s, maritime communities and the American and Canadian federal Life Saving Services began to notice that tow barges were notoriously helpless. For example, undermanned vessels with unskilled crews often signaled Life Saving Service stations for assistance to tie up their vessels, cast anchor, and other tasks that, twenty years before, were common chores easily performed by sailing vessel crews. The worst effect, however, of the decrease in crew quality was an increase in tragic loss of life. Long lines of barges created dangerous navigation hazards to other vessels during bad weather conditions. They were, however, more dangerous to their own sailors. Vessel owners calculated the risk and knew that if one of their tow barges foundered, financial losses

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[86] Jay C. Martin, "A Social History of Life Aboard the Commercial Sailing Vessels of the United States and Canada on the Great Lakes, 1813-1930", Ph. D. diss. (Bowling Green State University, 1995), 163.
[87] James P. Barry, *Ships of the Great Lakes*, 148.
[88] Martin, "A Social History", 163.

could be absorbed.[89] As a result, many sailors lost their lives during storms when tow cables connecting unwieldy top-heavy consorts and escorts were dropped or ripped apart. Helpless and at the mercy of wind and waves, tow barges often could not make it to shelter. Many ran aground violently and were pounded to pieces.[90]

Despite the negative attributes associated with the Consort System, its efficiency and profitability made mass shipment of lumber possible, allowing valuable materials to be shipped rapidly throughout Great Lakes ports. Unfortunately, their efficiency gave rise to several problems that played a part in their demise. Rapidly declining freight rates and increased competition greatly reduced profits. According to Great Lakes historian James Cooke Mills:

> The advent of the steam barge [sic], in the early sixties, marked the beginning of a new era in the freighting of heavy, coarse commodities; and to this type, with the consequent adoption of a system of tows some years after, is due the rapid decline in rates. In 1859 the freight on grain from Chicago to Buffalo was about sixteen cents a bushel, ten or twelve years later it had dropped to seven or eight cents, and in the eighties, when the towing system was in full operation, it was five cents.[91]

The main problem for vessel owners, however, was that the lumber boom could only survive as long as the Great Lakes pine forests were abundant. This seemed no problem in the 1850s, but by the 1920s the great forests of pine were stripped clean and the lumber industry had begun its migration to the Pacific Northwest. Destruction of the pine forests

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[89] *Ibid.*, 164-166.
[90] Mills, *Our Inland Seas*, 188.
[91] *Ibid.*, 186.

was the final blow to steambarges. The Great Lakes lumber boom was over, the industry collapsed, and with it went the glory days of the steambarge.[92]

The steambarges' nearest descendant, the wooden single and double-decked bulk carriers, were built much larger and could carry as much cargo alone as a steambarge with several tows. The development of these vessels signaled the end of the Consort System, because the bulk freighters were too large to tow barges safely and could carry a sufficient amount of cargo to turn a profit. Steambarge design was ultimately too specialized and their capacity too limited to make them profitable in any trade other than lumber, although a few did survive by carrying coal, sand, or gravel. Another interesting anomaly is the steel steambarge *Resolute*, a steambarge that made the technological transition from wood to steel.[93] These too, however, were mostly put out of commission by the Great Depression. Ironically, although steambarges had helped cause the extinction of sail powered vessels as independent wage earners, both vessel types were laid to rest at about the same time. By the 1930s, many old "lumber hookers" and tow barges were simply forgotten.[94] Their remains could be seen abandoned in backwater ports and tributaries-a testimony to the successful evolutionary process of Great Lakes vessel design. Some old hulls, however, fulfilled one last purpose: they were intentionally sunk and used as breakwaters around coastal communities.

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[92] Barry, *Ships of the Great Lakes*, 149.
[93] Bradley A. Rodgers (professor, East Carolina University), in discussion with the author, November 2006.
[94] Donald F. Richards, "The Glory Days," *Telescope Magazine* (1960): 261.

CHAPTER 4

FROM MUSSELS TO BACKBONE: THE *JOYS* OF DOOR COUNTY

Introduction

During the Fall of 2005, students and staff from East Carolina University (ECU) and the Wisconsin Historical Society (WHS) conducted an archaeological survey of a suspected steambarge in Sturgeon Bay, Wisconsin. The wreck site, known as the Sunset Park Wreck because of its close proximity to a park bearing that name, was mapped and analyzed over a period of eight working days.[1] The site is well preserved due to the cold waters of Sturgeon Bay and mostly intact from the keel to the waterline. The goal of the 2005 field season was to complete a Phase II pre-disturbance survey of the entire wreck. According to Principal Investigator Dr. Bradley Rodgers, "The object of a Phase II survey is a detailed site map, photographic imaging and interpretation of the site as well as an examination of individual artifacts for diagnostic purposes."[2] Although weather and mechanical delays shortened time on site, the entire wreck was successfully mapped successfully.

The purpose of this chapter is to summarize the methodology and findings of ECU's underwater archaeological investigation. The Phase II pre-disturbance survey of the Sunset Park Wreck provided a valuable source of information for two different

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[1] Although Sunset Park Wreck is most likely the *Joys*, it is referred to here as the Sunset Park Wreck to stay consistent with all archaeological data including site plans, maps, field notebooks, etc.

[2] No artifacts were recovered because conservation plans are generally outside the scope and budget of Phase II projects. Any artifacts located during the mapping process were photographed; Bradley A. Rodgers, *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge* City of Glasgow (Greenville, NC: East Carolina University, 2003), 1.

reasons. First, the project definitively identified the wreck remains as those of a steambarge. Second, the project served as a vital contribution to a twenty-one year project focused on studying major nineteenth-century Great Lakes ship classes. The project, begun in 1985 by ECU in collaboration with the State Historical Society of Wisconsin (SHSW), has enabled researchers to take a closer look at the technological evolution of internal construction and design characteristics of the major nineteenth-century Great Lakes vessel types.[3] Analysis of the Sunset Park Wreck is crucial to this study because it demonstrates how shipwrights transitioned bulk cargo vessels from sail to steam.

Project Location

The state of Wisconsin's most unusual geographic feature, the Door County Peninsula, is located on the eastern side of the state. This conical shaped Peninsula is approximately eighty-four miles long (135.185 km) and between three to ten miles wide (4.83 to 16.093 km).[4] Despite its relatively small area of 491 square miles (1,272 square km), the Door County Peninsula boasts more shoreline than any other county in the United States; approximately 240 miles (400 km).[5] The Sturgeon Bay Ship Canal, constructed in 1880, bisects the Peninsula and connects the waters of Green Bay with Lake Michigan.[6] The opening of the canal in 1880 vastly increased vessel traffic between Lake Michigan and Green Bay, and also boosted the area's economy. With

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[3] Bradley R. Rodgers, "Vernacular Craft of the North American Great Lakes: Twenty Years Research in Retrospective," (unpublished article, Program in Maritime Studies, East Carolina University, 2006), 2.
[4] Rodgers, *Bones of a Bulk Carrier*, 3.
[5] John C. Palmquist, ed., *Wisconsin's Door Peninsula: A Natural History* (Appleton, WI: Perin Press, 1989, 32.
[6] Lake Michigan is the third largest Great Lake with an average depth of 279 feet and a maximum depth of 924 feet. It is the only Great Lake contained entirely within U.S. borders.

more vessels came more shipwrecks and intentional abandonments, ensuring that Sturgeon Bay would claim at least one sample of every major nineteenth-century Great Lakes vessel type.

The Sunset Park Wreck, a Great Lakes steambarge, rests on a silty and sandy bottom under approximately ten feet of water. The vessel is located in the Sturgeon Bay Ship Canal approximately 500 feet west of the Sunset Park shore, just north of the Bay Shipbuilding Company. The wreck is oriented parallel to shore in a north-south orientation with the bow facing north (See Figures 4.1 and 4.2). To determine the exact location of the wreck, two buoys were attached to either end of the vessel and located with a Total Station from the Sunset Park shoreline where the site datum was positioned (See Figure 4.3). [7]

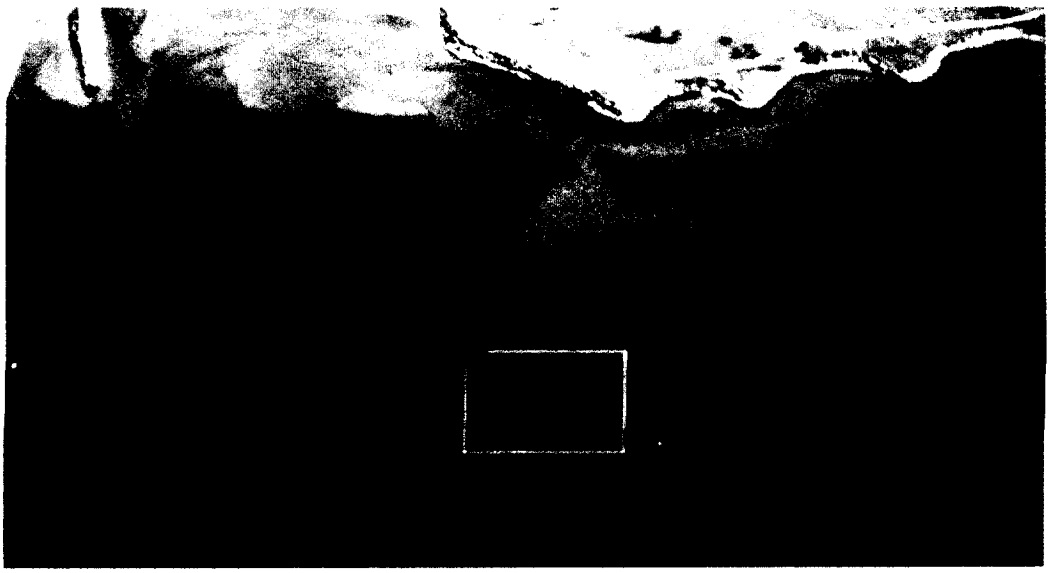

Figure 4.1: *Aerial photograph of the Sunset Park Wreck site taken in the 1970s (Courtesy of Jon Van Harpen).*

[7] According to archaeologist Jeremy Green, a Total Station is, "...a combination of a precise electronic theodolite and electronic distance-measuring instrument. The fundamental measurements made by the Total Station are slope distance, horizontal angle, and vertical angle"; Jeremy Green, *Maritime Archaeology: A Technical Handbook* (San Diego: Oxford Academic Press, 2004), 42.

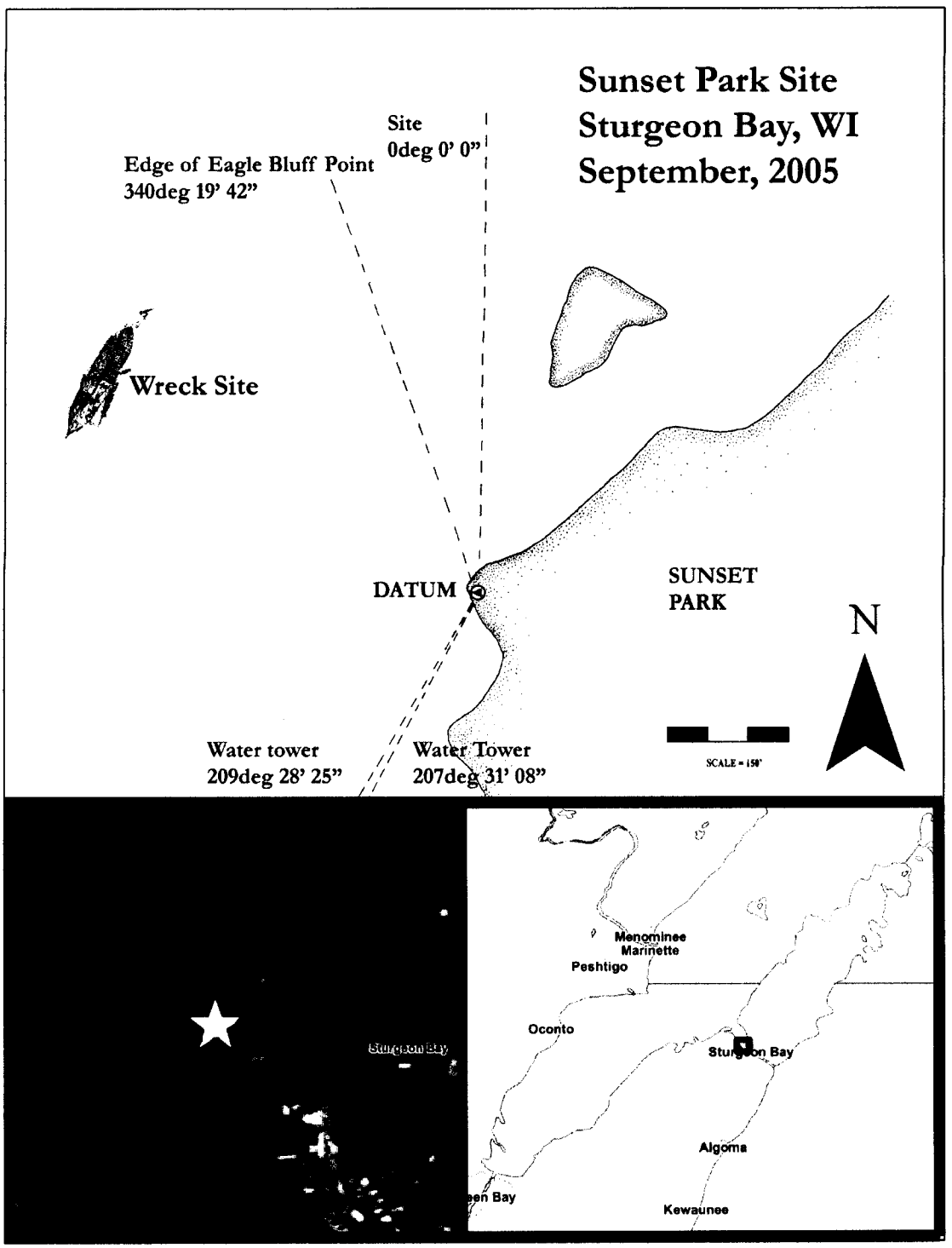

Figure 4.2: Orientation of the Sunset Park Wreck in relation to the Sunset Park shoreline (Courtesy of Dr. Nathan Richards, Program in Maritime Studies, East Carolina University).

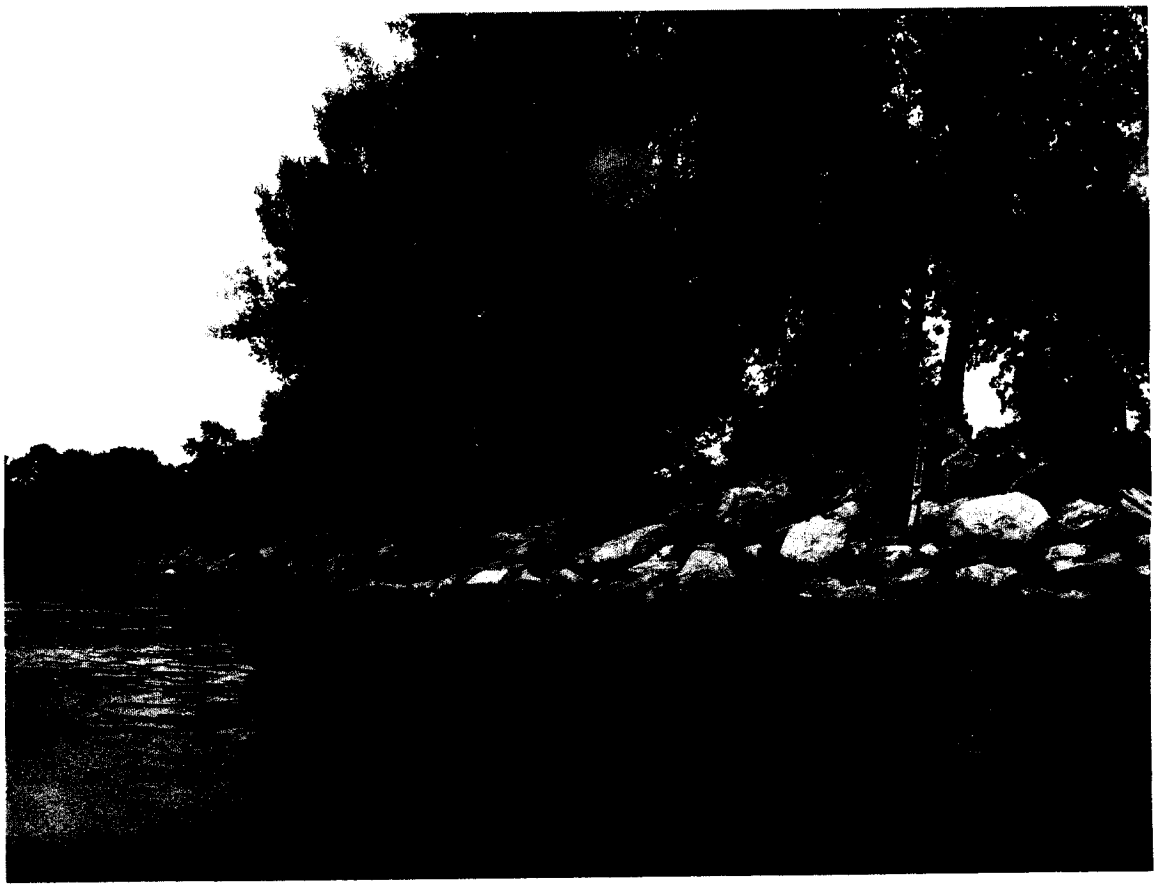

Figure 4.3: Student crew member at site datum locating the Sunset Park Wreck using a Total Station (Courtesy of the Program in Maritime Studies, East Carolina University).

Site History

Father James Marquette, one of the first Europeans to visit Sturgeon Bay, arrived on October 27, 1674. He found one small Potowatami Indian village and a well trodden portage path that linked the waters of Green Bay with Lake Michigan. Besides these, before 1834 all that existed in Sturgeon Bay was a temporary trading post used by French, English, and American fur traders in shipping their supplies from Green Bay to

Milwaukee.[8] When Increase Claflin, Door County's first Euro-American resident, moved to the nearby site of Little Sturgeon in 1834, Sturgeon Bay was still a heavily forested wilderness.[9] It was not until 1850 that Perry Graham, a prospective lumberman, saw potential in Sturgeon Bay's forest resources and built the future city's first house.[10] One year later he was joined by a Moravian congregation. About twenty families came to Sturgeon Bay seeking lands where they could farm and worship as they pleased.[11] Sturgeon Bay continued to grow, however, and during the last half of the nineteenth century it developed many industries including lumbering, agriculture, ice harvesting, stone quarries, summer resorts, shipping, and shipbuilding.[12] It was not until 1880, when the Sturgeon Bay and Lake Michigan Ship Canal was finally completed, that the town of Sturgeon Bay boomed economically (See Figure 4.4).

Building the canal was a tedious and difficult process that began as one man's dream. Joseph Harris Senior, a resident of Sturgeon Bay, believed that the canal would help Sturgeon Bay gain economic success. Harris began the canal project in 1861 when he traveled to Washington, D.C. to apply for a federal grant to finance the canal, which passed in the U.S. Senate but was rejected by the House of Representatives by two votes.[13] Harris realized that it would be almost impossible to get Congress to approve the project and land grant without the political backing and power of the state of Wisconsin.

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[8] Hjalmar R. Holand, *History of Door County, Wisconsin: The County Beautiful* (Chicago: S.J. Clarke Publishing Company, 1917), 304.
[9] M. Marvin Lotz, *Discovering Door County's Past: A Comprehensive History in Two Volumes* (Fish Creek, WI: Holly House Press, 1994), 12.
[10] Holand, *History of Door County*, 305.
[11] *Ibid.*
[12] *Ibid.*, 156-175.
[13] Lotz, *Discovering Door County's Past,* 65.

Figure 4.4: Artist's rendering of Sturgeon Bay as it appeared in 1880 (Bower, 1961: 36-37).

So, in 1864 he ran and was elected to the Wisconsin State Senate. While in office he drew up a charter of incorporation for the Sturgeon Bay and Lake Michigan Canal and Harbor Company and successfully lobbied to get the canal built.[14] Finally, seventeen years after the process began, the canal was inspected by government officials and declared fully completed.[15] For the first time ever, vessels were able to avoid the dangerous trip around the tip of the Door County Peninsula, known as "Death's Door." The canal also significantly shortened vessels' travel time on the Green Bay to Milwaukee and Chicago routes.[16] In 1893 the canal was purchased by the government for $103,000.[17]

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[14] Holand, *History of Door County*, 148-149.
[15] The dimensions of the canal are 7,400 feet long by 100 feet wide.
[16] Bradley A. Rodgers and Annalies Corbin, "Mud Box-filled with Stone: The Wreck of the Scow Schooner *Dan Hayes*," *The International Journal of Nautical Archaeology* 32 (2003): 215.
[17] Holand, *History of Door County*, 152-153.

The opening of the Sturgeon Bay Ship Canal vastly increased traffic through Sturgeon Bay and, consequently, greatly increased the number of shipwrecks and intentional abandonments in the area. Many vessel types were lost in the area including tugs, schooners, scows, tow barges, and steambarges.

Environment

Geology

Door County Peninsula is a unique geological formation with a rich and varied geological history. Over the last 400 million years, the area has been covered by both tropical seas and continental glaciers. The glaciers carved out two huge valleys, located on either side of the Door Peninsula, that became Lake Michigan and Green Bay (See Figure 4.5).[18] As a result, the Peninsula now has 250 miles of shoreline.[19] The northern part of the peninsula boasts several natural islands, bays, and harbors, while the southern end is characterized by unbroken shoreline and a lack of natural harbors.[20]

Door County Peninsula is also a portion of the Niagara Escarpment, a dolomitic limestone feature that extends for approximately 900 miles from New York to Wisconsin. A natural rift in the escarpment created the harbor at Sturgeon Bay.[21] Early residents in the Sturgeon Bay area were quick to realize the value of the limestone and its usefulness as a building material. In 1834, the federal government began to quarry stone to build breakwaters off Michigan City. In fact, almost every harbor constructed on Lake

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[18] Lotz, *Discovering Door County's Past*, 15.
[19] *Ibid.*, 16.
[20] *Ibid.*
[21] Palmquist, *Wisconsin's Door Peninsula*, 12; Rodgers and Corbin, "Mud Box", 214

Michigan during the 1800s and early 1900s was built with Door County stone.[22] Other materials present in the bedrock of Door County include chert and shale.[23]

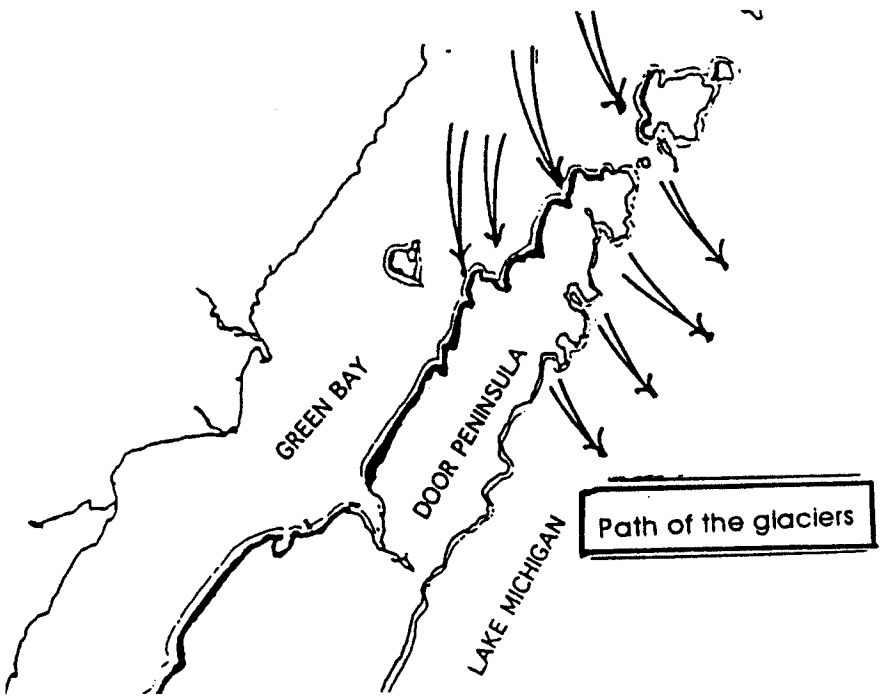

Figure 4.5: Path of the glaciers that formed Green Bay and Lake Michigan (Lotz, 1994: 17).

The sediments present in Lake Michigan include gravel, silts, and clays. The shoreline of Sturgeon Bay generally consists of sand and gravel. Not far from the shoreline the bottom material changes into sand and silt. Typically, the granular size of the sand becomes smaller when the distance from shore and depth of the water are increased.[24]

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[22] Holand, *History of Door County*, 166.
[23] Palmquist, *Wisconsin's Door Peninsula*, 85.
[24] Rodgers, *Bones of a Bulk Carrier*, 3.

Climate

Wisconsin has a "temperate continental" type of climate. Weather conditions vary greatly over the course of the year. Typical climatic conditions for Door County can be described as a cool climate with:

> ...long, gradual cool spring and long, gradual mild autumns because of the emergent rock's shape – long and narrow, surrounded by the moderating influence of much open water.[25]

Precipitation varies from periods of prolonged drought to occasional torrential downpours. In fact, Wisconsin experiences every type of atmospheric disturbance except hurricanes. Door County's particular climate has proved economically useful to the communities around Sturgeon Bay. During the winter, ice harvesting companies cut large quantities of ice that were shipped out of Sturgeon Bay by boat and rail.[26] In the 1890s A.L. Hatch, a commercial fruit grower from Richland County, and E.S. Goff, a professor at the University of Wisconsin, bought land and planted plums, apples, pears, strawberries, and cherries. The gradual spring and autumn seasons allowed the men to successfully produce modest quantities of cherries, and Door County became famous for the fruit.[27] As early as 1865 Door County was praised as a beautiful place to visit during the mild seasons. As a result, several individuals began running resorts.[28] Even today Door County is highly regarded as an optimal vacation destination.

Climatic conditions directly impact the Sunset Park Wreck. The temperature during the summer and winter seasons tends to be extreme, especially on the Lakes.

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[25] Palmquist, *Wisconsin's Door Peninsula*, 7.
[26] Holand, *History of Door County*, 174-175.
[27] *Ibid.*, 161-162.
[28] *Ibid.*, 171.

During the winter months, many ports on the Great Lakes are shut down for the season and vessel traffic is restricted. Sturgeon Bay is no exception. Since the Sunset Park Wreck is located in approximately ten feet of water and in relatively close proximity to shore, the weight and movement of the ice that forms each year puts tension and stress on the wreck. Although ice may be causing some damage, the cold freshwater environment typical of the Great Lakes assists in shipwreck preservation. Storms also affect the wreck. Wind and wave actions increase and create a significant surge in the bay, which disturbs the sand and silt on the bottom. As a result, sand is carried across the wreck's surface and can act like sandpaper on the timbers.[29]

Ecology

The waters of Sturgeon Bay contain a variety of indigenous freshwater animal and plant life including fish, algae, and plants. This ecosystem, like those of the other Great Lakes, is affected by the introduction of exotic species such as the round goby, ruffe, and zebra mussels. Zebra mussels, *Dreissena polymorpha*, have proven to be the most aggressive invasive species in the Great Lakes. Ships inbound from the Baltic Sea first introduced zebra mussels to the lakes through their bilge water.[30] This species was able to penetrate into Great Lakes ecosystems because they filled an ecological role previously unknown in North American freshwaters. Recreational boaters expedited the spread of the species because adult mussels attached themselves to boats, motors, and anchors.

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[29] During the archaeological documentation of the site, times of high surge created low visibility conditions and slowed down documentation.

[30] Bradley A. Rodgers and Russell T. Green, *Of Limestone and Labor, Shipwrecks of the Stone Trade: The 1999 Bullhead Point Stone Barge Investigation* (Greenville, NC: East Carolina University, 2003), 7.

Larvae also contributed to the spread of the species by living in bilge water, engine cooling water, bait buckets, and live wells.[31]

The Sunset Park Wreck is covered by thick masses of zebra mussels (See Figures 4.6 and 4.7). The biggest benefit of these animals is that they filter water and improve clarity, thus improving visibility at the wreck site. In some areas of the wreck they coat timbers and ceiling planking so severely that many vessel details are entirely obscured.

Figure 4.6: Thick layers of zebra mussels covering a timber on the Sunset Park Wreck (Courtesy of the Program in Maritime Studies, East Carolina University).

[31] Johnson, Ladd E. and James T. Carlton, "Post-Establishment spread in Large-Invasions: Dispersal Mechanisms of the Zebra Mussel Dreissena Polymorpha" *Ecology* 77(6): 1686-1690.

Figure 4.7: Diver utilizing a trowel to remove zebra mussels from the Sunset Park Wreck (Courtesy of the Program in Maritime Studies, East Carolina University).

Recently, the University of Vermont and the Lake Champlain Maritime Museum conducted a four year study showing that zebra mussel colonies promote anaerobic sulfate-reducing bacteria.[32] This is alarming, since sulfate reducers dissolve iron in shipwrecks, including fasteners, keel shoes, and any other iron component. It is theorized that, eventually, wrecks contaminated with zebra mussels will fall apart from either the loss of their iron components or the sheer volume of mussels attached to their surfaces.[33] This species represents a serious threat to Great Lakes shipwreck sites. If no method of

[32] Johnson, and Carlton, "Post-Establishment spread in Large-Invasions", 1686-1690.
[33] Rodgers, *The Bones of a Bulk Carrier,* 5.

controlling them is discovered soon, all underwater examples of Great Lakes shipbuilding innovation could disappear at an astounding rate.

Methodology

As stated above, the Sunset Park Wreck archaeological investigation was designed as a Phase II archaeological survey with the goal of recording the vessel's remains without removing artifacts or disturbing the site. This type of survey is advantageous for numerous reasons: it is quick, cost-effective, and leaves the wreck site intact. Two twenty-five foot skiffs, provided by the Sea Grant Institute, were anchored near the site and utilized as dive platforms for two surface supplied air, or "hookah", systems (See Figure 4.8). The hookah systems allowed two hour dive times before the system's engines had to be refueled.

The crew was escorted to the Sunset Park Wreck site on September 6, 2005 by Keith Meverden and Tamara Thomsen, two archaeologists from the Wisconsin Historical Society. A visual survey of the wreck was conducted to determine the best location for the baseline, and to get a better understanding of the vessel's size and features. Because of the wreck's shallow depth and water clarity, crew members were able to conduct the initial examination without the use of scuba.

Archaeological work began on September 7, 2005 with the installation of a baseline, shoreline mapping, and the investigation of another nearby wreck fragment. The baseline team, utilizing scuba, dove on the wreck site and staged two temporary reference points, one at the bow and one at the stern, centered along the keelson of the vessel (See Figure 4.9). Next, they installed a 170 foot steel cable baseline between the

two points. Once the baseline was in place, the divers secured a parallel tape measure with nails. The tape measure allowed the Principal Investigator to divide the site into ten foot sections that were then assigned to individual recorders for mapping.

Figure 4.8: View of boats and hookah systems over the wreck site (Courtesy of the Program in Maritime Studies, East Carolina University).

Figure 4.9: Diver installing a fence post used as a temporary reference point (Courtesy of the Program in Maritime Studies, East Carolina University).

While the baseline team was working in the water, the shore survey team established a permanent Datum with a total station. An artificial north was fixed on a rock face on the Leathem and Smith quarry property, located at 347 degrees from magnetic north. For additional accuracy, two water towers were used to ground the Datum in real geographical features. The tallest of the two towers was located at 207°31'05", and the second shorter tower was located at 209°28'15". The permanent Datum was fixed on a point along the shoreline of Sunset Park with a panoramic view of the site location and surrounding area. Once these points were established, the temporary

bow and stern reference points were located and recorded. The bow datum was located at 309°06'35" at a distance of 511.30 feet from the shoreline, the stern datum was fixed at 389°02'35" at a distance of 514.24 feet.

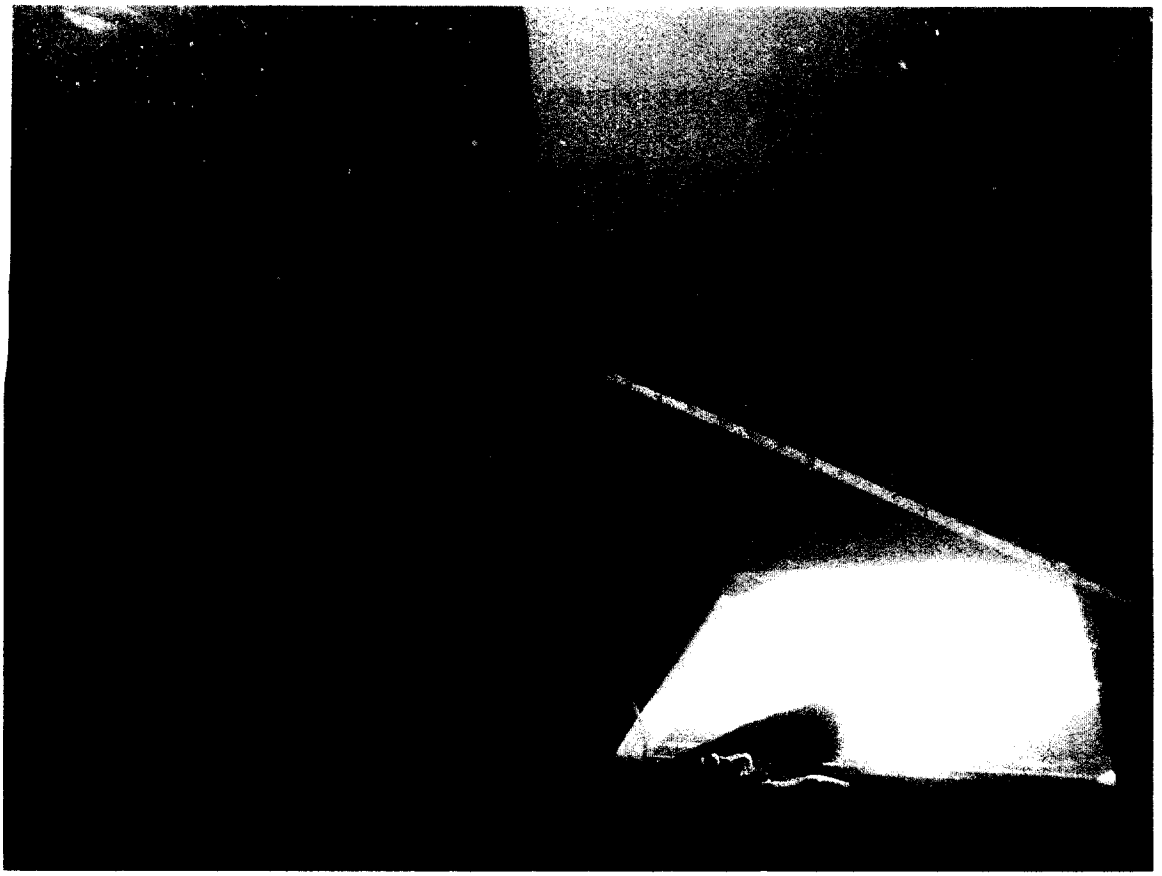

Figure 4.10: Archaeologist taking measurements and recording them on a sketch map (Courtesy of the Program in Maritime Studies, East Carolina University).

Starting on September 8, 2005, all recorders began mapping in individual ten foot sections, or units, starting at the bow. Each student utilized the tape measure on the baseline as a reference point for triangulation and baseline offset measurements. The measurements were recorded underwater on mylar as scaled sketches of the units in feet and tenths of feet (See Figure 4.10). Each evening divers transferred their field drawings onto a master graph paper site plan. This allowed recorders to resolve gaps in their data

on site the following day. The entire site was recorded after 177.2 man hours of bottom time. After the data was transferred onto the master plan, a scaled representation of the entire wreck site emerged (See Figure 4.11). The final draft of the master plan was then traced onto mylar.

In addition to mapping, each crew member kept a daily field log. This log provided divers with a place to reproduce a sketch of their mylar map and record any interesting artifacts or vessel attributes observed during the day's work. The site was also recorded with digital photographs taken by Sony Cybershot cameras. Images were loaded nightly onto a laptop computer where they were assigned a description and filed by date. Mapping of the site concluded on September 16, 2005.

Site Analysis

The Sunset Park Wreck site included an articulated hull below the waterline, artifacts such as iron fastenings and molding, and evidence of an engine bed and propeller. The most obvious attribute of the wreck was heavy black charring on most timbers inside and outside the wreck. In most places, the scantlings are narrowed and the ceiling is almost completely burnt away. Despite the extensive charring, most of the vessel is present below the waterline from bow to stern.

The overall dimensions of the Sunset Park Wreck are 145 feet total length, 130.6 feet in length between perpendiculars, and 27.7 feet in beam.[34] It should be noted that measurement taken of vessels in the archaeological record are approximate because

[34] A depth of hold measurement is not possible because all features and structures above the waterline are missing.

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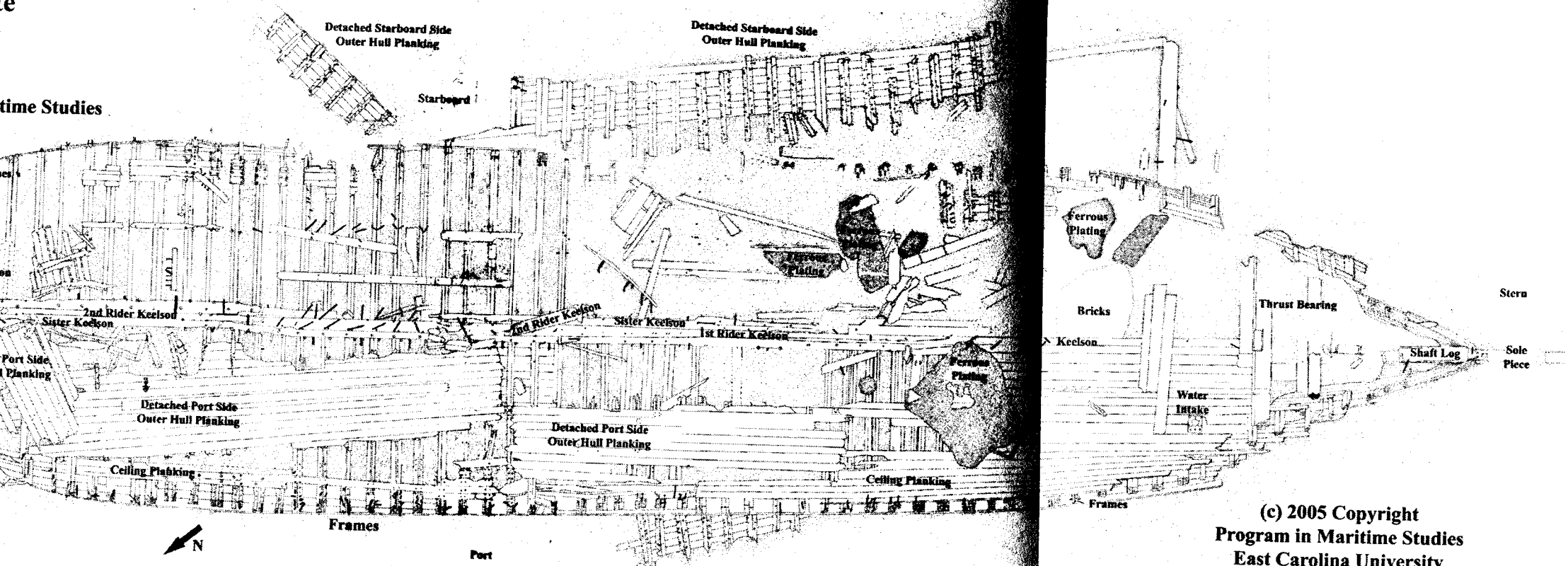
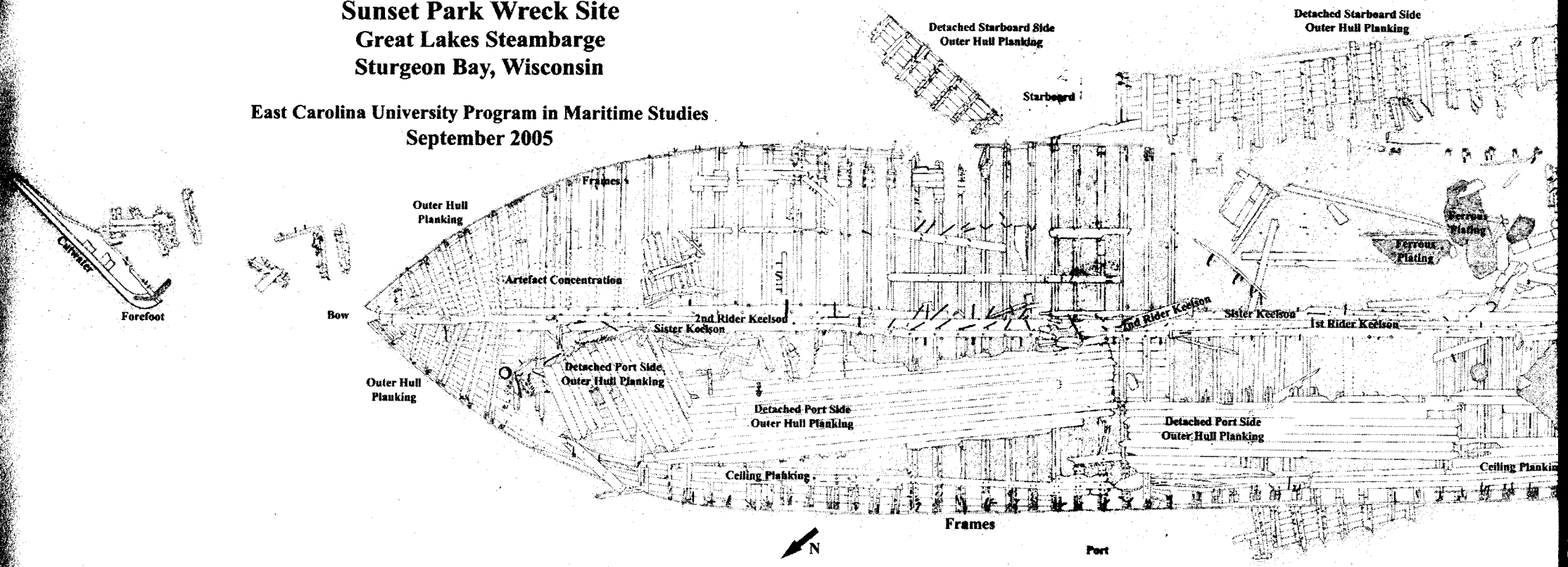


Sunset Park Wreck Site
Great Lakes Steambarge
Sturgeon Bay, Wisconsin

East Carolina University Program in Maritime Studies
September 2005



wooden vessels change shape over time and tend to take the shape of the surface on which they settle.[35] The main structural features of the Sunset Park Wreck included the following:

Stempost Assembly

The stem represents the forward most part of the vessel and is attached to the keel by scarphing.[36] On the Sunset Park Wreck, this component is detached and lies approximately fifteen feet north of the bow area (See Figure 4.12). The stem and forefoot structure measured 14.4 feet in length by 1.9 feet sided. The measured dimension of the broken-off stem post was 0.6 feet molded.

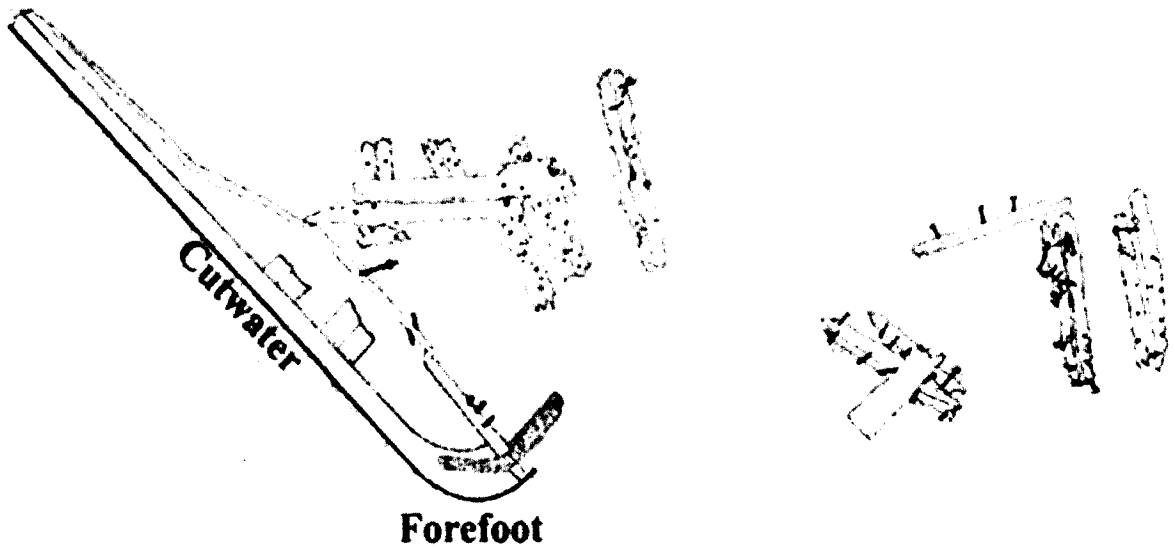


Figure 4.12: Stempost assembly as depicted in the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University).

[35] Rodgers and Green, *Of Limestone and Labor*, 32.
[36] Charles Desmond, *Wooden Ship-Building* (1919; repr., Vestal, NY: The Vestal Press, 1984), 11.

Keel/Keelson Assembly

The purpose of the keel/keelson assembly is to unite the keel, floors, and deadwood into one strong structural support unit.[37] This helps prevent the effects of hogging and sagging, a common malady wooden vessels with a high length to beam ratio are susceptible to. For this reason the keel/keelson assembly is often referred to as a ships' "backbone". The purpose of a heavy backbone in steamers, such as the Sunset Park Wreck, is to provide longitudinal hull strength, support for the boiler and engine bed, and, as mentioned, protect the vessel from hogging and sagging. The heavy composite backbone of the Sunset Park Wreck consisted of five large timbers all through fastened to the keel: one center keelson, two sister keelsons, fastened to the floors to add additional support to the vessel, and two rider keelsons, fastened to the top of the keelson (See Figure 4.13).

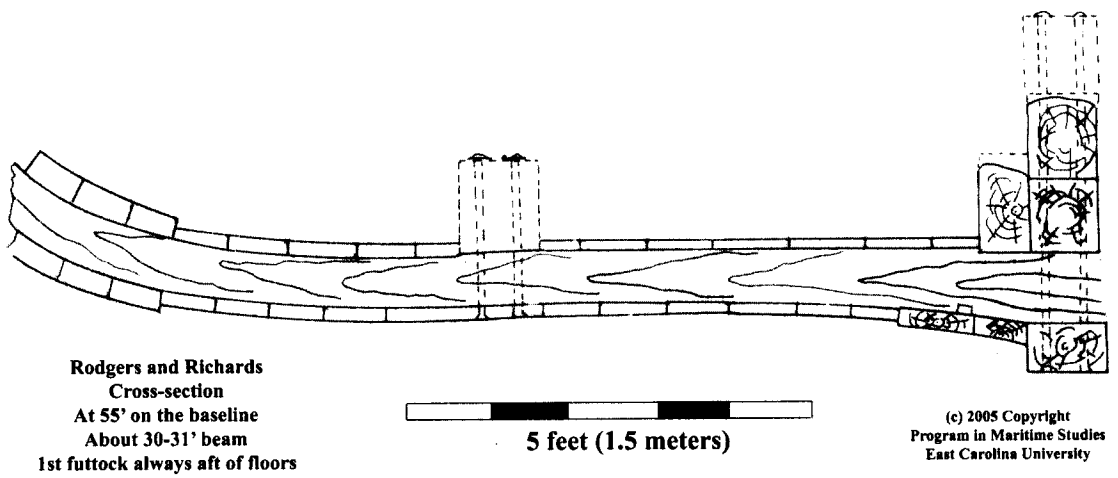


Figure 4.13: Sunset Park Wreck starboard side cross section (Courtesy of the Program in Maritime Studies, East Carolina University).

[37] Desmond, *Wooden Shipbuilding*, 55.

The dimensions of each component are as follows:

- Keel – 0.96 feet sided by 0.6 feet molded
- Keelson – 0.84 feet sided by 0.88 feet molded
- Rider Keelsons – 0.84 feet sided by 0.98 feet molded
- Sister Keelsons – 0.6 feet sided by 1.16 feet molded

While the majority of the Sunset Park Wreck's backbone is well preserved and intact, there is some visible damage and deterioration, likely more a result of fire than the vessel's time underwater. The second rider keelson is missing from 36.5 feet aft of the stem area, while the first rider keelson is missing 87.9 feet aft of the stem area. The keelson disappears 110 feet aft of the fore end of the keel/keelson assembly, beneath the thrust bearing. It is unclear weather it is broken, but most likely it is simply buried under the sediment and impossible to discern because layers of zebra mussels, vegetation, sand, and silt were particularly thick in the vessel's stern. Bilge keelsons, one on both the port and starboard sides, would have provided additional longitudinal support for the vessel. The presence of these timbers was indicated by the presence of fasteners, indicated on the site plan by dotted lines (See Figure 4.13).

Frames

The Sunset Park Wreck contained cant frames in the bow, double frames throughout, and quadruple frames in the stern for engine support. Five pairs of cant frames, measuring 0.3 feet to 0.4 feet in sided dimension, were present in the bow to accommodate the curvature of the vessel (See Figure 4.14).

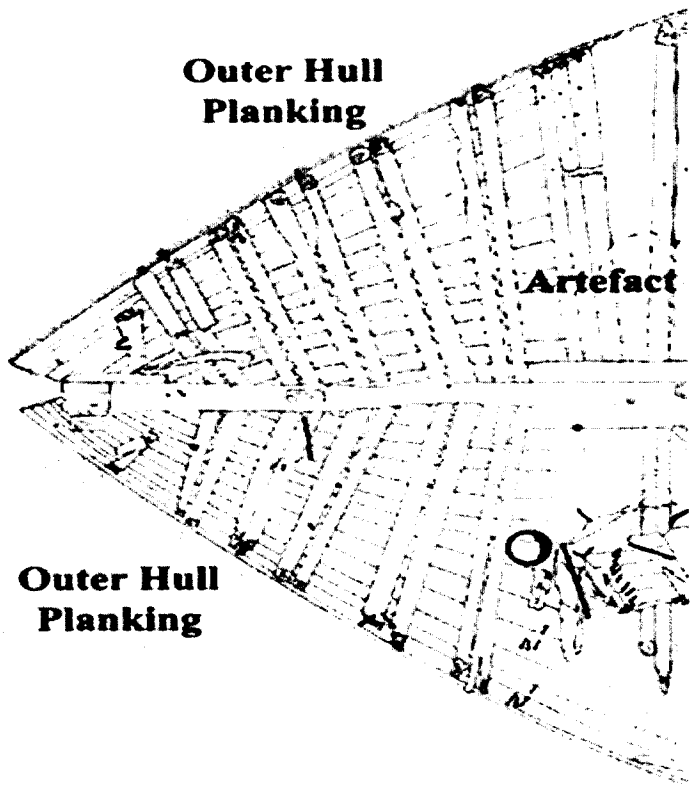


Figure 4.14: Cant frames as depicted in the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University).

As in most nineteenth-century wooden steambarges, the frames extended from port to starboard perpendicular to and sandwiched between the keel and keelson. Each frame was made up of a pair of futtocks measuring 0.3 to 0.4 feet sided, and was fastened to the keelson assembly every 1.8 feet with an average space of 1.0 feet between frames (See Figure 4.15). In the stern, quadruple floors were present to support the engine bed. The exact dimensions of the floor and frames were often difficult to obtain due to charring and deterioration.

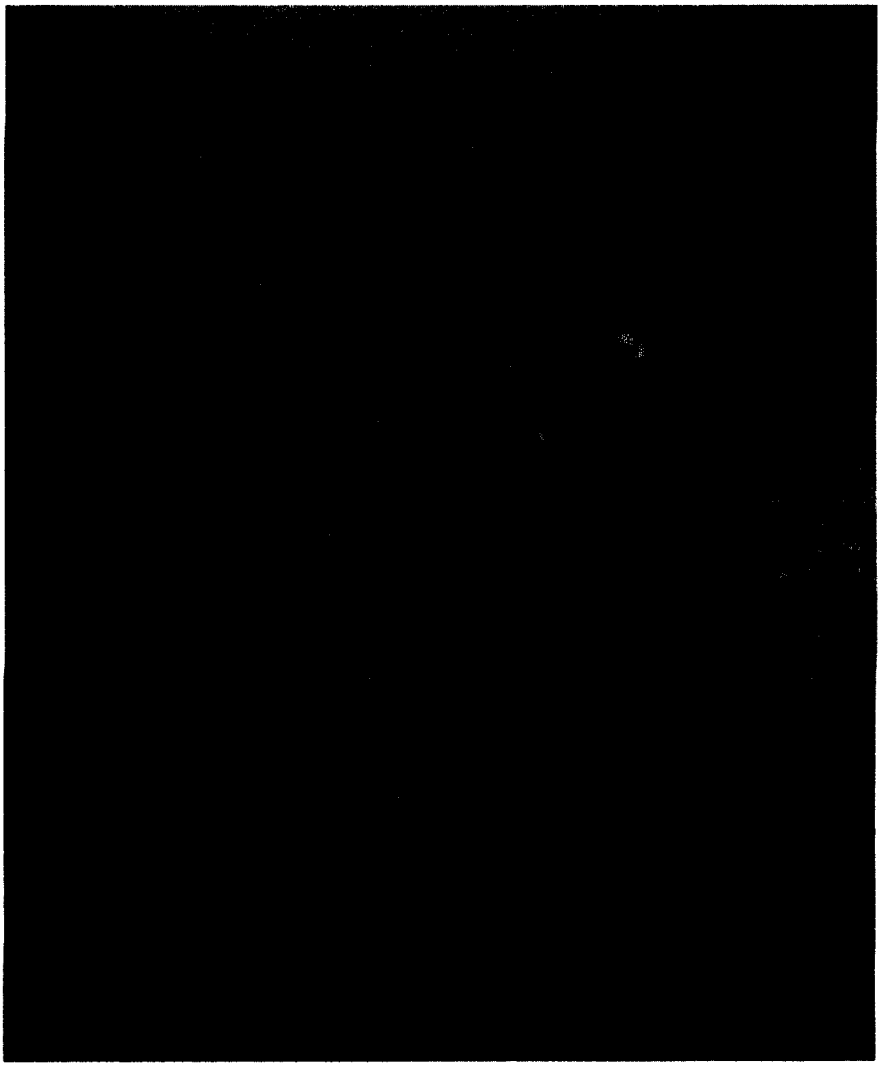


Figure 4.15: The Sunset Park Wreck's double frames. Notice the clean cut on top of the left frame, which indicates that they were cut intentionally (Courtesy of the Program in Maritime Studies, East Carolina University).

Ceiling Planking

Ceiling planking is the planking that covers the inside of the frames, forming the surface of the hold. Throughout most of the Sunset Park Wreck the ceiling was covered in a thick layer of silt, vegetation, and zebra mussels. Small test strips, however, reveal that the ceiling planks were 0.6 feet sided and longitudinally oriented. Longitudinal

ceiling planking is a common characteristic of nineteenth-century schooners and steambarges, and as such can be considered a diagnostic attribute. Much of the ceiling had been burned away, and all remaining planks were charred.

Inner and Outer Hull Planking

This vessel is double planked, a typical characteristic of steambarges that protected the hull from damage inflicted by heavy cargoes as well as natural elements. The dimensions of the inner and outer hull planks are similar, 0.6 feet sided by 0.16 feet molded. The ceiling and outer hull planking is fastened to the frames with iron pins. Two pins were used to fasten each individual plank to each frame. With the double frame construction, this resulted in four fasteners at each pair. Most of the fasteners on the ceiling of the vessel were iron nails used in combination with large washers. Though it cannot generally be seen, outer hull planks are nailed in the same pattern as ceiling planks with countersunk nails.

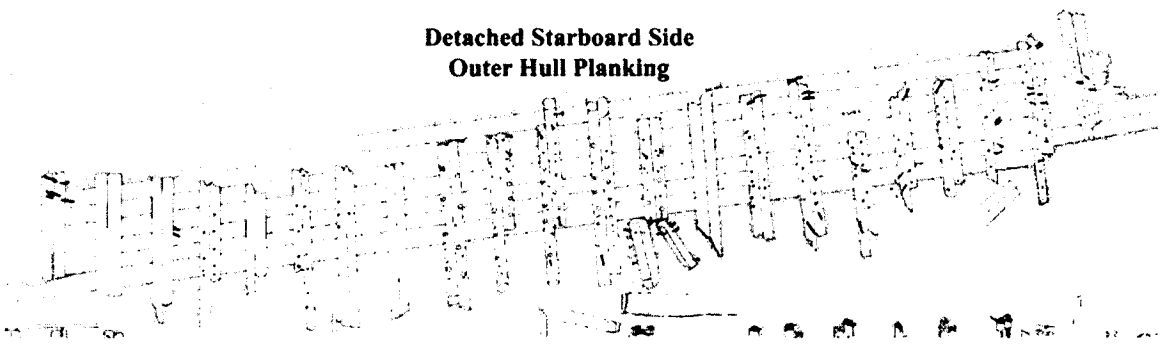


Figure 4.16: Portion of detached hull as it appears on the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University.)

Several sections of outer hull planking are detached and situated either directly inside or outside the hull (See Figures 4.11 and 4.16). These outside sections are between five to seven planks wide and are attached to double frames that are cleanly cut. The two

largest pieces of side reside inside the hull thirteen feet aft of the bow on the port side. These sections are both thirteen feet wide at their widest point. While one smaller piece is lying on top of the fore end of the second piece, it is probable that these two sections fit together and were attached at one time. The evenness of the frame tops on both the intact hull and the detached sections, as well as their locations in relation to the hull, indicate that the detached pieces were intentionally removed. Since the site is only approximately ten feet deep and located in a well-used recreational boating area, it is reasonable to assume that the detached portions of the hull were cut down to prevent boats from grounding or snagging on the wreck.

Engine Bed

While no engine parts or intact bed structure was recorded, in the stern seventy-five feet aft of the bow, archaeologists recorded large sections of iron plating and a large deposit of bricks (See Figures 4.17, 4.18, and 4.19). Five large pieces of ferrous material were recorded on the starboard side and two pieces were recorded on the port side. The location of this iron plating as well as the corresponding presence of quadruple frames, indicates that these pieces were the engine or boiler beds. The brick deposit measured approximately five by five and a half feet in area, and individual bricks were measured as 0.3 by 0.6 by 0.2 feet in dimension. None of the examined bricks had any distinguishing marks.

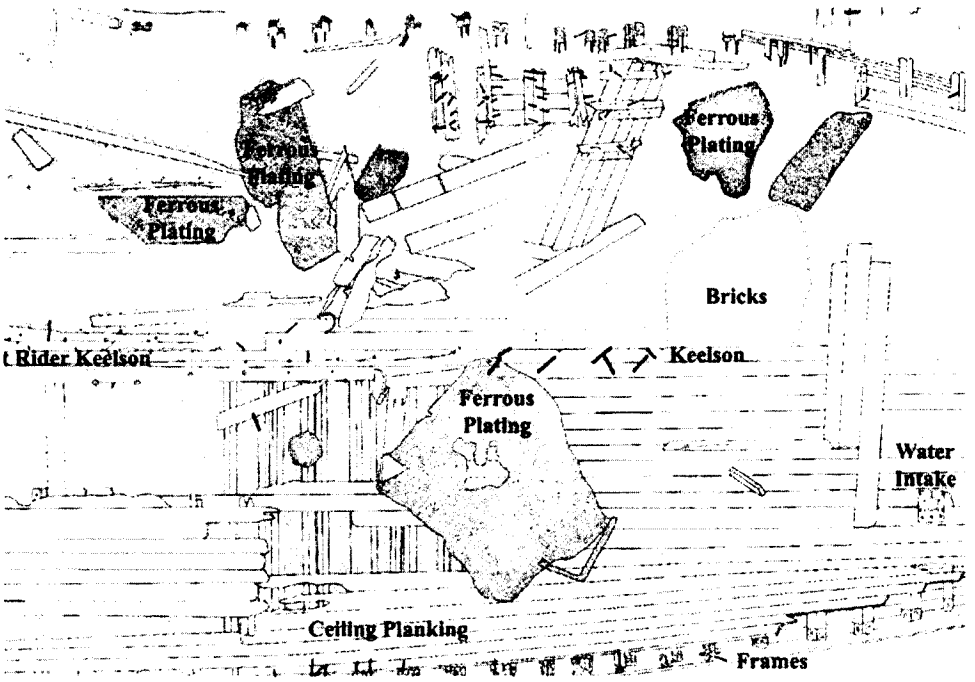


Figure 4.17: Plating and brick deposits as they appear on the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University).

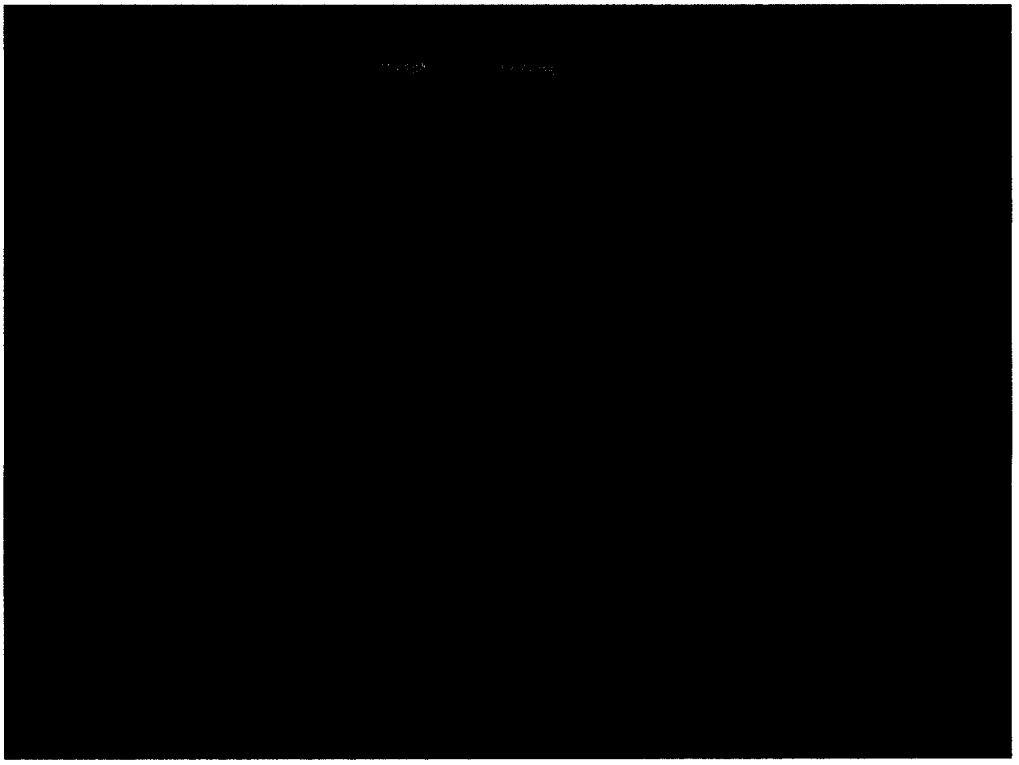


Figure 4.18: Iron Plates (Courtesy of the Program in Maritime Studies, East Carolina University).

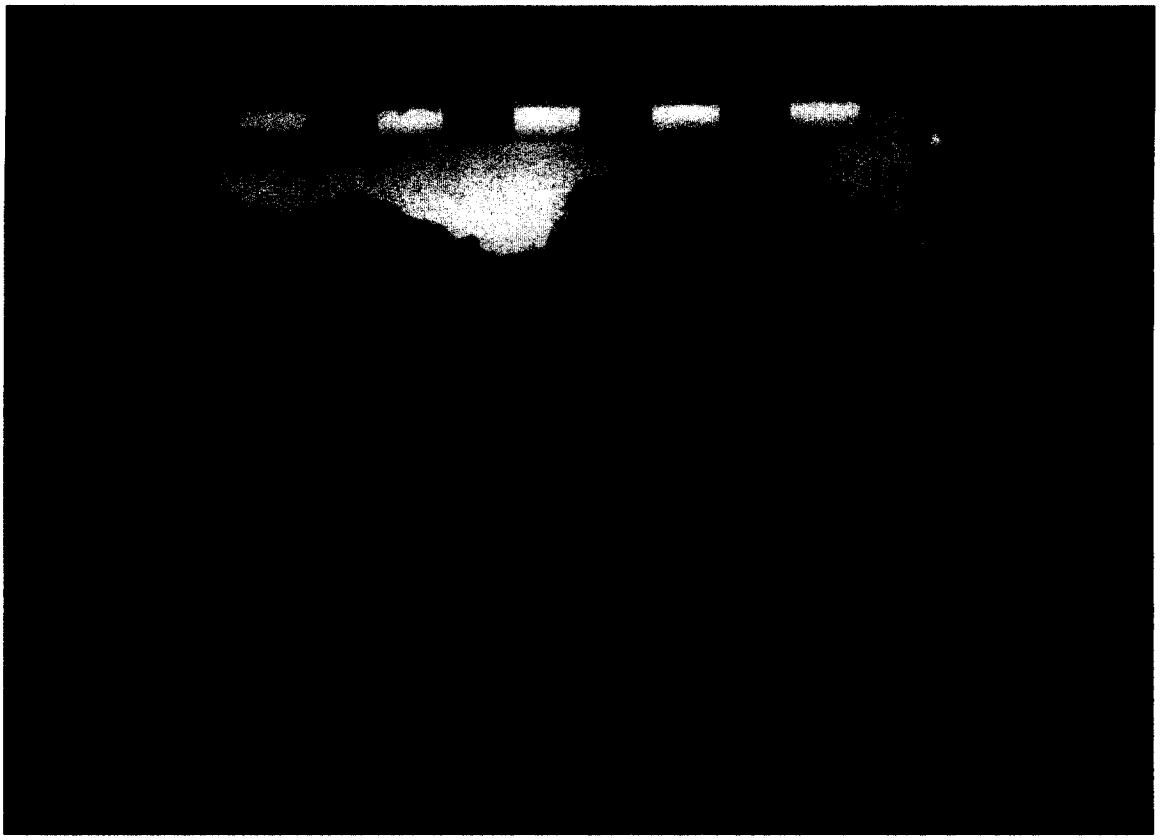


Figure 4.19: Ferrous mass (Courtesy of the Program in Maritime Studies, East Carolina University).

Propeller Assembly

Upon initial examination of the wreck, archaeologists uncovered a shaft log and sole piece aft of the stern post (See Figure 4.20). The presence of these components confirmed that the wreck was once a steamer. The shaft log measured 4.8 feet in length by 0.8 feet sided. The sole piece extended out from the keel and measured 9.0 feet in length and 0.8 feet sided. No other evidence of the propeller or rudder was found on the site, probably due to salvage activities.

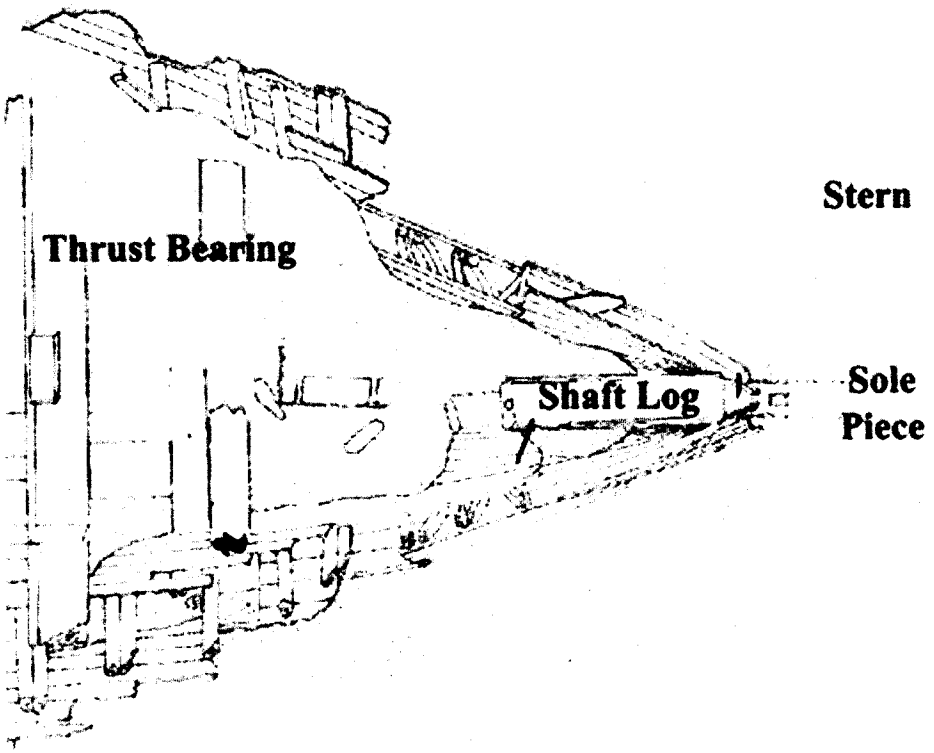


Figure 4.20: Propeller shaft assembly as it appears on the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University).

Artifact Scatter

Besides a random scattering of loose fasteners in various shapes and sizes, the Sunset Park Wreck contained a small sampling of other artifacts including white paste porcelain fragments and decorative metal fragments (See Figures 4.21 and 4.22). These artifacts were recorded in situ and not recovered, due to the Phase II non-intrusive nature of the project.

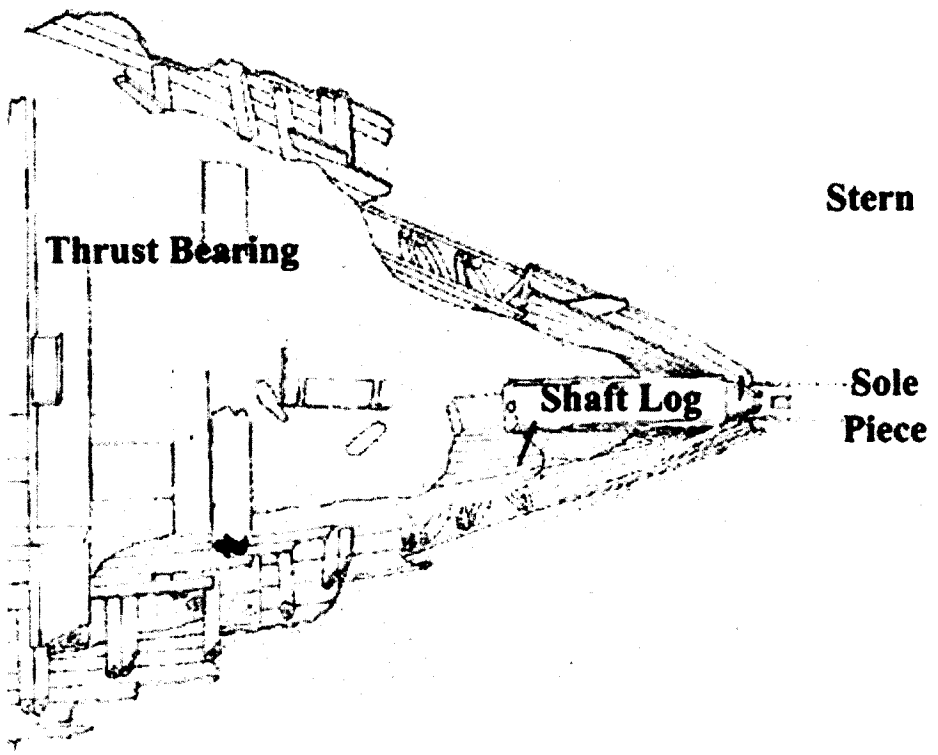


Figure 4.20: Propeller shaft assembly as it appears on the Sunset Park Wreck site plan (Courtesy of the Program in Maritime Studies, East Carolina University).

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Figure 4.21: Fasteners (Courtesy of the Program in Maritime Studies, East Carolina University).

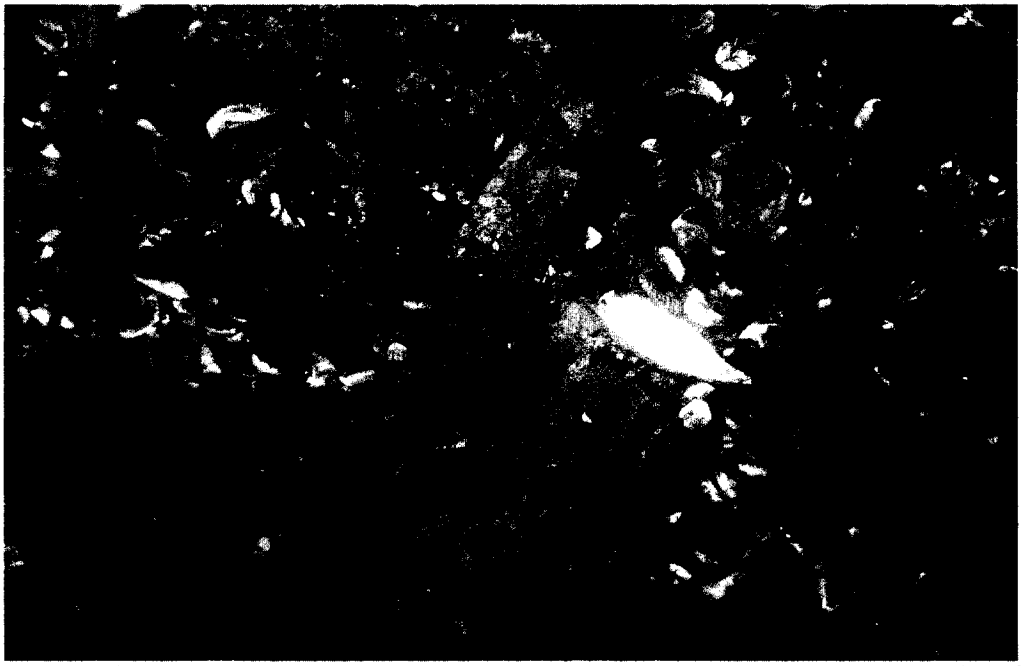

Figure 4.22: White porcelain, iron fasteners, and decorative metal fragments in situ. Note the lay of zebra mussels and extensive charring (Courtesy of the Program in Maritime Studies, East Carolina University).

Site Interpretation and Steambarge Chronology

The archaeological investigation of the Sunset Park Wreck confirmed initial suspicions that the vessel is a steambarge. This suspicion is based upon analysis of the vessel's internal construction, which reveals a schooner-like hull, indicated by longitudinal ceiling planking, bilge keelsons, and a heavy composite keel/keelson assembly, as well as self-propulsion machinery, indicated by quadruple frames in the stern and the propeller assembly. In the archaeological record, these features are diagnostic.[38]

Comparison of the Sunset Park Wreck with other archaeologically investigated steambarges further corroborates the vessel type identification and provides insight into the internal construction of wooden steambarges. Before the archaeological investigation of the Sunset Park Wreck, only four other Great Lakes steambarges had been documented in detail: *Adventure*, *Francis Hinton*, *Cleveland*, and *H.D. Coffinberry.* Other steambarges have been surveyed, but not mapped in detail. These include *Herman H. Hettler*, *Michael Groh*, and *H.E. Runnels.*[39]

The archaeological reports of these vessels are important primary sources that provide tools for comparison to the Sunset Park Wreck. In order to demonstrate the connection between the internal construction of the Sunset Park Wreck and other wooden

[38] Rodgers, "Vernacular Craft", 14.

[39] Rodgers and others, *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (Greenville, NC: East Carolina University, 2006), 37-40; C. Patrick Labadie, *Submerged Cultural Resources Study: Pictured Rocks National Lakeshore* (Santa Fe: Southwest Cultural Resources Center, 1989), 51-54, 62-67, 146-149; David J. Cooper, ed., *By Fire, Storm and Ice: Underwater Archaeological Investigations in the Apostle Islands* (Madison: State Historical Society of Wisconsin, 1996), 96-101; John O. Jensen and others, *Archaeological Assessment of Historic Great Lakes Shipwrecks: Surveys of the Steamers* Niagara *and* Francis Hinton (Madison: State Historical Society of Wisconsin, 1995), 39-44; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 30-35.

Great Lakes steambarges, further analysis of the archaeological data gathered during the investigations of these ships is warranted. The vessels are presented in chronological order and accompanied by a brief synopsis of their archaeological examination, as well as any archaeological documentation including site plans and cross sections. Steambarges that have been surveyed, but not mapped in any detail, have not been included. These sites are too disarticulated or the documentation too minimal to provide much useful information at this time.

Cleveland

The oldest archaeologically documented steambarge, *Cleveland*, was constructed for the lumber trade in 1860. *Cleveland* originally measured 150 feet long, 25. 5 feet in beam, and had an 11.6 foot depth of hold, although these dimensions changed during the vessel's career due to hull improvements and the vessel's conversion into a passenger/package freight propeller.[40] Although the steamer's career was plagued by a series of misfortunes, it continued to function efficiently until it was declared unfit for service in 1900. After this, it was converted to a barge. By 1902, the vessel had been completely stripped and turned into a crib for a stone quarry's loading dock.[41]

An archaeological investigation of the *Cleveland* was conducted by East Carolina University, Wisconsin Historical Society, and the Wisconsin Sea Grant Program in September of 2001 and September of 2002. Since the ship had been utilized as a crib, the hull was filled with riprap. This made documentation of the vessel's construction difficult, but not entirely impossible. Internal construction components consisted of an

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[40] Rodgers and Others, *From Quarry to Quay*, 25.
[41] *Ibid.*

offset centerboard, bilge keelsons, longitudinal ceiling planking, and added floor reinforcing toward the stern, evidence of boilers and engines (See Figure 4.23). The vessel internally is very schooner-like, complete with a pre-1860 style portside offset centerboard, that, despite its long career, is likely original equipment (See Figure 4.24).

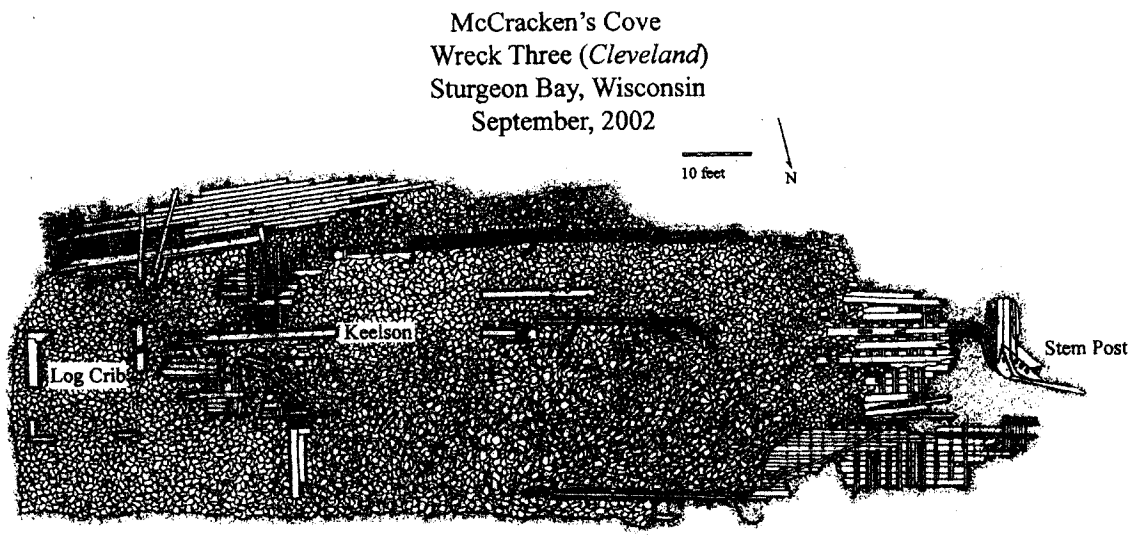

Figure 4.23: *Cleveland* site plan. Note the triple frames in the stern and longitudinal planking (Courtesy of the Program in Maritime Studies, East Carolina University).

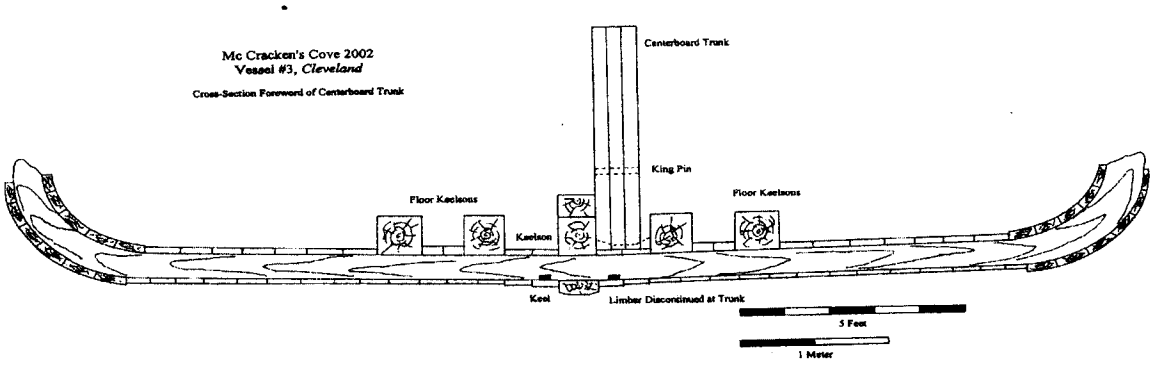

Figure 4.24: Steambarge *Cleveland* cross section. Note the offset centerboard and bilge (or floor) keelsons (Courtesy of the Program in Maritime Studies, East Carolina University).

Michael Groh

Michael Groh, another early steambarge, was constructed for the lumber trade in 1867 by Quayle and Martin for Thomas Manning and Michael Groh.[42] The ship measured 120.4 feet in length, 23.8 feet in beam, and had a 23.8 foot depth of hold.[43] *Michael Groh's* twenty-eight year career ended in 1895 when its rudder broke from the shoe on a trip to Cleveland. The vessel, rendered helpless, was driven onto the nearby shore where it pounded onto the rocks and sank.[44]

The *Michael Groh* wreck site was examined in 1988 by the Submerged Cultural Resources United of the National Park Service as part of a comprehensive evaluation of the Pictured Rocks National Lakeshore's underwater resources. The wreck is disarticulated and consists of two sections of ship's hull. The smallest section is fifteen feet long and consists of a centerline keelson, double and triple frames, as well as engine supports and a bearing support block (See Figure 4.25). The larger section of wreckage measured 104 feet in length and was not discovered until the conclusion of the Pictured Rocks survey project. Investigators noted in the site report that this section of hull contained double and triple frames, longitudinal ceiling planking, bilge stringers, and a single centerline keelson reinforced with an assistant keelson.

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[42] Ship Information and Data Record: *Michael Groh*, The C. Patrick Labadie Collection, Alpena Public Library.
[43] Labadie, *Pictured Rocks*, 62.
[44] *Ibid.*, 63-64.

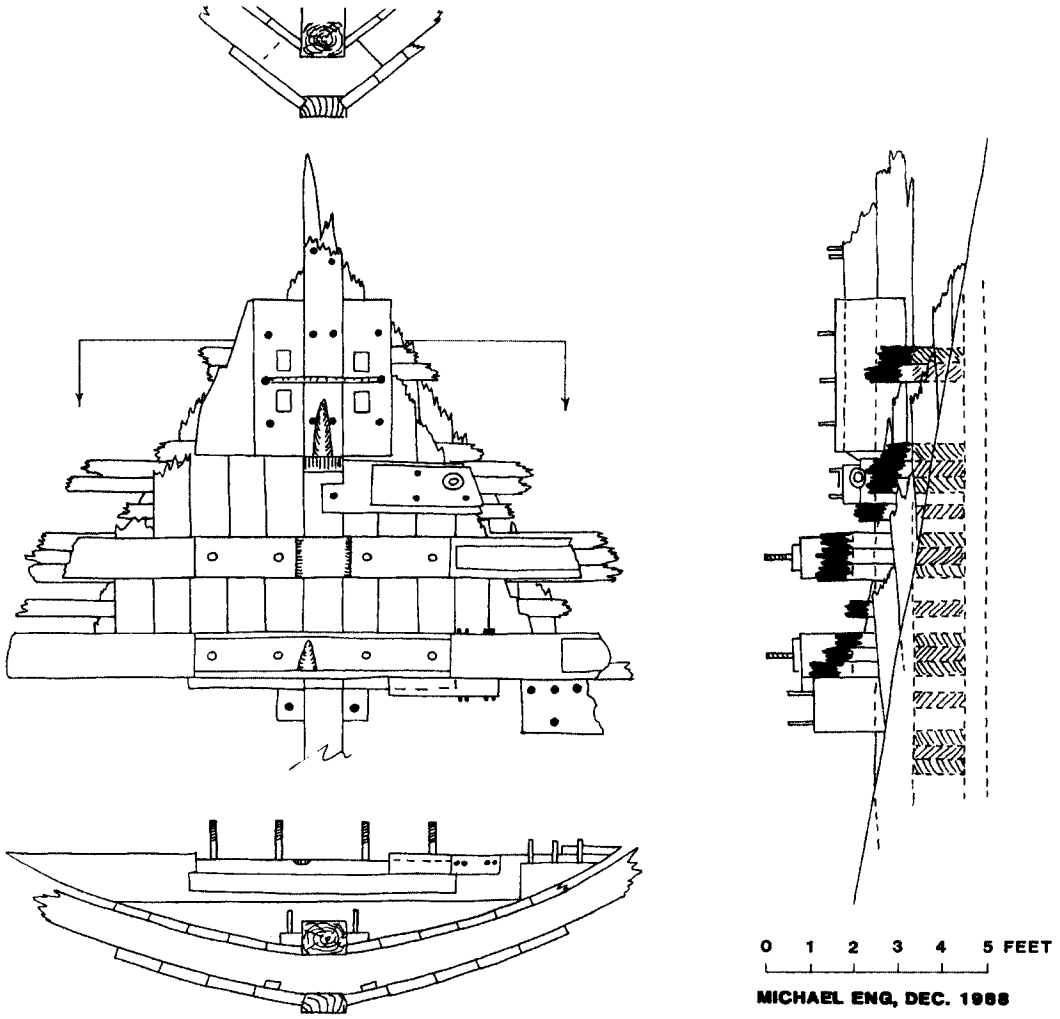

Figure 4.25: View of *Michael Groh's* engine bed (Labadie, 1989: 65).

H.D. Coffinberry

H.D. Coffinberry was built in 1874 by Thomas Arnold for the firm of Rust, King & Company, and carried cargoes of coal, corn, iron ore, and lumber during its career.[45] The ship measured 191.4 feet in length, 33.5 feet in beam, with a 13.4 foot depth of

[45] Cooper, *Apostle Islands*, 93.

hold.[46] Reports of groundings and accidents are abundant in the *Coffinberry's* history, and the ship had to be pumped out and towed to the nearest port for repair on two occasions.[47] The ship's final demise was due to the owner's financial distress. In 1912 the crew abandoned the vessel because the owners had not paid them. Five years later the vessel was raised, salvaged, and then re-abandoned at Red Cliff Bay in northern Wisconsin.[48]

Archaeological investigations of *H.D. Coffinberry* were conducted by the State Historical Society of Wisconsin, East Carolina University, UW-Sea Grant Institute, UW-Marine Studies Center, and the National Park Service as part of a survey of the submerged cultural resources of the Apostle Islands.[49] The wreck rests on a lakebed of sand, silt, cobble, and boulders. Surviving structural elements include only a badly damaged lower hull. Internal construction components consisted of double frames throughout and triple frames in the stern, heavy centerline keelson complex including two sisters and two riders, bilge stringers, longitudinal ceiling planking, and evidence of machinery including the remains of the ship's boiler bed and badly damaged boilers (See Figure 4.26).[50]

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[46] Ship Information and Data Record: *H.D. Coffinberry*, The C. Patrick Labadie Collection, Alpena Public Library.
[47] Cooper, *Apostle Islands*, 95.
[48] *Ibid.*, 96.
[49] *Ibid.*, 1.
[50] *Ibid.*, 96-101.

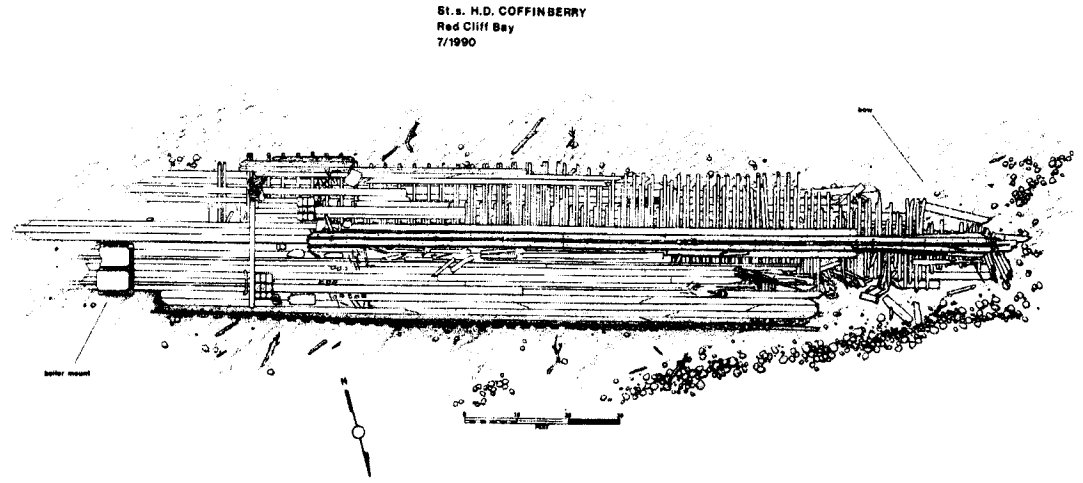

Figure 4.26: *H.D. Coffinberry* site plan. Note the triple frames in the stern and longitudinal planking (Cooper, 1996: 99).

Francis Hinton

Francis Hinton was built in 1889 by Hanson and Scove for the lumber trade.[51] *Hinton's* dimensions measured 152.2 feet in length, 30.9 feet in beam, and 10.89 feet in depth of hold.[52] The vessel was well maintained and its Inland Lloyds Rating never dropped below A 1 ½.[53] *Francis Hinton* enjoyed a successful career as a lumber carrier until 1909 when the vessel foundered off Two Rivers, Wisconsin, en route to Chicago with a full load of Norway pine. The wreck was quickly forgotten until it was rediscovered by sport divers in 1987.[54]

Archaeological work began on the wreck during the winter of 1994-1995. The project was conducted by Rogers Street Fishing Village Museum in Two

[51] Ship Information and Data Record: *Francis Hinton*, The C. Patrick Labadie Collection, Alpena Public Library.
[52] Ship Information and Data Record: *Francis Hinton*, Wisconsin Historical Society, Madison, Wisconsin.
[53] Jenson and others, Niagara *and* Hinton, 32.
[54] *Ibid.*, 34.

Rivers, Wisconsin, and the State Historical Society of Wisconsin with the assistance of Wisconsin Underwater Archaeological Association (WUAA) volunteers. The site is embedded in a clay bottom and sits almost flush with the lakebed.[55] During investigations divers noted the presence of the ship's bottom and broken sections of the vessel's sides. Internal construction components consisted of a heavy keelson assembly including a rider keelson and two longitudinal stringers, bilge stringers, double frames throughout, triple frames in the stern, longitudinal ceiling planking, machinery including the propeller assembly, as well as evidence of a centerboard at the bow (See Figure 4.27).[56]

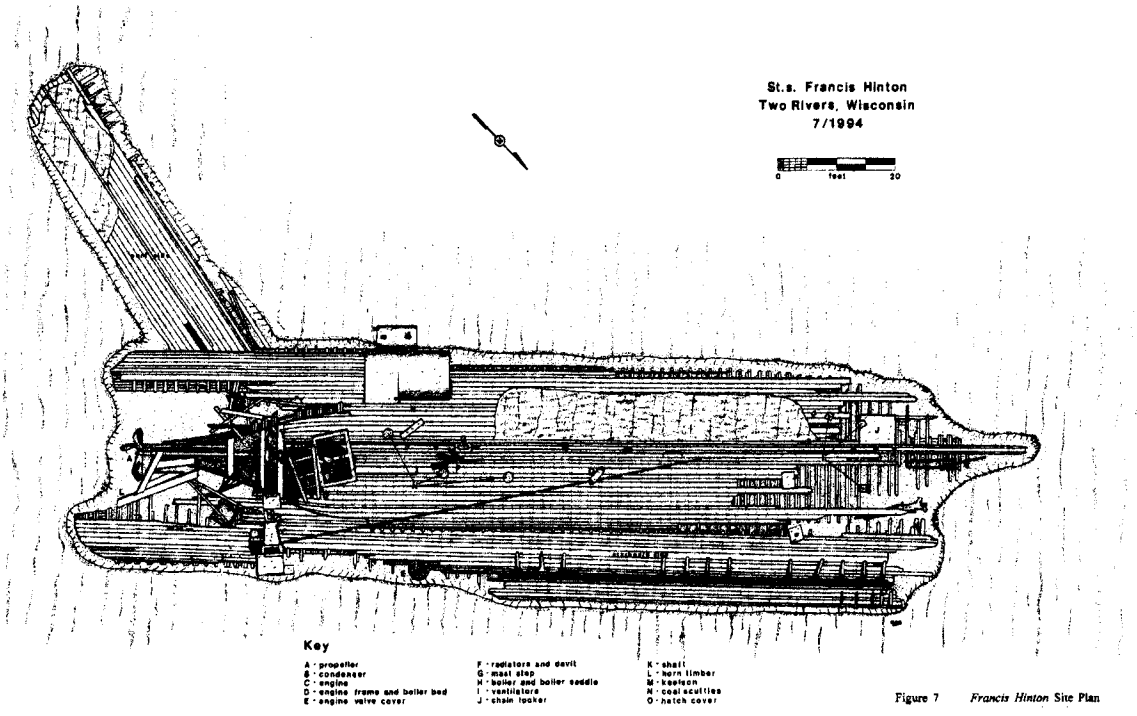

Figure 4.27: *Francis Hinton* site plan (Jensen et al., 1995: 41).

[55] *Ibid.*, 37.
[56] *Ibid.*, 39-45.

Adventure

Adventure was originally built as a schooner in 1875, and was rebuilt as a steambarge in 1897 by Henry D. Root of Lorain, Ohio.[57] Conversion to a steambarge was accomplished by:

> ...reconstructing and rounding the ship's square stern and installing a boiler, engine, tailshaft, propeller, and rudder. Simpler tasks included removal of the ship's bowsprit and her after (main) mast, relocating the foremast, and erecting a small forecastle at the bow. A cabin was also constructed on a raised poop deck at her stern.[58]

After conversion, the ship measured 108 feet in length, 24 feet in beam, with an 8.3 foot depth of hold.[59] On October 7, 1903, *Adventure* caught fire while loading a cargo of burned lime at the Kelleys Island Lime & Transportation Company. As soon as it became apparent that the vessel could not be saved, it was towed away from the shoreline where it burned to the waterline and sank.[60]

In 1997, Firelands College of Bowling Green State University offered an experimental workshop course designed to train avocational divers in the techniques of shipwreck documentation. The final goal of the class was to document the *Adventure* wreck site. The archaeological survey revealed that the wreck lay upright and mostly intact below the waterline, and rests on a bottom consisting of a mixture of silt, sand, gravel, limestone cobbles, and large glacial boulders. Internal construction components consisted of characteristic nineteenth-

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[57] Ship Information and Data Record: *Adventure*, The C. Patrick Labadie Collection, Alpena Public Library.
[58] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 7.
[59] *Ibid.*
[60] *Ibid.*, 10-11.

century schooner hull attributes including a thick composite keel/keelson assembly with two sisters and one rider keelson, bilge stringers, longitudinal

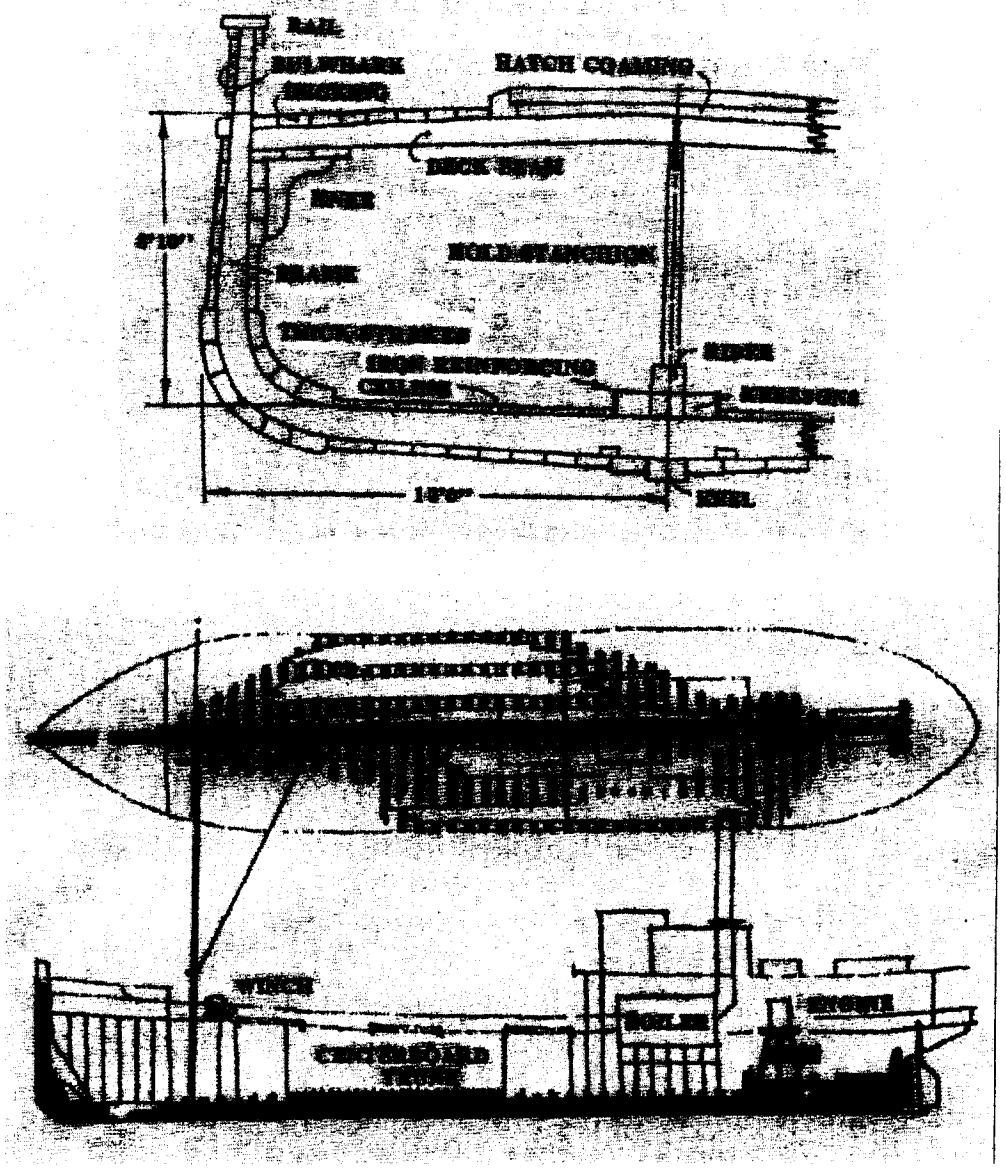

Figure 4.28: *Adventure* site plan and cross section. Note the heavy keel/keelson assembly (Labadie and Herdendorf, 2004: 32).

ceiling planking, and a centerboard (See Figure 4.28). Machinery components, including a very visible engine bed, shaft log, and stern post, were also found on site (See Figure 4.28).[61]

Conclusions and Recommendations

The archaeological examination of the Sunset Park Wreck, as well as *Cleveland*, *Michael Groh*, *H.D. Coffinberry*, *Francis Hinton*, and *Adventure*, provided archaeologists with an opportunity to get a closer look at what has until now been one of the most elusive nineteenth-century Great Lakes vessel types. Of the five archaeologically documented steambarges discussed above, only two, *Francis Hinton* and *Adventure,* have allowed investigators to take a close look at the internal construction characteristics. *Cleveland* was mostly covered with stone, and only a small portion of *Michael Groh* was documented, while very little of *H.D. Coffinberry* remains intact. Despite this, analysis of the vessels' archaeological remains reveals some commonalities between the sites, and thus establishes some diagnostic characteristics for internal steambarge construction in the archaeological record.[62] Most importantly, in some way all of these vessels shed light on the internal construction characteristics of steambarges and help establish the link between sail and steam powered cargo vessels.

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[61] *Ibid.*, 31-34.

[62] Because the archaeologically examined steambarge to date have demonstrated only below the waterline components, no comparison of the above the waterline features is possible from an archaeological standpoint. Examinations of historical photographs and deck plans, however, have provided a wealth of information about these components. For more information on the external construction characteristics of steambarges, see Chapter 3.

Diagnostic internal construction characteristics of steambarges resemble that of typical nineteenth-century schooners, including heavy keel/keelson complexes, single decks, longitudinal ceiling planking, double framing, and sometimes centerboards. Of the six vessels presented, the Sunset Park Wreck, *H.D. Coffinberry*, *Francis Hinton*, and *Adventure* all demonstrate heavy keel/keelson complexes.[63] *Cleveland* (1860) and *Michael Groh* (1867), the earliest archaeologically documented steambarges, do not. Their keelsons, however, are both reinforced with assistant keelsons.[64] These vessels primarily carried lumber and other bulk cargoes, and required strong keelson assemblies to support the wear and tear of transporting heavy bulk commodities.[65] Another shared attribute that contributed to the vessels' overall strength is longitudinal ceiling planking. This characteristic, as well as double-framing throughout the vessels' hulls, was present on all six archaeologically documented steambarges.[66]

The final schooner-like internal construction attribute some steambarges share with schooners is a centerboard. According to Rodgers, "...earlier craft or those that were converted to steam barges [sic] from sailing schooners, sometimes still contain centerboards".[67] Of the six steambarges examined, three contained centerboards, *Cleveland*, *Adventure*, and *Francis Hinton*. Two vessels, *Cleveland* and *Adventure*, fit the above criteria mentioned by Rodgers. *Cleveland*, constructed in 1860, was one of the

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[63] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 32; Cooper, *Apostle Islands*, 96; Jenson and others, Niagara *and* Hinton, 39-45.
[64] Rodgers and others, *From Quarry to Quay*, 40; Labadie, *Pictured Rocks*, 67.
[65] Labadie, *Pictured Rocks*, 26.
[66] Rodgers and others, *From Quarry to Quay*, 37-40; Labadie, *Pictured Rocks*, 51-54, 62-67, 146-149; Cooper, *Apostle Islands*, 96-101; Jensen and others, Niagara *and* Francis Hinton, 39-44; Labadie and Herdendorf, *Wreck of the Steam Barge Adventure*, 30-35.
[67] Rodgers, "Vernacular Craft", 14.

earliest steambarges ever built, and was constructed during a time when shipwrights were still transitioning schooner hulls from sail to steam.[68] These builders would not have wanted to deviate far from tried and true schooner construction techniques, and knew that centerboards helped make sailing vessels effective sailors. *Adventure* was originally constructed as a schooner, and the vessel's centerboard was not removed during conversion to a steambarge in 1875.[69] *Francis Hinton* is an exception. This vessel was constructed as a purpose built steambarge in 1889, during the peak of steambarge construction. Archaeological investigations of the ship, however, revealed evidence of a centerboard trunk in the vessels' extreme bow. According to the site report, "The [centerboard] trunk appears to have been closed up and the centerboard removed as part of a later modification."[70] The fact that this late steambarge contained a centerboard may be explained by shipwrights' choices. The site report also states that:

> She [*Francis Hinton*] was the final vessel built by the Danish immigrants Hanson and Scove, a shipbuilding partnership primarily known for its fine schooners rather than steam vessels.[71]

Since these men were primarily focused on building schooners it makes sense that they would include a centerboard, a typical schooner characteristic, in *Francis Hinton*, a steambarge that exhibited internal construction characteristics almost identical to those of typical nineteenth-century schooners. In this light, it is important to note that not all ships assigned to the steambarge class satisfy all criteria established for the type.

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[68] Rodgers and others, *From Quarry to Quay*, 37.
[69] Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 32.
[70] The description of the position of Francis Hinton's centerboard seems to indicate that it was similar to the Charles H. Bradley's. See figure 3.20 in Chapter 3; Jensen and others, *Niagara* and *Francis Hinton*, 39.
[71] *Ibid.*, 32.

The most notable attributes that differentiate steambarges from schooners in the archaeological record are engines and boilers, and those features associated with their support. These include one or two bilge stringers per side and heavy triple or quadruple framing and flooring in the stern.[72] All six wrecks demonstrate these characteristics.[73]

The Sunset Park Wreck as a steambarge is a unique Great Lakes vessel type and as such is an important contribution to maritime cultural history, providing us with a tangible link to the past. It also represents a distinctive Great Lakes vessel type that was specially tailored to overcome the environmental particularities of the Lakes. It is, therefore, important to protect that information for future generations. Wisconsin state law protects the site and establishes ownership of the vessel and all affiliated artifacts. Although the detail in which the wreck was mapped makes any future archaeological examination unnecessary, the wreck can still serve as an educational tool. The site is well known to the surrounding communities, and any attempts to block recreational boaters and divers from examining the site would be futile. The best course of action is to educate the local community on the wreck's importance to Great Lakes maritime heritage. With this in mind, the Wisconsin Historical Society plans to install an interpretive sign on the Sunset Park shore detailing the vessel's history (See Chapter 5), importance, and archaeological investigations (See Figure 4.29). Hopefully, the site will educate and be enjoyed by generations of people who take nothing but pictures and leave only bubbles.

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[72] Rodgers, "Vernacular Craft", 14.

[73] Rodgers and others, *From Quarry to Quay*, 37-40; Labadie, *Pictured Rocks*, 51-54, 62-67, 146-149; Cooper, *Apostle Islands*, 96-101; Jensen and others, Niagara *and* Francis Hinton, 39-44; Labadie and Herdendorf, *Wreck of the Steam Barge* Adventure, 30-35.

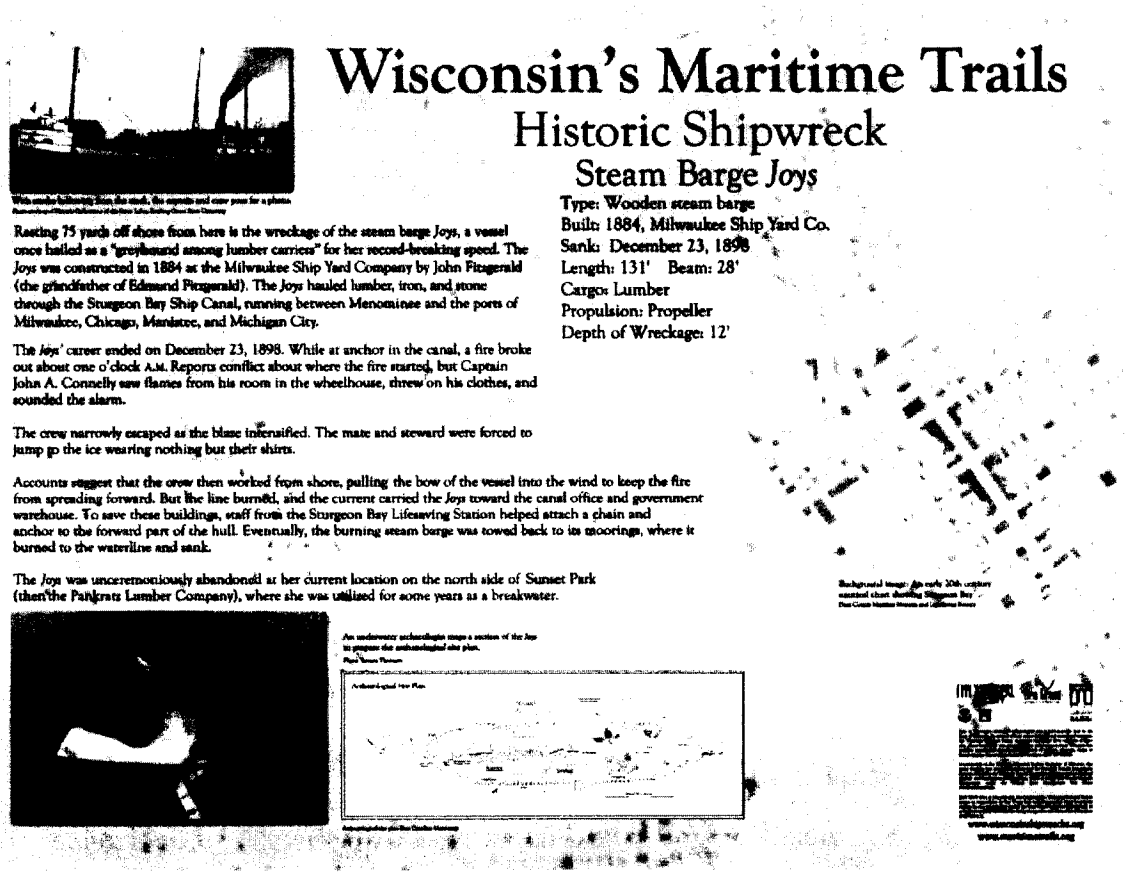

Figure 4.29: Mock up of the *Joys* Maritime Trails Marker that will be installed in Spring 2007 (Courtesy of the Wisconsin Historical Society).

CHAPTER 5

THE HISTORY AND ARCHAEOLOGY OF THE *JOYS*: "GREYHOUND OF THE LAKES"

--Every ship has a story. Men wrap their lives about it, and women their loves, and in so doing it makes fiction appear dull in comparison.

--Dana Thomas Bowen[1]

Introduction

During the archaeological examinations of the Sunset Park Wreck the identity of the vessel was uncertain. No definitive evidence of the wreck's identity, such as a nameplate, was discovered on site, therefore the only way to identify the Sunset Park Wreck is through a multidisciplinary approach. One of the most powerful tools archaeologists have at their disposal for identifying and interpreting shipwrecks is historical evidence. Historical data can be utilized in conjunction with archaeological data to reveal identity, typology, and other important aspects of a shipwreck site. Comparison of the Sunset Park Wreck's archaeological record with historical data pertaining to shipwrecks in Door County, Wisconsin, led East Carolina University archaeologists to conclude that the Sunset Park Wreck is likely the steambarge *Joys*.

The purpose of this chapter is to blend historical data with archaeological evidence to reveal both the history and identity of the Sunset Park Wreck. The first half of this chapter presents the history of *Joys*, focusing on hull modifications the ship experienced before, during and after wrecking that may still be present in the archaeological record. Historical information relevant to this vessel, once heralded as the

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[1] Mark L. Thompson, *Steamboats & Sailors of the Great Lakes* (Detroit: Wayne State University Press, 1991), 30.

"greyhound of the Lakes," is found in vessel enrollments and newspaper articles and provides enough key evidence to trace the ship's career. The second half presents and examines archaeological data uncovered during the Sunset Park Wreck project that substantiates and corroborates the identity of this wreck as the steambarge *Joys*.

The Milwaukee Ship Yard Company

In 1884, *Joys* began its fourteen year career at the Milwaukee Ship Yard Company in Milwaukee, Wisconsin. The company was organized by Captain John Fitzgerald, the youngest of six brothers who were all Great Lakes' captains (See Figure 5.1). In 1874, Fitzgerald bought the Allan, McClelland & Company holdings and constructed the Milwaukee Ship Yard Company on the former owner's grounds. John Fitzgerald, of course, named himself president of his new company. The only other officer was Andrew M. Joys, who served as both secretary and treasurer.[2]

Figure 5.1: John Fitzgerald (Cutler and Hirthe, 1983: 112).

[2] Elizabeth F. Cutler and Walter M. Hirthe, *Six Fitzgerald Brothers: Lake Captains All* (Milwaukee: Wisconsin Marine Historical Society, 1983), 119.

One of the Milwaukee Ship Yard Company's first orders of business was to put a plan for growth and expansion into action. They wanted to operate not only a ship yard, but a dry dock as well (See Figures 5.2 and 5.3). In order to accomplish this, Fitzgerald purchased a piece of land adjoining the ship yard that extended his river front property by 340 feet. Next, he changed the course of their slip so that larger vessels could be accommodated and then raised and refitted parts of the Allan, McClelland & Company floating dry dock. After this, construction began on the new dry dock.[3] According to Richard J. Wright:

> When the program was completed, the company's 200 feet of new steam-powered floating dry docks could handle the largest freighters on the Lakes. A ninety-foot reconditioned floating dry dock could take smaller vessels, and a permanent dry dock vessels for major repairs [sic.]. The new dry dock was 311 feet long 70 feet wide at the bottom and had 15 feet of water over the sill.[4]

After six years, the successful Milwaukee Ship Yard Company began getting contracts to construct several wooden steambarges. Between 1881 and 1883, the company built *C.H. Stark*, *Marshall F. Butters*, *Louis Pahlow*, and *George C. Markham*.[5] In 1884, Fitzgerald and company built *Joys*, a steambarge specifically designed for the lumber trade. This vessel was named after the company's secretary and treasurer, Andrew M. Joys.[6]

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[3] *Ibid.*, 119.
[4] *Ibid.*, 119-123.
[5] *Ibid.*, 123-124.
[6] *Ibid.*, 127.

Figure 5.2: View of a typical Great Lakes Ship Yard. This photograph was taken in 1886 at the Wolf and Davidson Ship Yard, which later became the South Yard of the Milwaukee Dry Dock Company (Cutler and Hirthe, 1983: 148).

Milwaukee Ship Yard Co.

Opposite Elevators "B and C," Menominee River,

Materials for Building and Repairs.

Can UNSHIP any CENTREBOARD at Yard.

DRY DOCK CAPACITY FOR LARGEST VESSELS.

JOHN FITZGERALD, Prest.

Figure 5.3: 1884 advertisement for the Milwaukee Ship Yard Company that ran in R.L. Polk & Company's Marine Directory (Cutler and Hirthe, 1983: 120).

Figure 5.2: View of a typical Great Lakes Ship Yard. This photograph was taken in 1886 at the Wolf and Davidson Ship Yard, which later became the South Yard of the Milwaukee Dry Dock Company (Cutler and Hirthe, 1983: 148).

Figure 5.3: 1884 advertisement for the Milwaukee Ship Yard Company that ran in R.L. Polk & Company's Marine Directory (Cutler and Hirthe, 1983: 120).

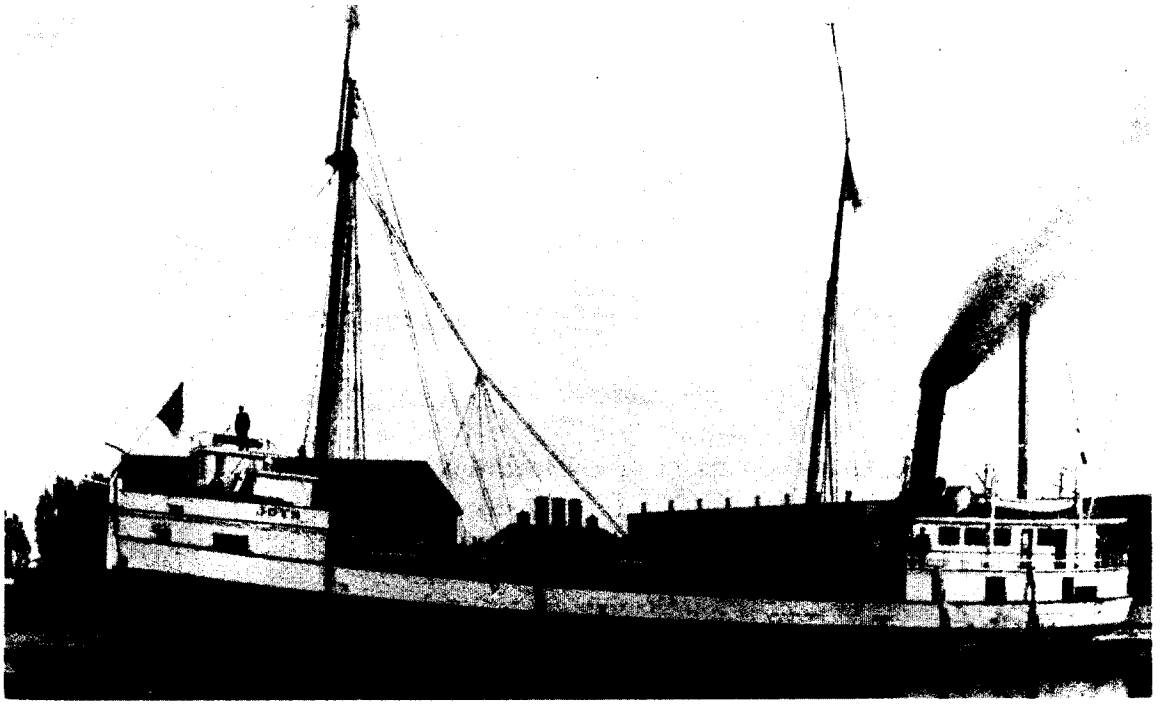

Figure 5.4: Possibly the only image of the *Joys* (Courtesy of the C. Patrick Labadie Collection, Alpena Public Library, Alpena, Michigan).

The Joys

Joys was first enrolled on October 1, 1884 as, "A propeller with one deck and two masts, plain head, and round stern" (See Figure 5.4).[7] John Fitzgerald, president of the Milwaukee Ship Yard Company, was the principal carpenter. The Milwaukee Ship Yard Company, Conrad Starke, and James Sheriffs were *Joys'* original owners, all with an equal 1/3 share.[8] James Sheriffs owned Sheriffs Vulcan Iron Works Company which repaired marine machinery and manufactured propellers, marine engines, steam steering engines, dredging machinery, and deck hoisting engines. The Milwaukee Ship Yard

[7] Vessel Enrollment, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[8] *Ibid.*

Company had a convenient partnership with Sheriffs' company. Marine machinery from Sheriffs' company was often placed in vessels constructed by the Milwaukee Ship Yard Company, and Sheriffs received partial ownership of these vessels as payment. *Joys'* fire box boiler was built by R. David Marine Boiler Works, and the High Pressure Engine was built by Sheriffs' Company.[9] The vessel's measurements were listed as 131 feet long, 28.2 feet in beam, 9.9 foot draft, 268.07 gross tons, and 221.55 net tons.[10]

Information regarding the ship is scant from 1884-1892. In 1885, the list of owners expanded to include several Milwaukee residents beyond the original part-owners. Conrad Starke and James Sheriffs each owned 4/12, and the Milwaukee Ship Yard Company owned 1/12. The list also included John Joys, A.M. Joys, and C.W. Norris, who all owned a 1/12th share. L. Olsen was master.[11] Although vessel information for these years is scant, *Joys* was definitely hauling cargo. A list in the *Cleveland Leader* states that the vessel was finally laid up at Milwaukee for the winter.[12] It is, however, unlikely that *Joys* was anything more than mildly successful during the 1885 and 1886 seasons, as these were recession years.[13]

Ownership, according to the enrollments, did not change again until 1887. Conrad Starke and James Sheriffs still owned 4/12 each. Two new owners, William Starke of Milwaukee and Robert Winkler of Manistee, owned 2/12 each. A.E. Johnson

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[9] Ship Information and Data Record: *Port of Milwaukee*, The C. Patrick Labadie Collection, Alpena Public Library.
[10] Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[11] Vessel Enrollments, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[12] *Cleveland Leader*, 4 December 1885.
[13] William Gerald Rector, *Log Transportation in the Lake States Lumber Industry, 1840-1918: The Movement of Logs and Its Relationship to Land Settlement, Waterway Development, Railroad Construction, Lumber Production and Prices* (Glendale, CA: Arthur H. Clark Company, Glendale, 1953), 215.

took L. Olsen's place as master.[14] The *Duluth Daily News* mentioned *Joys* twice in 1887. On April 7th it stated that:

> On Saturday evening the steamer *Joys* left Milwaukee for Kewaunee, where she is to take on a cargo of cedar ties for Chicago at the rate of 7 cents apiece. The same figure is being paid to other vessels engaged in the trade.[15]

One month later the paper noted that, "The steamer *Joys* sprung a leak at Manistee last Saturday night and Sunday morning had six feet of water in her. The tug *Williams* pumped her out."[16] By 1889, William Starke had sold his share of the vessel and Conrad Starke, James Sheriffs, and Robert Winkler each owned 1/3 of the vessel. A.E. Johnson was still master.[17] Most importantly, the *Joys* was mentioned in Sturgeon Bay, Wisconsin's newspaper, the *Door County Advocate*, for the first time.[18] On December 21, 1889 the paper noted that:

> The steambarge *Joys* passed through here [Sturgeon Bay Ship Canal] again Tuesday afternoon with lumber from Menominee to Chicago. This is certainly forcing the season, to say the least...Lumber freights between Menominee and Chicago have advanced to $2.50 and $2.75, and the owners of the steambarges Joys [sic] and Mary Mills [sic] are making a good thing out of it by continuing their boats in commission.[19]

Joys appears to have navigated the Lakes without incident until 1890. That year, both the vessel's enrollments and its physical structure experienced changes. For

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[14] Vessel Enrollments, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[15] *Duluth Daily News*, 7 April 1887.
[16] *Duluth Daily News*, 9 May 1887.
[17] Vessel Enrollments, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[18] This *Door County Advocate* is a crucial primary source for historical information on *Joys*. Without it, next to nothing would be known about this vessel.
[19] The phrase "lumber freights" refers to the cost of shipping lumber; *Door County Advocate*, 21 December 1889.

unknown reasons, Conrad Starke sold his share of the vessel to James Sheriffs. James transferred the ownership of his 2/3 share to Christine Sheriffs, most likely his wife. Robert Winkler maintained his 1/3 share. The *Joys'* master of three seasons, A.E. Johnson, was replaced by Louis Guthrie.[20] Two months after the enrollments changed, *Joys* collided with the schooner *Boyce* near Chicago. As a result, both the pilothouse and spar were lost and had to be replaced.[21]

In 1892, Christine Sheriff became the vessels' sole owner. The master was listed as Thos. P. Dunn.[22] *Joys* was regularly spotted hauling loads of lumber, but also transported a few cargoes of iron ore and stone. Between the years 1892 and 1898, the *Door County Advocate* began documenting *Joys*' progress regularly. The vessel began traveling a regular route through the Sturgeon Bay Ship Canal between Milwaukee, Chicago, Manistee, Michigan City, and Menominee (See Figure 5.5). This route proved to be economically successful for *Joys* and it was the first vessel to pass through the canal each season from 1892-1898. The *Door County Advocate* praised the economic success of *Joys* in both 1892 and 1893. The December 17th, 1892 paper noted that:

> The propeller Joys [sic] made fifty round trips between Menominee and Milwaukee from June 1st to November 28th. This is an average of one trip in a trifle over three days and a half and includes the loading and discharging of about 350,000 feet of lumber. This is a remarkable exhibit

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[20] Vessel Enrollments, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.
[21] *Cleveland Plain Dealer*, 24 May 1890.
[22] Vessel Enrollments, Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library.

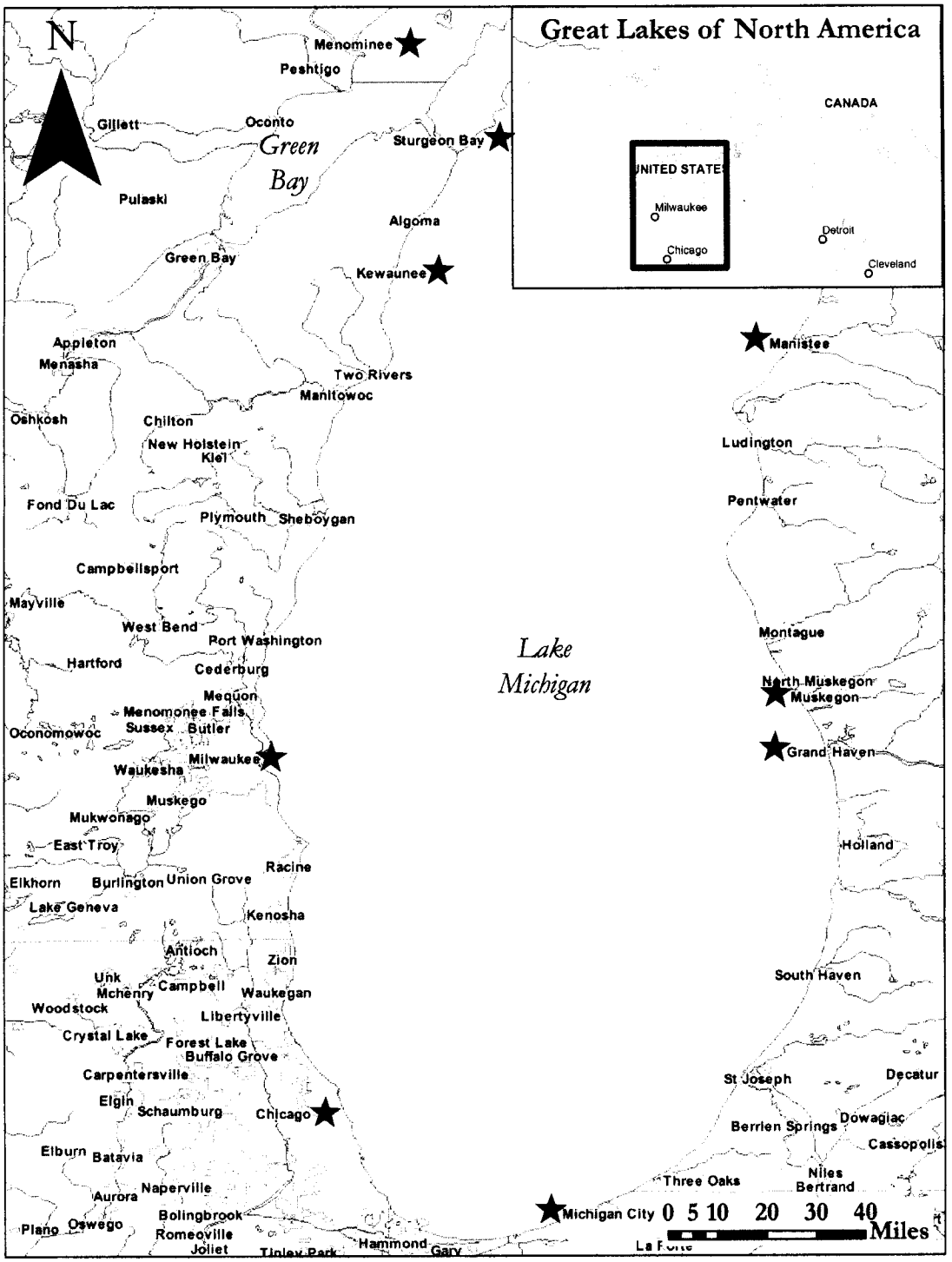

Figure 5.5: Cities regularly visited by *Joys* (Courtesy of Dr. Nathan Richards, Program in Maritime Stuies, East Carolina University).

> and it is a question whether better work has ever been done on the lakes, no matter where.[23]

In 1893, the *Joys* was described as a "greyhound among the lumber carriers" because it made three round trips between Menominee and Milwaukee in one week. During these trips the vessel delivered 1,000,000 feet of lumber, which was the best showing on record.[24] The years 1894 and 1895 seemed to have passed without incident except for a small collision with the scow *Lady Ellen.*[25]

During the last three years of *Joys'* career, the vessel began to show signs of wear and tear and underwent several improvements and repairs. In 1896 the foremast was replaced and the crank pin on the engine "ran hot", necessitating repairs in Chicago.[26] The next year the hull was significantly damaged during a storm and was taken to a dock in Sturgeon Bay for, "bottom searching and other repairs below the water line, as a result of having the oakum pounded out of the seams for'ard. Also the sail was completely carried away and the gaff broken."[27] At the end of the month, *Joys* found itself in trouble again when the engine broke down en route from Manistee to Michigan City. This time the ship was taken back to Sheriffs Manufacturing to receive a new cylinderhead, cylinder, piston, and pistonrod.[28]

During the 1897 and 1898 seasons *Joys* primarily carried cargoes of stone. This is consistent with the decline in the lumber industry, as discussed in Chapter two, as well

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[23] *Door County Advocate*, 17 December 1892.
[24] *Door County Advocate*, 9 September 1893.
[25] *Door County Advocate*, 1 December 1894.
[26] *Door County Advocate*, 18 April 1896; 25 April 1896.
[27] *Door County Advocate*, 1 May 1897.
[28] *Door County Advocate*, 22 May 1897.

as the simultaneous ascendancy of the stone production industry in Sturgeon Bay. In 1897 the vessel contracted to carry 1,500 cords of stone from the Washington Ice Company's quarry to the Muskegon Government piers. The south harbor pier at Muskegon was in the process of being extended 200 feet, which required two 100 foot cribs. *Joys* was capable of carrying between 65 and 70 cords on each trip, but the quarry could not always keep up with the demand.[29] In 1898, the vessel carried some cargoes of lumber, but was again contracted to deliver cargoes of stone, this time from the Termansen & Jensen Quarry, located on Bull Head Point in Sturgeon Bay, Wisconsin, to Grand Haven, Michigan.[30] By September, however, it appears that the vessel was back in the Menominee lumber trade.[31] Another change for the vessel during this year was that Christine Sheriff transferred a ¼ share to John A. Connelly of Chicago, who was also listed as master.[32]

Christmas Fire

Unfortunately for the Sheriffs and Captain Connelly, *Joys'* career ended on December 23, 1898. At approximately one a.m., while awaiting favorable weather in the Sturgeon Bay Ship Canal, a fire broke out.[33] According to the *Door County Advocate,* the fire, "originated from the smoke stack in the vicinity of the breeching, consuming the

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[29] *Door County Advocate*, 24 July 1897.
[30] Jon Van Harpen, "Story of a Week Among Jack Tars of the Unsalted Seas," *Lake Nautical Affairs* 3 (2004): 3.
[31] *Door County Advocate*, 24 September 1898.
[32] *Door County Advocate*, 5 February 1898.
[33] Paul J. Creviere Jr., Wild Gales and Tattered Sails: The Shipwrecks of Northwestern Lake Michigan From Two Creeks, Wisconsin To Dutch Johns Point, Michigan and All of the Bay of Green bay (De Pere, WI: Paul J. Creviere, Jr., 1997), 176.

after cabin first."[34] The *Door County Democrat*, however, states that the fire started in the hold.[35]

Captain Connelly was the first to spot the fire. He stated in the *Door County Advocate* that he saw the illumination of flames from his room in the Texas, threw on his clothes, and sounded the alarm to awaken the rest of the crew. The fire apparently spread so quickly that most of the crew almost lost their lives. Some crew members, including the mate and steward, had rooms close to the fire and were forced to jump from the ship to the ice below wearing nothing but shirts. None of the crew, except for Captain Connelly, were able to save any of their possessions. Connelly supposedly saved the ships' papers, but later lost the books and most of the accounts in the excitement. The crew attempted to stop the fire from spreading by using the mooring line to head the vessel into the wind. Before they could accomplish this task, however, the line burned and the current carried *Joys* towards the canal office and government warehouse. When it looked like these buildings might ignite, the staff from the local lifesaving station joined the crew and attached a kedge anchor with a chain to the forward part of the hull. Eventually, the burning steambarge was towed back to its moorings where it burned to the waterline and sank.[36] A week later the vessel was surrendered to the insurance company as a total loss.[37] *Joys* was worth $15,000 and carried $14,000 worth of fire insurance.[38]

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[34] *Door County Advocate*, 24 December 1898.
[35] *Ibid.*
[36] *Ibid.*
[37] Ship Information and Data Record: *Joys*, The C. Patrick Labadie Collection, Alpena Public Library
[38] *Door County Advocate*, 31 December 1898.

Fraud?

Though history can seldom be used to accuse someone of a crime, historical hindsight reveals that the burning of the *Joys* may represent insurance fraud. Several details regarding the fire seem at odds. First, vessel owners participating in the lumber industry seem to have had a hard time turning a profit at this time. The peak of lumber production was reached in 1892. After this, production declined rapidly rendering a large portion of the steambarge fleet idle.[39] The excess transportation capacity certainly gave the *Joys*' owners a reason to look for an excuse to decommission the vessel. In February 1898, a vessel owner from Michigan published a letter in the *Door County Advocate* in which he expressed his concerns:

> The lumber carriers for several years past have been running at ruinously low rates on account of the strong competition of the vessel owners themselves. I think this could be very easily overcome, providing enough of the owners would get together to form a lumber carrying association to fix a minimum rate of freight, whereby it would show a reasonable return on the investment...[40]

Three months later the *Door County Advocate* mentioned again that the lumber trade was stagnating.[41] Yet again, in June, the *Advocate* mentions signs of trouble in the lumber industry:

> The small freighters are better off this season than the big fellows. The former can secure cargoes of lumber and wood where the others would find it both impracticable and unprofitable to do so under existing conditions.[42]

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[39] Rector, *Log Transportation in the Lake States Lumber Industry,* 215.
[40] *Door County Advocate*, 5 February 1898.
[41] *Door County Advocate*, 28 May 1898.
[42] *Door County Advocate*, 25 June 1898.

The difficulty the *Joys* was having obtaining cargoes was also discussed in this issue:

> The *Joys* being unable to obtain a stone cargo, or rather there being no present demand for this material at Grand Haven, Captain John A. Connolly on Monday took a ride across to Marinette on one of the passenger steamers and he was successful in corralling a load of lumber at that port. The crew of the Joys [sic] had mean time [sic] dressed the hull and upper works in a handsome coat of green and white paint, which very greatly adds to the appearance of the craft.[43]

In all, it seems to have been a time of financial hardship for the *Joys'* owners. The lumber industry was suffering and *Joys* was finding it difficult to obtain cargoes.

Other suspicious aspects of the fire are evident in the statements given by Captain Connelly to the *Door County Advocate*. First, Connelly allegedly was the first to notice the fire even though his quarters were forward and farthest away. He also claims that, as soon as he saw the fire, he immediately threw on his clothes and ran to give the alarm. Secondly, the fire spread so fast that most of the crew lost everything including money, jewelry, and clothing. Connelly, however, claimed that he had time to grab the ship's papers, books, and accounts, which were also located forward and farthest from the fire, but mysteriously were later lost in the excitement. Finally, the captain claimed that he had no idea whether or not the *Joys* carried any fire insurance; claiming that James Sheriffs, "looked after the chartering, insurance, and other details incidental to her management."[44] It seems odd that Connelly, who owned a fourth of the ship, did not know if *Joys* carried fire insurance.

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[43] *Door County Advocate*, 25 June 1898.
[44] *Door County Advocate*, 24 November 1898.

One other point warrants consideration: *Joys* was destroyed by fire on the last trip of the season right before undergoing an extensive and expensive scheduled rebuild at the dry dock in Sturgeon Bay.[45] It could be theorized that Connelly and Sheriffs wanted to burn *Joys* before they had to finance an expensive rebuild. Alternatively, the fire may have also been the result of the owners' lack of income. Financial hardship could have forced the owners to skimp on routine maintenance expenses, leaving the ship vulnerable to accidental fire.

Salvage

No matter what the cause of the fire, something still had to be done with the burned hull (See Figures 5.6 and 5.7). Brief inspections of the wreck showed that additional damage to the vessel was sustained because the weight of the machinery and boiler aft countered that of the cables and anchors forward and broke the vessel in two amidships. This caused the foremast to break and fall.[46] Later, when the hull was more thoroughly inspected, it was found to be only partially broken in two, likely at the upper bulkwarks. Despite the condition of the ship, Leathem and Smith, a local quarrying company, purchased the vessel for its engine and boiler.[47]

The Leathem and Smith Towing and Wrecking Company began the job of salvaging the remains in April 1899. The wrecking tug *Wright* successfully recovered *Joys'* boiler with the help of a scow and steam derrick. It was eventually placed in the

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[45] *Door County Democrat*, 24 November 1898.
[46] *Door County Advocate*, 31 December 1898.
[47] Creviere, *Wild Gales and Tattered Sails*, 263.

tug *Smith*; later it was purchased by the Charlevoix Lumber Company and placed in their tug.[48]

Raising the hull proved to be a more difficult task and involved passing two iron cables through holes cut in the hull planking, one cable forward and one aft, along the bottom. Then a lighter was sunk over the hull, the cables fastened to it, and the water pumped out. Once the vessel was raised off the bottom, it was secured to the tug and towed to the shipyard. According to the *Door County Advocate*, "The hull will be raised on the dock and if worth it will be rebuilt, if not, the propeller wheel, shaft, rudder, shoe, etc. will be removed and the hull disposed of in some manner."[49] By May, salvagers had decided that the keelson, frames, and planking were too badly burned to warrant rebuilding. Several tons of iron were removed from the bottom of the hull, then it was towed out to Dunlap Reef and beached.[50] Finally, after fourteen years of service, *Joys* was unceremoniously towed from Dunlap Reef and dropped off on the north side of the Pankratz Lumber Company's boomage, where it was scuttled and utilized as a breakwater.[51] There the ship once hailed as the "greyhound of the Lakes" found its final resting place.[52]

Vessel Identification

As mentioned, the identity of the Sunset Park Wreck was unknown during the archaeological investigations. Seven key factors seem to indicate that *Joys* is, however,

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[48] *Door County Advocate*, 22 April 1899; 4 April 1907.
[49] *Door County Advocate*, 29 April 1899.
[50] *Door County Advocate*, 6 May 1899.
[51] *Door County Advocate*, 13 May 1899.
[52] The last articles in the *Door County Advocate* pertaining to *Joys* state that the vessel was a "menace to navigation" and that it should be relocated; *Door County Advocate*, 20 June 1907; 10 June 1909; 14 July 1910.

the correct identity of the vessel. These include vessel type, the charred condition of the wreck, site location, length and beam, searches in shipwreck lists and databases, vessel parts and machinery noted as missing during the archaeological investigation in September 2005, and most significant, salvage holes located on the ship's hull below the waterline.[53] None of this circumstantial evidence alone confirms the identity of the vessel, but analysis reveals the following.

The Sunset Park Wreck is, quite clearly, a steambarge. Comparison of the Sunset Park Wreck's archaeological remains with the only other well documented steambarges, including *Cleveland, Francis Hinton, Adventure,* and *H.D. Coffinberry*, confirms this interpretation. Internal steambarge construction is quite similar to typical nineteenth century schooner construction except, of course, steambarges contained all of the necessary equipment and structural modifications, including boilers, engines, bilge keelsons, and triple or quadruple frames aft, to allow the vessels to be steam-propelled. Internal schooner construction is also characterized by heavy keelson assembly, double-frames, and longitudinally planked ceiling timbers. All of these features are present on the Sunset Park Wreck.

The most readily apparent attribute of the site was that the vessel is extensively burnt inside the hull. Most of the timbers inside and outside the wreck exhibited a charred black surface. In most places, the scantlings are narrowed due to burning and the

[53] For more information on the condition of the vessel during archaeological investigations, see Chapter 5; The salvage holes located on the ship below the waterline were noted by Principal Investigator Dr. Bradley Rodgers during the September 2005 archaeological examination; Bradley A. Rodgers (professor, East Carolina University), in discussion with the author, November 2006.

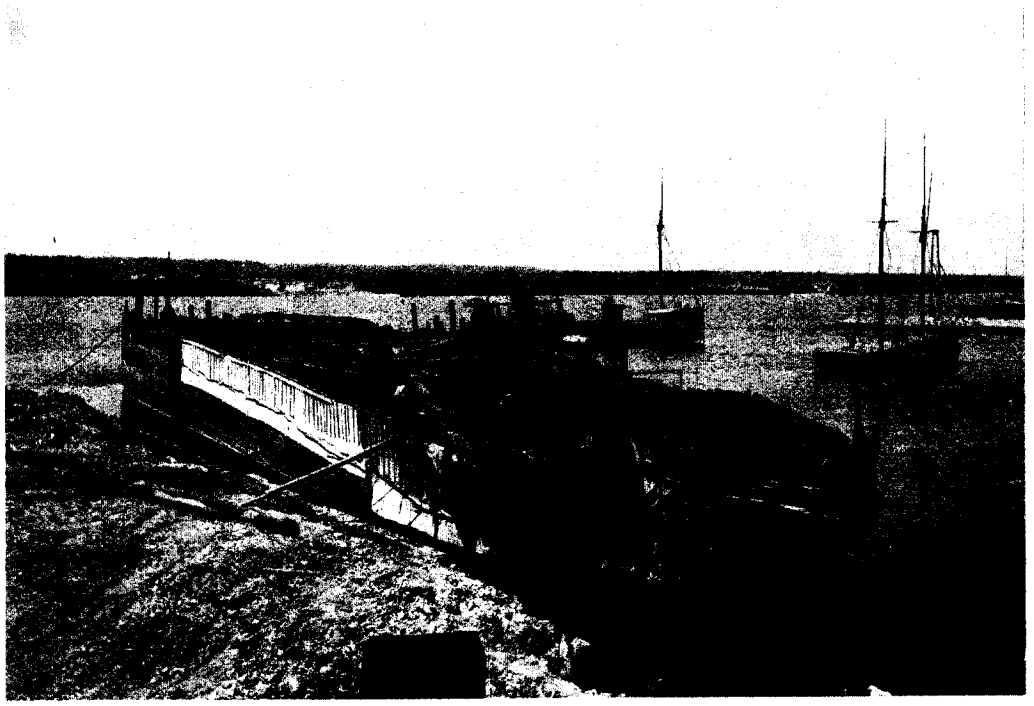

Figure 5.6: *Joys* could possibly be the vessel located directly behind *City of Glasgow*, pictured in the forefront. This is possible because *City of Glasgow* burned in 1907 and *Joys* would have been abandoned as a breakwater by then. Note the fore and aft configuration of the vessel, which suggests that it is a steambarge, and the burned condition of the hull (Courtesy of Jon Van Harpen).

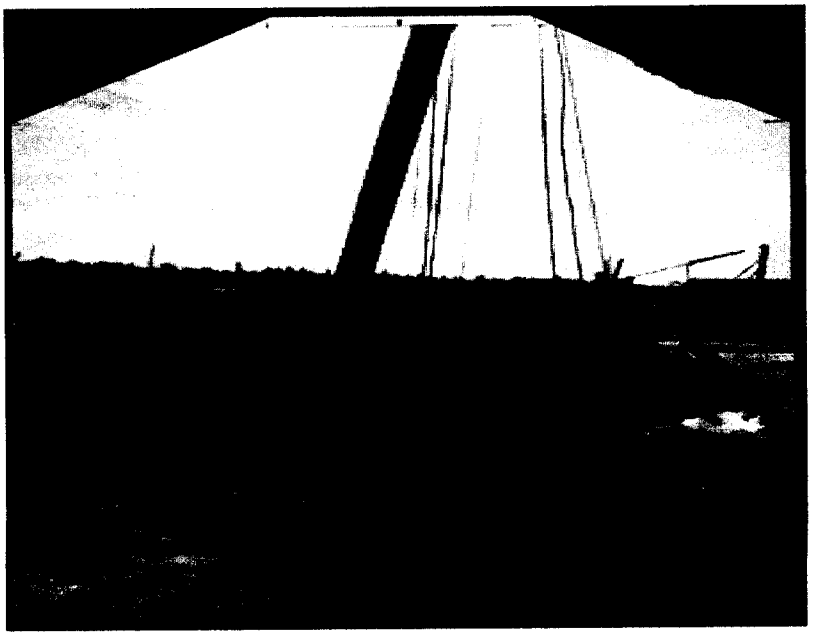

Figure 5.7: This photograph, with a view of the ship yard in the background, is suspected to be of *Joys* (Courtesy of the Door County Maritime Museum, Sturgeon Bay, Wisconsin).

ceiling is almost completely burned away. This is consistent with the *Joys*' historical record.

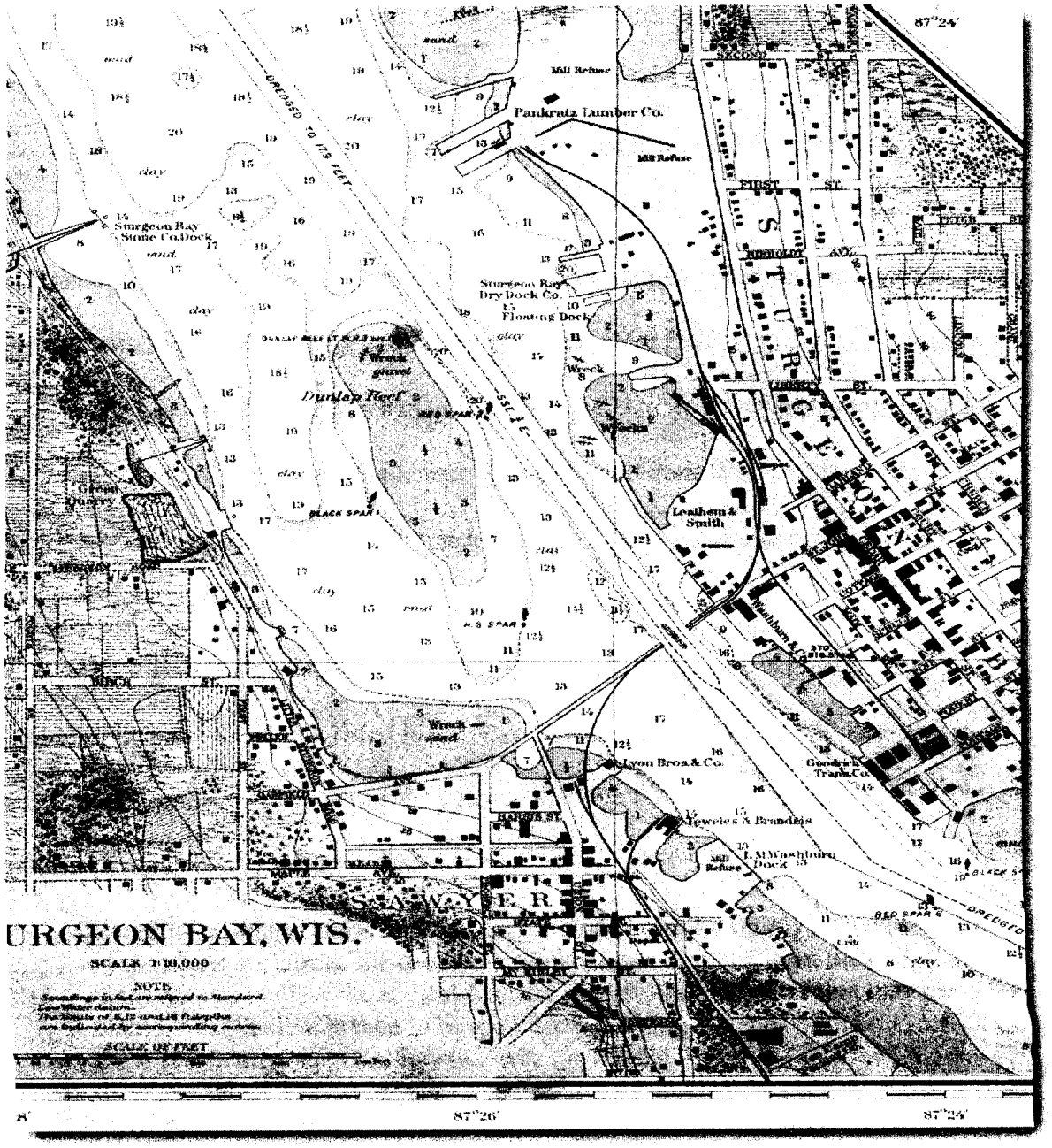

Figure 5.8: Map depicting the location of the Pankratz Lumber Company in 1925. Note the Sturgeon Bay Drydock Company located at the present day site of the Bay Shipbuilding Company (US War Department, 1925).

Presently, the wreck site is located in Sturgeon Bay approximately 500 feet offshore from Sunset Park and north of the Bay Shipbuilding Company. An 1899 article in the *Door County Advocate*, published four months after the *Joys* burned and sank, stated that, "The wreck of the steamer Joys [sic] has been utilized as a breakwater by the Pankratz Lumber Company for the protection of their boomage located on the north side of their dock."[54] In the 1890s, the area around the present day park was occupied by both the Pankratz Lumber Company and the Sturgeon Bay Dry Dock Company.[55] These two companies are clearly marked on a map issued by the U.S. War Department on May 27, 1925 (See Figure 5.8). Today, the location of the Sunset Park Wreck seems to coincide with the historical location given for the *Joys* in the *Door County Advocate*.

The overall length of the Sunset Park Wreck appears to be approximately 145 feet. At first glance, this appears to indicate that the *Joys* is the wrong identification for the vessel because the length listed in the *Joys'* enrollments is 131 feet. However, the length measurement system required by law at the time the *Joys* was constructed (1884) had been established in 1865. It stated:

> Length: The length at the tonnage deck is to be taken by tightly stretching a line on the upper surface of the deck, at such a parallel distance from the middle line of the ship as to clear the several hatchways and other obstacles that may present themselves; the line is then to be measured, marking the ends of the line on deck; these points are then to be squared in to the middle line of the ship, and the distances taken from them so squared in, to the inside of the plank at the bow and stern, deducting from this length what is due to the rake of the bow in the thickness of the deck, and what is due to the rake of the stern-timber in the

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[54] *Door County Advocate*, 13 May 1899.
[55] Nancy Emory, pers. comm., 20 November 2005.

> thickness of the deck, and also what is due to the rake of the stern-timber in one-third of the round of the beam.[56]

These rules were almost immediately simplified in *Rules Relative to the Construction of Lake Sail and Steam Vessels*, adopted in 1866 by the Board of Lake Underwriters. The 1866 version simplifies the law and states that length measurements are to be taken from the forward side of the stem to the after-side of the stern post on deck.[57] In essence, therefore, the legal length of the ship does not include the fantail overhang that would add approximately fifteen feet. The Sunset Park Wreck is approximately 130 feet by legal definition, but would actually be 145 feet overall . The only change made pertaining to length and tonnage measurements made after 1865 occurred on 5 August 1882, at which time an act was passed that allowed vessel owners deductions for crew space, storerooms, machinery, etc.[58]

Additional historical and archaeological research provides further support for the identification of the Sunset Park Wreck as Joys. Sources pertaining to wrecks located in Sturgeon Bay include Wild Gales and Tattered Sails, by Paul Creviere, Jr., and the online Wisconsin Historical Shipwreck Database. No vessel matching the dimensions and charred condition of the Sunset Park Wreck was discovered except for Joys. In addition, the Door County Advocate stated that the salvors intended to remove the boiler, propeller wheel, shaft, rudder, shoe, and other valuable vessel parts if Joys could not be rebuilt.

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[56] Manual of Admeasurement: The United States Law of 1864, with an Analysis of the Mode of Measuring Ships and Vessels (Boston: I.R. Butts and Company, 1865), 37.
[57] Board of Lake Underwriters, *Rules Relative to the Construction of Lake Sail and Steam Vessels* (Buffalo, NY: Matthews and Warren, 1866) 14.
[58] Walter M. Hirthe and Mary K. Hirthe, *Schooner Days in Door County* (Minneapolis: Voyager Press, 1986), xi.

None of these items were present on the Sunset Park site. Since the salvors determined that the vessel's structure, including the keelson, frames, and planking, were too badly burnt to warrant rebuilding, it is logical to assume that they stripped the machinery and equipment to help pay for the cost of raising the vessel and towing it to the shipyard.

The single most important piece of evidence that identifies the Sunset Park Wreck as *Joys* is evidence of salvage located on the vessel's hull. As mentioned above, the *Door County Advocate* reported that *Joys* was salvaged by the Leathem and Smith Towing and Wrecking Company in April 1899.[59] This involved cutting holes in the vessel's planking below the waterline, into which metal rings, called "thimbles", were inserted to support iron cables.[60] The cables were connected to a barge sunk over the hull and enough water was pumped out to raise *Joys* from the bottom.[61] After all archaeological work was completed on the Sunset Park Wreck, a detailed site plan was produced that revealed evidence of salvage. This evidence, as interpreted by the principal investigator, includes the presence of an iron cleave or "thimble" (circular object shown in the upper left hand corner of Figure 5.9) and a half circle hole, cut into the detached port side outer hull planking, into which the thimble would have been inserted (visible in the lower right hand corner of Figure 5.9).[62]

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[59] *Door County Advocate*, 22 April 1899; *Door County Advocate* 4 April 1907.
[60] Bradley A. Rodgers (professor, East Carolina University), in discussion with the author, November 2006.
[61] *Door County Advocate*, 29 April 1899.
[62] Remarkably, this is the first evidence of salvage East Carolina University's archaeologists have uncovered during investigations of nineteenth-century vessel classes on the Great Lakes; Bradley A. Rodgers (professor, East Carolina University), in discussion with the author, November 2006.

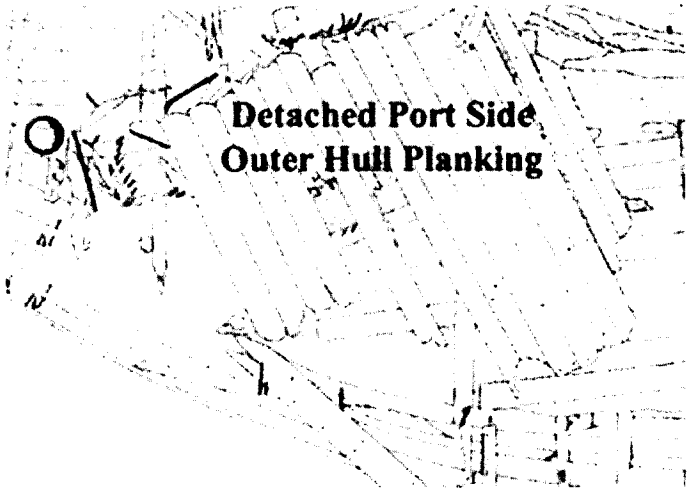

Figure 5.9: Evidence of salvage from the Sunset Park Wreck (Courtesy of the Program in Maritime Studies, East Carolina University).

Conclusion

Sturgeon Bay, Wisconsin has a rich history deeply steeped in maritime tradition. The opening of the Sturgeon Bay Ship Canal in 1880 assured that residents of Sturgeon Bay would have extensive contact with all types of Great Lakes vessels. More vessel traffic meant more shipwrecks and intentional abandonments, ensuring that Sturgeon Bay would play host to wide variety of nineteenth-century Great Lakes vessel types; one of these ill fated vessels was the *Joys*.

Although *Joys* proved to be one of the most successful steambarges on record, it succumbed to the nemesis of many wooden Great Lakes steam vessels, fire.[63] After fourteen years of faithful service in both the lumber and stone industries, *Joys* was reduced to a breakwater for the Pankranz Lumber Company. The destruction of *Joys* was

[63] Bradley A. Rodgers, *The Bones of a Bulk Carrier: The History and Archaeology of the Wooden Bulk Carrier/Stone Barge* City of Glasgow (Greenville, NC: East Carolina University, 2003), 12; Claire P. Dappert, *Oaken Whale with a Cast Iron Tail: The Single-Decked Wooden Bulk Carrier* Monohansett (master's thesis, East Carolina University, 2005), 60-62.

unfortunate for its owners but became an archaeological boon for ECU's researchers, allowing them a look into one of the Lakes' most undocumented vessel type. The wreck's vessel type, location, condition and dimensions, as well as the absence of other historical canidates, the absence of the propeller wheel, shaft, rudder, and keel shoe, and evidence of salvage combine to implicate the *Joys* as the logical choice for the identity of the Sunset Park Wreck.

CHAPTER 6

CONCLUSION

The Missing Link Between Sail and Steam: Steambarges and the Joys *of Door County, Wisconsin* uses both history and underwater archaeology to demonstrate how Great Lakes shipwrights transitioned the design of cargo sailing vessels to steam. During the eighteenth and early nineteenth centuries, before the introduction of the steambarge, merchants in the business of transporting bulk commodities had no other transportation choice than sail powered vessels. Schooners, however, depended on the wind, which could at times be unpredictable and unreliable. Loading and unloading bulk cargo on sailing vessels by hand was also an expensive and time consuming task. This was the situation when steam technology made its debut on the Great Lakes.

The incorporation of self-propelled steam-powered vessels on the Lakes in 1816 did not immediately threaten schooners' economic dominion over the bulk cargo transportation industry in the Great Lakes economy.[1] Competition between schooners and steamers was minimal for two reasons: cargo capacity and expense. The cost of operating a paddle-wheel steamboat made it impossible for owners to make a profit transporting relatively low value bulk commodities such as grain, coal, and lumber. The large inefficient low-pressure engines, boilers, and fuel source took up too much valuable cargo space.[2] In addition, any cargo transported by steamers could not be loaded through convenient deck hatches, such as those found on schooners. Loading bulk cargo, or any

[1] William N. Still, Gordon P. Watts, and Bradley Rodgers, "Steam Navigation and the United States," in *The Advent of Steam: The Merchant Ship Before 1900*, ed. Robert Gardiner and Dr. Basil Greenhill (Edison, NJ: Chartwell Books, Inc., 1993), 69.
[2] *Ibid.*

cargo at all on a paddle-wheeler, was an expensive and time consuming process that required several crew members and dock workers using wheel-barrows.[3] This was the situation on the Lakes until the introduction of new transportation technology in 1841. This was the first propeller, *Vandalia*. The incorporation of propeller technology in *Vandalia's* design freed up valuable cargo space and, for the first time, enabled a steam-powered vessel to pass from the Upper Lakes to the Lower Lakes via the Welland Canal.[4]

It seems likely that the success and future potential marketability of *Vandalia's* design planted the seed for the development of steambarges. The success of propellers on the Great Lakes encouraged shipwrights to begin experimenting with a new vessel type that could combine the carrying capacity of sail powered ships with the speed and reliability of steam ships. The result was the steambarge, the first cargo vessel type that bridged the gap between sail and steam.

The first steambarge to sail the Great Lakes was the *Petrel* (1848).[5] *Petrel* was followed by a few other steambarges including, *Pacific* (1853), *Illinois* (1853), *Reciprocity* (1853), *Ross* (1854), *Coaster* (1854), and *Cleveland* (1860).[6] Although these ships were all ideally suited for the lumber trade, there was too little demand for lumber during the 1840s and 1850s to make them profitable. Steambarge owners were forced to mitigate financial losses by converting the vessels into package freighters,

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[3] Mark L. Thompson, *Steamboats and Sailors of the Great Lakes* (Detroit: Wayne State University Press, 1991), 31.
[4] James P. Barry, *Ships of the Great Lakes: 300 Years of Navigation*, rev. ed. (1973; repr., Holt, MI: Thunder Bay Press, 1973), 52.
[5] *Detroit Free Press*, 15 May 1873; Ship Information and Data Record: *Petrel*, The C. Patrick Labadie Collection, Alpena Public Library.
[6] Comprehensive Steambarge Data Record: *Steambarges, The* C. Patrick Labadie Collection, Alpena Public Library.

passenger/package freight propellers, or employ the vessels in carrying more cost effective bulk cargoes such as coal, grain, stone, or ice.[7]

During the 1870s and 1880s, post-Civil War reconstruction and the resumption of westward migration created an almost insatiable demand for building materials in America. As a result, white pine fever swept the Lakes. White pine, or *Pinus strobus*, was highly demanded as a building material because it is light, strong, durable, and takes and retains paint well.[8] Lumbermen struggled to keep pace with the demand while transporting timber products cheaply and effectively. The problem of transportation was taken very seriously because mismanagement or bad luck in this area of business often caused mill owners to go into debt or bankruptcy.[9] "Regardless of time, place, or type of operation," wrote William Rector, "the transportation of logs was a major pivot point around which the entire manufacturing process was forced to revolve."[10] In fact, a study of Great Lakes lumbering analyzed the cost of transportation between 1870 and 1901 and found that log transportation accounted for an incredible fifty-two to seventy-three percent of the total cost of logs.[11] As a result, steambarges were re-introduced to the Great Lakes lumbering industry with the *Trader* (1865).[12]

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[7] *Cleveland* is a prime example of the typical career of an early Great Lake steambarge. For more information on this vessel, see Rodgers and others, *From Quarry to Quay: Shipwrecks of McCracken's Cove, the 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site* (Greenville, NC: East Carolina University, 2006), 25-27.

[8] Gray, "It Grows in Trees: Wisconsin Lumber Industry, Part I," *Wisconsin's Underwater Heritage* 10 (2000): 9.

[9] William Gerald Rector, *Log Transportation in the Lake States Lumber Industry, 1840-1918: The Movement of Logs and Its Relationship to Land Settlement, Waterway Development, Railroad Construction, Lumber Production and Prices* (Glendale, CA: Arthur H. Clark Company, 1953), 15-16.

[10] *Ibid.*, 20.

[11] *Ibid.*, 23.

[12] C. Patrick Labadie, *Submerged Cultural Resources Study: Pictured Rocks National Lakeshore* (Santa Fe: Southwest Cultural Resources Center, 1989), 26.

It was the utilization of steambarges in conjunction with the Consort System, however, that made lumber transportation cost effective. In 1861 Mr. Noyes (no first name given), a ship owner from Buffalo, engaged in the lumber trade and decided to convert two side-wheelers into barges that could be towed by tug boats. These idle and rotting vessels, named *Empire* and *Sultana*, were purchased at a small fraction of their original value and modified with minimal effort.[13] Noyes had the tug *Reindeer* tow these barges up the Saginaw River to load pine lumber. The barges were found to have an enormous carrying capacity; five times that of contemporary propellers![14] Thus the Consort System was born, resulting in sharply decreased shipping costs for lumber and bulk commodities.[15]

The Consort System proved an ingenious solution to the lumber shortage problem, but it was not until the introduction of the steambarge that the system reached its full potential and capacity. Steambarges, sometimes referred to as "lumber hookers" or "steam-schooners" on the West coast, proved to be a profitable solution, and were designed especially with the particular needs of the lumber industry in mind.[16] Steambarges could tow up to five or six schooners at consistent speeds of six to eight

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[13] The conversion of the *Empire* and the *Sultana* was followed by the conversion of the *St. Lawrence* in 1862; J.B. Mansfield, *History of the Great Lakes*, vol. 1, reprint edition (1899; Cleveland: Freshwater Press, 1972), 403.

[14]Daniel J. Lenihan, ed., *Submerged Cultural Resources Study: Shipwrecks of Isle Royale National Park* (Santa Fe: Southwest Cultural Resources Center, 1994), 56.

[15] Mansfield, *History of the Great Lakes*, 414 and 520; Lenihan, *Isle Royale*, 56.

[16] Bradley R. Rodgers, "Vernacular Craft of the North American Great Lakes: Twenty Years Research in Retrospective," (unpublished article, Program in Maritime Studies, East Carolina University, 2006), 13-14.; C. Pat Labadie and Charles E. Herdendorf, *Wreck of the Steam Barge Adventure: An Archaeological Investigation in Lake Erie at Kelley's Island, Ohio* (Peachman: Great Lakes Historical Society, 2004), 8.

miles an hour.[17] This helped merchants maintain their bottom line, because the more cargo a ship owner could move in a season the more profit he could make.

The analysis and comparison of the *Joys'* history with data gathered during the Sunset Park Wreck site investigations is important for three different reasons: it provides archaeologists with an opportunity to observe internal construction of a typical Great Lakes steambarge and also conclusively identifies the wreck as the *Joys*. This analysis also provides archaeologists with the tools to draw both historical and archaeological connections between sail and steam powered bulk cargo transportation.

The examination of steambarges in the archaeological record, such as the Sunset Park Wreck, *Cleveland*, *H.D. Coffinberry*, *Adventure*, *Michael Groh*, and *Francis Hinton* help establish a clear lineage between schooners and steambarges. Analysis of these wreck sites supports the idea that the internal construction design of steambarges establishes structural links between sail and steam. These include a heavy keelson assembly, double frames, longitudinally planked ceiling timbers and occasionally, centerboards. In fact, the only difference between the two vessel types seems to be the addition of self-propulsion machinery, including boilers and engines, as well as the associated heavy aft framing and bilge keelsons in steambarges.[18] All of these elements are present on the Sunset Park Wreck, which is likely the *Joys*.

Joys was a successful Great Lakes steambarge that was praised as the "greyhound of the Lakes" by *Door County Advocate* reporters who saw the vessel pass through the

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[17] Labadie, *Pictured Rocks*, 22.
[18] Rodgers, "Vernacular Craft", 15-16.

Sturgeon Bay Ship Canal first every season.[19] After a few years of financial struggle, the vessel's fourteen year career ended when it burned to the waterline in the Sturgeon Bay Canal. Comparison of *Joys'* history with archaeological data collected during the investigation of the Sunset Park Wreck site established an identity for the vessel by uncovering commonalities between the historical record and archaeological data, which were then identified on the Sunset Park site plan. Because no evidence of the vessel's name was discovered at the Sunset Park Wreck site, this is the *only* way possible to confirm the identity of the wreck. These include vessel type, the charred condition of the vessel, site location, length and beam, searches in shipwreck lists and databases, vessel parts and machinery noted as missing during the archaeological investigation in September 2005, and rectangular salvage holes located on the ships hull below the waterline.[20] These salvage holes are by far the most significant piece of archaeological data tying the Sunset Park Wreck with *Joys*.

The inclusion of this examination into wider scope studies of Great Lakes vessel design evolution answers questions about the impetus for technological change, exchange, and innovation on the Lakes. Although Great Lakes shipwrights were constantly experimenting and tweaking the designs of vessels to make them perform best in the Lakes' environment, steambarges were arguably their finest innovation. Through these vessels, shipwrights successfully transitioned bulk cargo vessels into the steam age.

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[19] *Door County Advocate*, 9 September 1893.

[20] For more information on the condition of the vessel during archaeological investigations, see chapter 5. The salvage holes located on the ship below the waterline were noted by Principal Investigator Dr. Bradley Rodgers during the September 2005 archaeological examination. Bradley A. Rodgers (professor, East Carolina University), in discussion with the author, November 2006.

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