

Jefferson J. Gray. FUELING THE FIRE: AN UNDERWATER ARCHAEOLOGICAL INVESTIGATION OF THE CLAFLIN POINT WRECK AND LITTLE STURGEON, WISCONSIN. (Under the direction of Dr. Bradley A. Rodgers) Department of History, November 1998.

A vessel's skeleton rests a few hundred feet offshore of the Claflin Memorial Park in Little Sturgeon, Wisconsin. An imaginative mind is able to envision these remains as a once lively steamship. After an initial survey in 1994, more than twenty years after its discovery and nearly a century after its sinking, Wisconsin state archaeologists identified the vessel's remains as that of a wooden-hulled steam propeller that had been converted to a barge.

In September of 1995, students and staff from East Carolina University's Program in Maritime History and Nautical Archaeology conducted a Field Semester course at the site. Aided by SHSW staff, the project was designed as a detailed investigation and documentation of the Claflin Point Wreck. The project's scope has since expanded beyond an exclusive focus on the wreck. The archaeological research generated historical questions. How did the wrecked vessel fit into or affect the economic history of Little Sturgeon? How was this particular vessel, and other similar vessels, used in Great Lakes trade?

The wreck's identity has eluded investigators. However, aided by archaeological and historical research, this site, dubbed the Claflin Point Wreck, offers a glimpse into the fast-paced industrial world of Great Lakes communities during the late nineteenth century. The vessel wrecked at Claflin Point and others like it, were indispensable workhorses in supporting the expansion and development of the region.

The development of lumber, lime, and ice industries put Little Sturgeon on the map, and their demise nearly erased it. Reminders of Little Sturgeon's industrial heritage surround the wreck. During the latter half of the nineteenth century, these industries temporarily transformed Little Sturgeon from an isolated outpost to a center of commercial activity, reliant upon maritime trade for moving products to market. These industries depended upon the village's protected harbor, and as many as six vessels cleared Little Sturgeon dock in a single day. The archaeological site resting offshore of Claflin Memorial Park reflects Little Sturgeon's industrial past and its connection to regional development.

The research design of this project included historical and archaeological analysis and interpretation of the Claflin Point Wreck and the surrounding area. Archaeological methods were used to record and analyze the physical remains of the Claflin Point Wreck and to reveal construction techniques, hull features, and vessel type as well as the circumstances of its loss. Historical research, on the other hand, provided a backdrop to explain how the local industries fit into the larger economic context of the region in the late nineteenth century.

FUELING THE FIRE:
AN UNDERWATER ARCHAEOLOGICAL INVESTIGATION
OF
THE CLAFLIN POINT WRECK
IN
LITTLE STURGEON, WISCONSIN

A Thesis
Presented to
the Faculty of the Department of History
East Carolina University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in History

by
Jefferson J. Gray
November 1998

Acknowledgements

This report is the result of a tremendous team effort stretching from Wisconsin to North Carolina. I would like to thank Dr. Bradley Rodgers for his guidance both in research and review that truly paved the way to completion. Other East Carolina University faculty, Dr. Donald Parkerson and Dr. Timothy Runyan, were also instrumental in the development and completion of this project.

Wisconsin's State Underwater Archaeologist David Cooper, together with Dr. Rodgers, served as the principal advisors and mentors. Their support made the project a reality. John Jensen also saw the report through its many drafts and contributed many hours to improving the final product.

I would like to thank the field crew whose hard work during the archaeological investigation of the Claflin Point Wreck provided the data used in this study. The contributions of David Beard, Frank Cantelas, Hans Van Tilburg, Nathan Henry, and Wendy Coble are all greatly appreciated. A special thank you is in order for ECU Diving Safety Officer Steven Sellers whose expertise ensured safe and smooth diving operations.

Other individuals who were helpful in this project were Russ Lietz who assisted in researching the *Door County Advocate*, and Allen Brown whose professional videography was utilized in documenting the wreck. Additional appreciation goes to Filippo Ronca who helped bridge the gap between North Carolina and Wisconsin.

This project was made possible through the combined efforts of the State Historical Society of Wisconsin and East Carolina University's Program in Maritime History and Nautical Archaeology. The University of Wisconsin Sea Grant Institute, a generous supporter of Wisconsin underwater archaeology, provided the research vessel *Orion*, survey equipment, and a support van.

Thank you to family, friends, and colleagues for their advice and assistance. Most importantly, I am deeply indebted to Trina Haag. Her editing, encouragement, and patience made the completion of this project possible.

Table of Contents

List of Figures	vii
Chapter I Introduction	1
Chapter II Opening the Way for Passengers and Packages	13
Opening the Door.....	16
Separated by Land, Connected by Water.....	18
More Water—Creating Geography.....	20
Smoke on the Water.....	22
Types of Steam Vessels.....	24
Land Propulsion.....	25
Floating Palaces	26
The Marine Propulsion Revolution.....	28
People and Packages.....	31
Chapter III An Industrial Outpost: Little Sturgeon, Wisconsin	39
It Grows in Trees: Little Sturgeon's Lumber Industry.....	40
Pinus Magnifica.....	42
A Felled Forest in the Prairie—Chicago.....	47
Consumption.....	49
A Peninsula of Wood.....	50
Logs into Ships.....	52
Timmmber.....	57

Burning Stone: Little Sturgeon's Lime Industry.....	59
Burning Stone.....	61
A little Lime with your Lumber?.....	63
Up in Smoke.....	66
Capturing the Winter: Little Sturgeon's Ice Harvest.....	68
The Early Commercial Ice Harvests.....	69
Porkopolis.....	71
Gim'me a Cold One.....	73
Frozen Sewage.....	76
Out of the City and into the Country.....	78
An Industry on Thin Ice.....	84
Chapter IV Little Sturgeon's Submerged History.....	89
Project Genesis.....	90
Project Location and Environment.....	93
Methodology/Field Work.....	94
Site Description.....	99
The Docks.....	99
The Claflin Point Wreck.....	101
Interpretations.....	109
The Wreck.....	109
The Sinking.....	115
Recommendations.....	117

The Lime Kilns.....	117
The Docks.....	117
The Claflin Point Wreck.....	118
Conclusion.....	119
Bibliography.....	122

List of Figures

1	Map of the Door Peninsula and Little Sturgeon Bay	2
2	The Great Lakes.....	14
3	The <i>Vandalia</i>	29
4	Package Propeller <i>Alaska</i>	34
5	Passenger Propeller <i>Japan</i>	34
6	Passenger Propeller <i>Depere</i>	37
7	The <i>F.B. Gardner</i>	53
8	Lime advertisement from the <i>Door County Advocate</i>	65
9	An early advertisement for lager beer	75
10	An icehouse being filled	80
11	Horse-drawn scrapers removing snow	81
12	Advertisement for Piper Ice Co.	86
13	<i>Alaska</i> after being converted to a barge	90
14	Claflin Point Wreck Site Plan	95
15	Claflin Point Main Site Plan	97
16	Plan of Starboard Fantail Section	103
17	Cross-section of Hull 70-feet Aft of Bow	104
18	Plan of Port Hull Section	106
19	Plan of Stern Assemblage	108
20	Repositioned and Justified Faired Hull Lines	110
21	Hull Shape Plotted from Faired Lines	111

22	Various Cross-sections of Great Lakes Vessels	112
23	Passenger Propeller <i>Puritan</i>	114

Chapter I Introduction

Little Sturgeon, Wisconsin, a small village located on the Green Bay side of Door County, leads a quiet existence as an intimate vacation spot. Nestled on a bay that bears its name, Little Sturgeon has a drastically different appearance than it did a century ago. In those days the ring of caulker's mallets and the hum of whirling saws echoed from a bustling shipyard and sawmill. In the winter months, huge crews scoured the frozen bay extracting commercial ice, while loggers worked in nearby forests. Quaint cottages now stand where mammoth ice sheds and the lumber mill once operated. Today, the bay is silent, void of the industrial activities that defined its colorful past. Although time has silenced the village's industries, signs of its history still remain visible to the curious eye.

On a point in Little Sturgeon Bay, a small granite monument commemorates Increase Claflin, the Door Peninsula's first white settler, and marks the site where he lived in 1835. A short distance away, along the curving shore of Green Bay, the rusted stacks of a timeworn lime kiln stand over 40 feet high. Camouflaged by thick overgrowth, the masonry foundation of the structure stretches 75 feet. Just offshore from Claflin's marker, other signs of the area's past are scattered underwater. Hidden beneath the surface lie tons of quarried limestone, logs, timbers, slab wood, and edging, a giant 400-foot rock crib pier, and other remnants of the industrial village that once prospered.

The nineteenth-century lumber, lime, and ice industries provided the foundation for Little Sturgeon's prosperity. Much like the fur trade, these endeavors depended on the area's rich natural resources and the ability to transport them across the Great Lakes to market. The seemingly endless forests of virgin timber, the mammoth bluffs of high-grade limestone, and the waters of Little Sturgeon Bay provided the raw materials for the above-named industries.

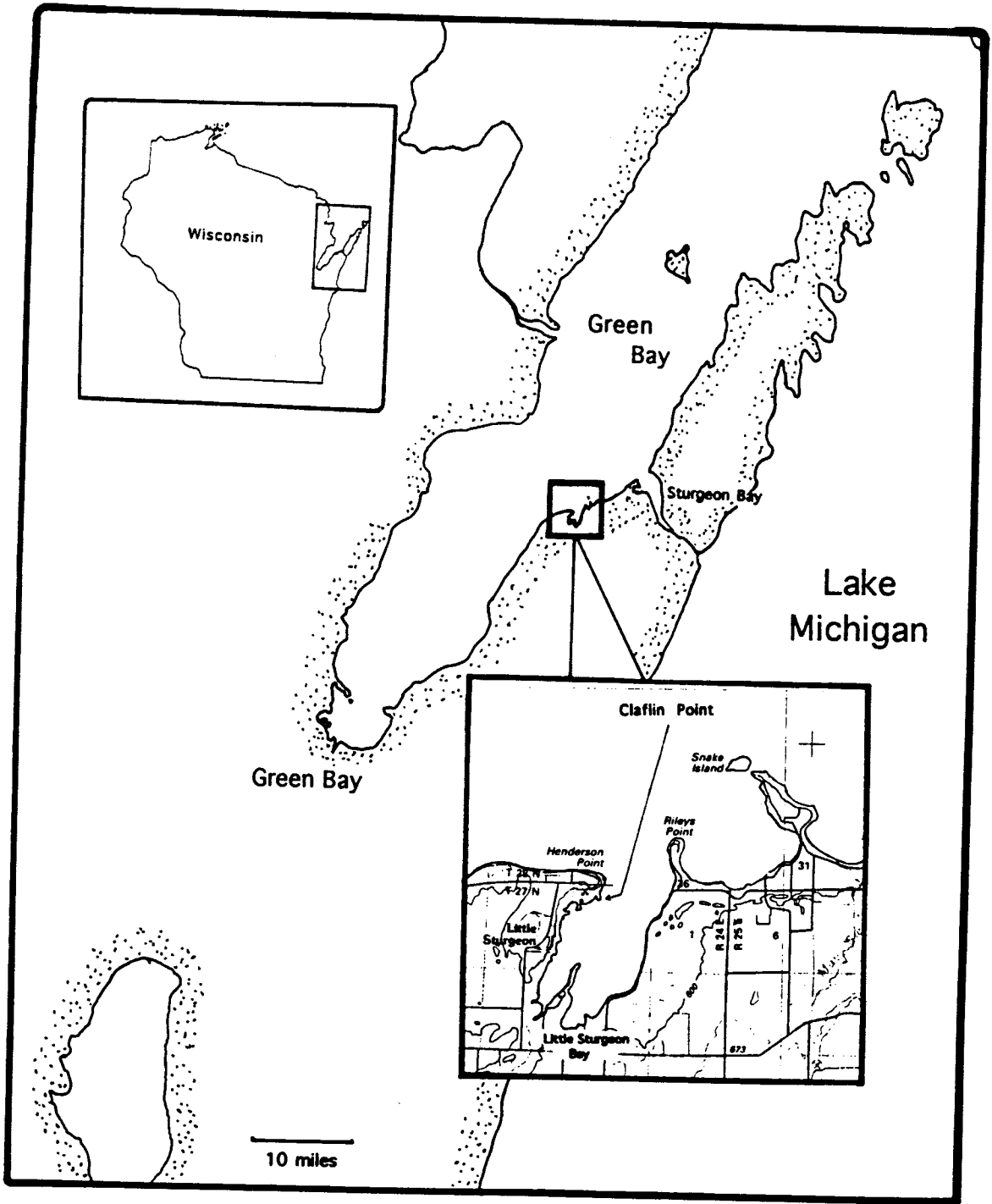


Figure 1: Map of the Door Peninsula and Little Sturgeon Bay (Rodgers, The 1995 Predisurbance Wreck Site Investigation at Clafin Point, Little Sturgeon Bay, Wisconsin, 4).

Between the fingers of the completely submerged rock-crib pier hides another clue to Little Sturgeon's past. The wreckage of a wooden ship rests on the sandy bottom in 5 to 15 feet of water. The remains of this steam propeller, turned barge, are partially buried under limestone blocks similar to those in the pier. Like the kilns, this vessel reflects a nearly forgotten industrial Little Sturgeon.

In 1835, Increase Claflin established a trading post at what later became Little Sturgeon. Although he only stayed a short time, others followed his lead and set up homesteads on the protected bay. Over the next several decades, modest pursuits in fur trading, fishing, and farming characterized the village's economy. However, the arrival of Freeland Gardner in 1854 transformed the sleepy village into a prosperous commercial center. In time, Little Sturgeon challenged its rival to the north for "Sturgeon Bay was the county seat, but Little Sturgeon had the business."¹ By 1862 Little Sturgeon had developed into such a bustling center of activity that the regional newspaper, the *Door County Advocate*, considered making the community its headquarters in 1862.² Yet, a half-century after Gardener's arrival, Little Sturgeon's thriving economy came to a complete halt. A combination of economic, environmental, and technological factors contributed to this decline. This thesis turns to the historical and archaeological record to document and explain the brief period of industrial success in Little Sturgeon.

Increase Claflin initiated settlement in Little Sturgeon, but Freeland Gardner's enterprises made the village known. In 1856, Gardner established one of the county's earliest and largest sawmill operations. Gardner's mill grew steadily cutting and shipping almost 60 million board feet annually.³ Shortly after the Civil War, Gardner introduced

¹ Hjalmar R. Holand, History of Door County, Wisconsin The County Beautiful (Chicago: S.J. Clarke Publishing Co., 1917), 431.

² Sturgeon Bay was picked to host the paper's office. *Ibid.*

³ *Ibid.*, 156.

shipbuilding in Little Sturgeon. The shipyard was located adjacent to the mill for easy transportation of timbers. The yard built or rebuilt nearly a dozen vessels during its nine-year tenure and was Door County's largest shipyard before the turn of the century.⁴

Harbors, piers, breakwaters, building and bridge foundations required quarried stone for construction, while railroad bed, highway, and street construction called for enormous amounts of crushed rock.⁵ With limestone deposits up to 800-feet thick, Door County's geology piqued the interest of early surveyors and settlers. Limestone extraction became a significant part of the area's economy. First quarried in the 1830s, ships carried the high-quality stone from Door County to cities around all five Great Lakes. Most of Little Sturgeon's limestone, however, was processed into quicklime, an essential component of mortar before the adaptation of portland cement. In 1868 a patent lime kiln was constructed on a bluff in Little Sturgeon to supply the city of Green Bay and the west shore. By 1874, the expanded facilities supplied Chicago and other distant ports. Over the next few years production peaked as crews worked around the clock, yielding 160 barrels of lime a day.⁶

As late as the 1850s, refrigeration machinery was nonexistent. Ice to prevent food spoilage remained a luxury for the majority of the population. However, the development of large-scale commercial ice harvesting in the North brought ice to the masses. By 1880, some communities' ice expenditure equaled fuel expenditure.⁷ In the final quarter of the

⁴ Mary K. and Walter M. Hirthe, Schooner Days in Door County (Minneapolis: Voyageur Press, 1986), 15.

⁵ Danny Aerts, Report on the Leathem & Smith Rock Quarry Site, 1990-1993 (Unpublished Archaeological Report distributed by the Wisconsin Underwater Archaeology Association, 1994), 4.

⁶ Randall Rohe, "Ghost of the Bayshore: Little Sturgeon Part II," Voyageur, Vol. 14, no. 1, (1997), 37.

⁷ Lee E. Lawrence, The Wisconsin Ice Trade (Madison: State Historical Society of Wisconsin, 1980), 5.

nineteenth century, rampant pollution forced Chicago and Milwaukee to pass ordinances limiting the harvest of "city ice." These restrictions, coupled with the reliable harvests of the northland, pushed the natural ice industry northward. The operations in Brown and Door Counties, made possible by marine transport, marked the northern boundary of Chicago and Milwaukee's ice hinterland. Introduced in 1876, ice harvesting became the dominant, and final, industry to operate in Little Sturgeon. Peaking in the mid-1880s, the operation employed well over 100 workers to cut, store, and ship over 100,000 tons of ice in a single year.⁸

With the departure of the lumber industry, the *Door County Advocate* prematurely predicted Little Sturgeon's demise in the early 1880s:

The mill buildings all have the appearance of neglect and unless something is done to revive some old time life into the place, it will go where the woodbine twineth in a few years. Nothing but a heap of stone and a few pieces of iron remain to mark the site of the mill, which was destroyed by a fire five years ago this winter; and in a short time this old familiar land mark will be entirely obliterated.⁹

Yet, by exploiting different local resources, the village managed to temporarily avoid the fate of many lumber boom towns.¹⁰

Little Sturgeon soon rejuvenated, with lime, ice, agriculture, and fishing all thriving, and the village reached its economic peak. The local population grew to nearly 800 in 1885 (albeit a large portion was seasonal). However, despite efforts to diversify

⁸ Rohe, "Ghost of the Bayshore: Little Sturgeon Part II," 34.

⁹ *The Door County Advocate*, 22 March 1882.

¹⁰ See Randall Rohe, "Star Lake: From Boom Town to Ghost Town," in Seventeenth Annual Meeting of Forest History Association of Wisconsin, (1992). Rohe examines how towns founded by lumber companies depleted local resources and were forced to relocate. He explores how places like McKenna, Wisconsin literally became McKenna, Washington. He details the boom and bust of Starr Lake, Wisconsin. The town grew to a population of 400, and the company erected 85 houses for its employees, which were never painted. Ten years later, there was only an open field where the town stood. For more information on lumber towns see Jeremy W. Kilar, Michigan Lumber Towns: Lumbermen and Laborers in Saginaw, Bay City, and Muskegon, 1870-1905 (Detroit: Wayne State University Press, 1990).

Little Sturgeon's economy, the boom could not last, and the *Advocates* prophecy came true. By the new century, all industrial activity vanished from Little Sturgeon. According to the 1901-02 *Wisconsin State Gazetteer*, Little Sturgeon's population fell to under 50. Charles Jenquin's General Store and Cheese Factory, along with a saloon comprised the village's only business. By 1907, the *Gazetteer* listed no businesses. Hjalmar Holand wrote in his 1913 history of Door County:

Scarcely a bolt remains of all the equipment that once made Little Sturgeon famous as the busiest place on the peninsula. The peace and quiet of an obscure summer resort has descended upon it, and it lies almost as tranquil and primal as the day when Increase Claflin first settled on it in 1835.¹¹

The lumbering industry started Little Sturgeon's flash-in-the-pan existence as a industrial center, which was further stoked by the lime and ice industries. After only a half-century of operations, the village closed this chapter of its history. It had evolved from a settlement to an industrial outpost and with the disappearance of the ice industry, it slipped back into a slumbering village.

Individually, nineteenth-century Little Sturgeon and other comparable communities, may be over-looked as historically insignificant. However, collectively they played a vital role in the Midwest's development, particularly in rapidly growing urban areas. Outlying communities supplied a crucial source of natural materials for the urban areas of the Great Lakes that could not supply for themselves. The demands of cities and industry for lumber, lime, and ice drew Little Sturgeon into a regional network where urban and rural economies intertwined.

Historically, Little Sturgeon's industrial fate seemed predetermined by the vagaries of economics, invention, and resource depletion. Yet as a port town, Little Sturgeon also has a maritime history that is linked to, but also separate from, its purely industrial history.

¹¹ Holand, *History of Door County*, 433.

This maritime history is perhaps most easily understood through the archaeological examination of Little Sturgeon's submerged remains.

The Claflin Point Wreck, tentatively identified as a passenger/package propeller converted into a barge, is an excellent source of information about Little Sturgeon's maritime past. The wreck serves historians two-fold. First, the wreck's location at the submerged pier, surrounded by industrial remains, codifies the village's reliance upon the Lakes transportation system. From Native Americans to fur traders, and from nineteenth-century industries to modern tourism, the Great Lakes have remained central to the local economy. To provide a more complete understanding of Little Sturgeon's past, this thesis will combine archaeological evaluation and historical research. The two methodologies compliment one another, each filling in where the other leaves off. Little Sturgeon's industrial history lays the groundwork for interpreting the Claflin Point Wreck, and the wreck and wharf in which it lies contributes to the historical interpretation of the area. Up to this point, historical sources relating to Little Sturgeon lack either the detail or historical context to fully understand the industrial abandonment of Little Sturgeon. By combining the information of secondary historical sources, with primary historical sources and archaeological information, a better understanding of Little Sturgeon history has resulted.

Besides serving as a symbol of the region's historical dependency upon maritime trade, the Claflin Point Wreck also provides a wealth of archaeological information. The wreck reveals features of the wooden-passenger/package propeller's construction, a vessel class not well represented in the archaeological record. As population and industry grew on the Great Lakes, these vessels provided expedient service for passengers and freight where there were no through-rail connections or developed roads.

Built along similar lines, passenger and package propellers differed mainly in their cabin arrangement; passenger propellers had cabins constructed on their upper decks, while freight propellers did not. Many of these vessels changed between passenger and package

propellers with the addition or removal of cabins.¹² Since the Claflin Point Wreck had its upper works removed when converted to a barge, it could have been either or both. Therefore, this thesis refers to it as a passenger/package propeller based on its hull construction discussed in Chapter IV. Its conversion to a barge further illustrates the adaptability of a wooden vessel, which could be refitted to accommodate changes in cargo to extend its productive life. The Claflin Point Wreck in Little Sturgeon Bay represents two different classes of Great Lakes vessels--the passenger/package propeller and the humble work barge.

The original intent of this study was to document and interpret, archaeologically and historically, the remains of the Claflin Point Wreck. The thesis generated from research was expected to center upon the archaeological interpretation of this historic wooden vessel, revealing the vessel type and possibly its historic identity. A wreck's name unlocks the historical accounts of a particular vessel. However, the identity of this vessel remains a mystery. But while it cannot yet be named, its hull features and construction details indicate it was a late nineteenth-century passenger/package propeller, and had been converted into a barge by the time of its sinking.

Field investigations of the Claflin Point Wreck revealed other artifacts beyond the shipwreck. Researchers found miles of slab wood, edging, logs, and lumber, along with other sawmill artifacts. Quarried limestone covers certain areas of the lakebed, while two linear piles of the stone sit within the wreck's hull. Just off the wreck's starboard side, lies a wall of limestone and slab which juts out of the sand and wraps toward shore outlining the submerged foundation of a commercial wharf. Far from being an isolated find, the wreck hides amid a large collection of industrial relics. By analyzing the shipwreck's

¹² C. Patrick Labadie, Submerged Cultural Resources Survey: Picture Rocks National Lakeshore. Southwest Cultural Resources Center Professional Papers No 22: Santa Fe, New Mexico (Washington D.C. U.S. Government Printing Office, 1989), 25.

surroundings, it became clear that the wreck did not constitute the entire site, rather it was a feature of a larger site linked to Little Sturgeon's industrial heritage. This thesis has been expanded to include both the industrial history of Little Sturgeon and the Claflin Point Wreck as a source of data on ship construction and vessel use.

As mentioned, the wreck itself is an important source of archaeological data on passenger/package propeller construction. The Claflin Point Wreck is a focal point, but this thesis also highlights the contributions of Little Sturgeon as a hinterland community. The presence of the wreck, the associated submerged structures, the scattered artifacts, and the abundance of processed raw materials (wood and stone) all reflect the bygone activities in Little Sturgeon.

The body of this thesis opens with two history chapters that lay the foundation for the subsequent archaeological interpretation of the Claflin Point Wreck. Chapter II, *Opening the Way for Passengers and Packages*, discusses the dynamic forces that fostered the growth of the Great Lakes region in the nineteenth century. It also examines the rise and fall of the passenger and freight trades on the Great Lakes and their context within Great Lakes transportation history.

Chapter III, *An Industrial Outpost: Little Sturgeon, Wisconsin*, explores the impact of the village's three major industries--lumber, lime, and ice--in regional development.¹³ After the fur trade era, Little Sturgeon turned to other natural resources to support the area's economy. The forests, the bluffs of limestone, and the frozen waters all served as major contributors to regional growth. By extracting, processing, and shipping

¹³ Other economic pursuits of Little Sturgeon's history are not discussed in this thesis. Little Sturgeon's shipyard (the largest to operate in the county until the turn of the century), is examined only in the context of the lumber industry. It may seem peculiar that a nautical archaeology thesis, illustrating a village's maritime dependency, only makes brief mention of a shipyard. However, this pursuit falls outside the scope of this study which focuses on Little Sturgeon's extraction industries in the second half of the nineteenth century. The three "f's," fur, fish, and farms, are other notable omissions. Although all of these played important roles in the development of Little Sturgeon, in order to make this study manageable, the scope of the research needed to be narrowed.

these natural resources, Little Sturgeon became an industrial center. Similar to other hinterland villages, Little Sturgeon's rise and fall were connected to larger regional patterns. Before proceeding, it will be helpful to examine the concept of hinterland in some detail and to explain how it is used in this study of Little Sturgeon.

In studying the Great Lakes region during this dynamic period, it would seem logical to focus on the major cities. In the cities industry thrived and money flowed, yet urban centers were surrounded by and depended on smaller cities, villages, and settlements that made up the hinterland, making it important to understand the indispensable contributions of smaller towns in regional development. Urban growth during the nineteenth century placed incredible stress on young, expanding cities. Lacking some resources, while depleting and polluting others, urban centers developed an unquenchable thirst for natural resources to supply growing populations and industry. Forced to look farther, cities turned to a network of smaller communities. Often utilizing lake and river transportation, the hinterland developed, in part, to supply food, building materials, and other resources. Without the ability to obtain distant resources, urban growth could not occur, and without a demand for the resources, industrial outposts would not have developed.

The Claflin Point Site reflects Little Sturgeon's relationship with major urban centers, particularly Milwaukee and Chicago. Historians such as Roberta Miller, and more recently, William Cronon have stressed the relationship between cities and their smaller "hinterland" outposts.¹⁴ Concepts such as urban and rural, so often viewed as opposites have increasingly been understood as part of a seamless web of relationships servicing growing urban demands for raw materials including lumber, lime, and ice. Little

¹⁴ Roberta Balstad Miller, City and Hinterland: A case study of urban growth and regional development, (Westport: Greenwood Press, 1979); William Cronon, Nature's Metropolis: Chicago and the Great West (New York: W.W. Norton and Co.1991).

Sturgeon's growth and economic prosperity were linked to large scale urban growth. Large cities depended little upon any particular industrial outpost, but collectively communities like Little Sturgeon, provided fuel in the form of raw materials to fire the growth of Midwestern urban development. This interrelationship provides the dominant theoretical perspective for interpreting the underwater industrial archaeology of Little Sturgeon Bay.

Although the commodities shipped from Little Sturgeon supplied places as close as Green Bay and Milwaukee and as far as Europe, Little Sturgeon was mainly part of Chicago's hinterland. A city that epitomized nineteenth century growth, Chicago went from an insignificant frontier settlement to one of the world's great cities in only a few decades. In 1830, Chicago did not appear in the U.S census. A decade later, the city's population reached 4,900; in 1860, Chicago had over 100,000 inhabitants.¹⁵ Chicago's unprecedented growth, in both population and industry, created demands for resources that the city, and local area, could not provide. William Cronon, describes the Chicago's relationship with its hinterlands and how market demand acted as a catalyst for the interaction between urban and rural:

Chicago, and the economic demand it represented, put new pressures on species hundreds of miles away. Its markets allowed people to look farther and farther afield for the goods they consumed, vastly extending the distance between points of ecological production and economic consumption. Now food and other resources made ever longer journeys to reach the places where people consumed them. The cattle that grazed on a Wyoming hillside, the corn that grew in an Iowa field, and the white pine that flourished in a Wisconsin forest would never ordinarily have shared the same landscape. All nonetheless came together in Chicago. There

¹⁵ K. Jack Bauer, A Maritime History of the United States: The Role of America's Seas and Waterways. (Columbia: University of South Carolina Press, 1988), 189-90, 193. The growth was by no means limited to Chicago and was felt throughout the region. In 1840, no city west of Buffalo on the Great Lakes carried a population greater than 10,000, however the developing lake commerce changed this quickly. Twenty years later, Cleveland, Detroit, and Milwaukee all counted over 45,000 people within their limits, and Chicago surpassed the 100,000 mark.

they were valued according to the demands and desires of people who for the most part had never even seen the landscapes from which they came. In an urban market, one could buy goods from hinterlands halfway round the world without understanding much if anything about how the goods had come to be there.¹⁶

It is this concept of hinterland that is used to lay the foundation for the archaeological interpretation of the Claflin Point Wreck in Chapter IV, *Little Sturgeon's Submerged History*. Archaeological methods were used to record and analyze the physical remains of the Claflin Point Wreck and to reveal construction techniques, hull features, and vessel type as well as the circumstances of its loss. Yet without the historical identification of the vessel, the study took a new slant, and a more detailed investigation of Little Sturgeon's industries resulted. Although the entire story of the Claflin Point Wreck has not surfaced, a better understanding of the economic factors that most likely drew the vessel to its final resting place surfaced.

This thesis brings together archival and field research to tell the story of an important vessel type and an industrial outpost. The result is a sketch of industrial Little Sturgeon, as painted by environmental and economic history with industrial and underwater archaeology.

¹⁶ Cronon, *Nature's Metropolis*, 266-67.

Chapter II

Opening the Way for Passengers and Packages

The trading posts...were on the sites of Indian villages which had been placed in positions suggested by nature. . . . situated so as to command the water systems of the country. . . . Thus civilization in America has followed the arteries made by geology, pouring an even richer tide through them, until the slender paths of aboriginal intercourse have broadened and interwoven into the complex mazes of modern commercial lines; the wilderness has been interpenetrated by lines of civilization, growing ever more numerous...if one would understand why we are to-day one nation, rather than a collection of isolated states, he must study this economic and social consolidation of the country.¹

Frederick Jackson Turner, "The Significance of the Frontier on American History" (1893)

During the last ice age, snow and ice accumulated forming massive glaciers miles thick. The tremendous weight created incredible pressure on the lower ice fields, and the force slowly pushed the ice sheets south across present day New York, Ohio, Michigan, Wisconsin, Indiana, and Illinois. The immense weight of the glaciers carved deep scars into the ground it passed. The ice fields continued south until higher temperatures forced a retreat. As the ice crawled back, meltwater collected in the enormous hollows created by the glacier. In this way the Great Lakes were born some 15,000 years ago.

The Great Lakes and their connecting waterways provide a natural highway extending over a thousand miles into the heart of North America. For centuries before European contact, these inland seas and tributaries served as important lines of trade and communication for Native Americans. Over the past 300 years, these waters have been

¹ Frederick Jackson Turner, "The Significance of the Frontier in American History," Frederick Jackson Turner: Wisconsin's Historian of the Frontier (Madison: The State Historical Society of Wisconsin, 1986), 29.

further exploited by Euro-Americans and have greatly contributed to the growth of the North American interior. Marine transport on the Great Lakes played a crucial role in the exploration, settlement, and industrialization of the region.

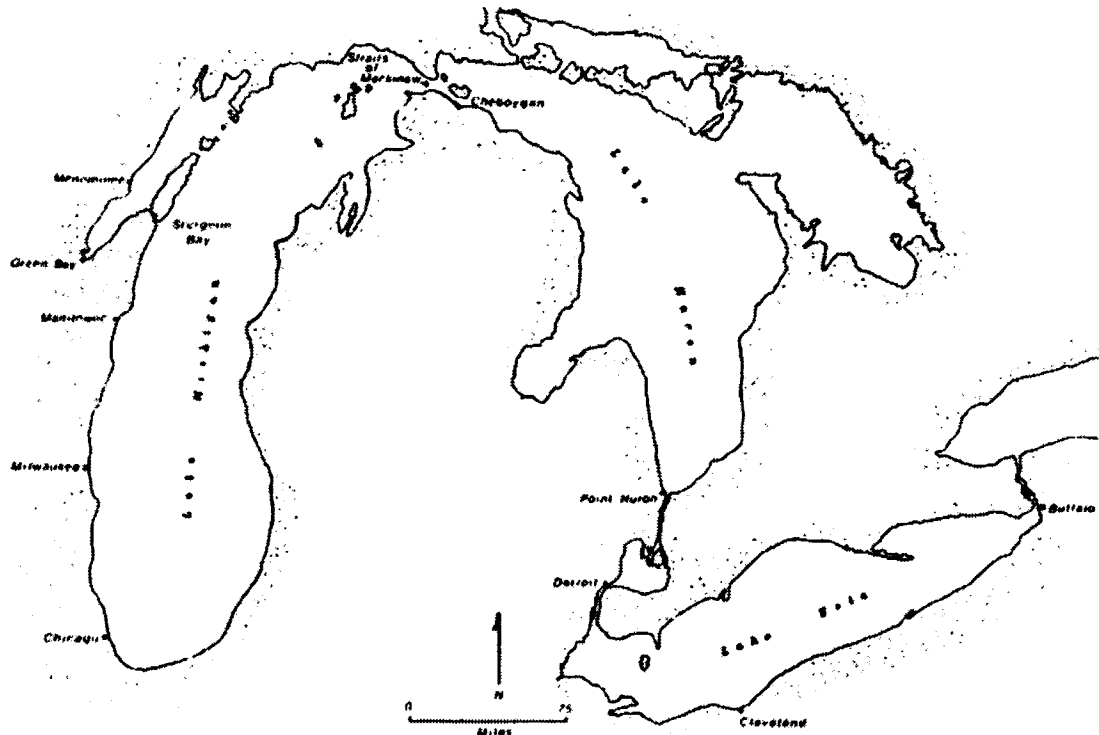


Figure 2: The Great Lakes (Cooper, *Fleetwing*, 24.)

French fur traders motivated by a booming European market in the seventeenth century employed the Great Lakes and their tributaries to penetrate the continent in search of lucrative beaver, otter, and mink. The birch-bark canoe was essential in transporting furs and supplies between the western frontier and eastern markets. Trappers, amazed by the efficiency and versatility of the native vessels, devised modified versions of the birch-bark canoe. The *canot du maitre* and *grand canot* were similar to the aboriginal version, but constructed on a larger scale to suit the voyagers' commercial needs. These canoes, reaching lengths of 35 feet, capacities over 8,000 pounds, and had the strength to shoot

rapids and the stability to navigate big water.² Light enough to portage, yet capable of carrying large loads, the birch-bark canoe was also easily repaired in the frontier. A blend of Native American and European technology, the versatile craft carried the fur trade.

With the signing of the Treaty of Paris (1763), and the end of the French and Indian War, the French surrendered all of New France, consisting of Canada and all lands east of the Mississippi, to the British. For the next twenty-two years, commercial navigation on the Lakes was restricted to British naval craft, and merchants and traders were forced by the Crown to ship all cargo on government vessels that made up the Provincial Marine.³ The American Revolution forced a relaxation of restrictions on commercial shipping in the 1780s, and Great Lakes trade grew, predominately on Lake Ontario.⁴

The United States received, as part of its victory over Britain, the lands that became the Northwest Territory. Despite political control passing from France to Britain and from Britain to the United States, relatively little changed in the Upper Lakes basin over the first 200 years of Euro-American contact.⁵ Initially, only a trickle of settlers followed the explorers, missionaries, and fur traders into today's upper Midwest. With virtually no commercial logging or farming, and only a few posts constructed, much of the area remained unexplored.⁶ However, the pursuit of the pelt gradually revealed the region's economic promise and invited other efforts to profit from the land. Nineteenth century historian Frederick Gunther commented on how the trade drew settlers into the area: "[t]he rich peltries of North America were the magnet holding forth the promise of the commercial

² James P Barry, Ships of the Great Lakes: 300 Years of Navigation (Berkeley: Howell-North Books, 1970), 11-12.

³ Labadie, Picture Rocks National Lakeshore, 17.

⁴ *Ibid.*, 19.

⁵ Barry, Ships of the Great Lakes: 300 Years of Navigation, 11.

⁶ Cooper, Submerged Cultural Resources in Northern Door County, 9.

gain, that drew hitherwards the pioneers and precursors of civilization.”⁷

Opening the Door

After a slow start in the seventeenth and eighteenth centuries, the Upper Lakes developed rapidly during the nineteenth. During this period, the Great Lakes and western river systems began to provide the United States and Canada with an invaluable transportation network that fostered growth of the continent's interior. However, two obstacles hindered large scale settlement of the region: the British and the Native Americans.

Despite gaining the Northwest Territory from Britain with the signing of the Treaty of Paris (1783), American commercial development in the Upper Lakes remained sluggish after the Revolution. The British were slow to abandon their forts, and it was not until the signing of Jay's Treaty in 1795 that the United States took formal possession of the land. Tensions along the border persisted, and the threat of military action hindered commerce and development on the Upper Lakes. British impressment of American sailors and their blockades on French ports, which prevented American free trade with Europe, further strained relations between the nations. Encouraged by the War Hawks in Congress, James Madison declared war against the British on June 18, 1812. However, many viewed the war as an opportunity for American expansion in the western frontier and Canada rather than a response to British practices.⁸

On the afternoon of September 10, 1813, a long-anticipated battle between the American and British squadrons on Lake Erie finally materialized. After a fierce and

⁷ Gunther, Frederick "One Hundred Years of American Commerce" as quoted in J.H. Mansfield, History of the Great Lakes in Two Volumes, Vol. I (Chicago: J.H.Beers & Co,1899), 75.

⁸ John A . Garraty, The American Nation: A History of the United States to 1877 (New York: Harper Collins Publishers, 1991), 199, 205.

bloody three-hour fight, the thundering roars from the cannons fell silent. U.S. Commander Oliver Hazard Perry reported, "we have met the enemy and they are ours."⁹ For the first time in history, a British fleet had surrendered. Perry's victory gave the Americans a strong claim in peace negotiations for the Northwest Territory, which the British recognized in the Treaty of Ghent in 1814. In theory the Rush-Bagot Agreement of 1817 limited arms and armaments on the Great Lakes.¹⁰ However, all was not peaceful on the Great Lakes after this time. Historian Dr. Bradley Rodgers writes in Guardian of the Great Lakes that several events occurring after the War of 1812 that "continually aggravated relations between the United States and Great Britain, often pushing them to the brink of disaster."¹¹ Yet, the American victory in the War of 1812 opened the Great Lakes region to increased white settlement and massive growth followed.

The War of 1812 also confronted problems of Native American resistance to white expansion. Before the war, the Shawnee chief Tecumseh sought to organize the tribes east of the Mississippi into a powerful confederation to stop white advancement. Tecumseh tried to rally tribal support from Florida to Wisconsin: "Let the white race perish. They seize your land; they corrupt your women. . . . Back whence they came, upon a trail of blood, they must be driven."¹² However, General William Henry Harrison's two victories, Tippecanoe (1811) and the Thames River (1813), did much to crush Indian

⁹ Oliver H. Perry to William H. Harrison, 10 Sept. 1813 as quoted in William S. Dudley and Michael J. Crawford, The Naval War of 1812: A Documentary History Vol. II. (Washington: Naval Historical Center, 1985), 553.

¹⁰ Bradley A. Rodgers, Guardian of the Great Lakes: The U.S. Paddle Frigate *Michigan* (Ann Arbor: University of Michigan Press, 1996), 13. Dr. Rodgers states, "[a] fallacy has risen that the border of the Great Lakes is peaceful and has been so since 1814. This misconception is perpetuated because the agreements made to limit arms and armament after the War of 1812 have been viewed out of context of the times. As is often the case, arms agreements are marriages of convenience, upheld only when it is advantageous or cost effective to do so."

¹¹ *Ibid.*

¹² Garraty, The American Nation, 209.

resistance in the region, particularly the latter in which the death of Tecumseh shattered any hopes for a successful Indian confederation. The American government enhanced its expansionist policy through a series of negotiations and treaties with different tribes, further opening the western territories for settlement.

With the pacification of the Native Americans,¹³ the end of the War of 1812, and the establishment of a relatively peaceful border along the lakes and the 49th parallel, the door to the west opened. The development of the American interior transportation system further propelled the rapid growth in the population, economy, and industry of the Great Lakes area throughout the nineteenth century.

Separated by Land, Connected by Water

During much of the nineteenth century, traveling across land remained an arduous task. George Rogers Taylor in The Transportation Revolution described the hardships of early nineteenth-century overland travel and the primitive state of many roads:

[Roads] were hardly more than broad paths through the forest. In wet places they presented a line of ruts with frequent mud holes, and where dry, a powdered surface of deep dust. The largest stones and stumps were removed only so far as absolutely necessary to permit passage. An early act . . . provided that stumps left in the road should not be more than a foot high.¹⁴

The harsh conditions of the landscape made traveling and hauling supplies an expensive and labor intensive activity. In favorable weather, a messenger (not cargo wagon) could make a 100-mile journey in one to two days, however, adverse weather

¹³ Things were by no means peaceful. The 1832 Black Hawk War drove the Sac and Fox Indians out of Wisconsin, and eliminating most threats to settlers. However, the threat of a mass unification was eliminated during and shortly after the War of 1812.

¹⁴ George Rogers Taylor, The Transportation Revolution (New York: Rinehart & Company, 1951), 15.

could make many roads practically impassable.¹⁵ The best roads had limited travel distance. Horse-drawn wagons, on the nation's best turnpikes, could hope to make 20 miles a day.¹⁶ The limited cargo capacities and the high costs of horses and drivers made wagons uneconomical for moving bulky goods any distance. The shipper could not absorb the costs of traveling by land, and logistics set limits to operational ranges.¹⁷ Without an efficient means to transport people and goods between eastern markets and the Great Lakes region, the economic potential of the Midwest could not have been realized. Marine transportation made the rapid growth of the nineteenth century possible. Water was the most convenient, efficient, and in some cases, the only means to move people and goods. The Great Lakes, along with the western river system, greatly reduced the distances and relieved some hardships of overland travel. Travel across water was, by far, the more economical option. In the early nineteenth century, a United States Senate committee reported that a ton of cargo could be shipped 3,000 miles from Europe for about nine dollars, but that sum only moved the same load 30 miles across land in the United States.¹⁸

The laws of physics favor water carriage of bulky goods since the force necessary to move a floating body through the water is appreciably less than that needed to push it through any other medium.¹⁹

A natural highway system that stretches inland over 1,000 miles, the Great Lakes

¹⁵ Max Rosenberg, The Building of Perry's Fleet on Lake Erie, 1812-1813 (Harrisburg: Pennsylvania Historical and Museum Commission, 1950), 16.

¹⁶ Taylor, The Transportation Revolution, 138.

¹⁷ Ibid., 15-16; Cronon Nature's Metropolis, 59.

¹⁸ Taylor, The Transportation Revolution, 132.

¹⁹ Bauer, A Maritime History of the United States, xii.

offered an attractive travel and shipment alternative to land transport. Together the lakes, along with their rivers and streams, drastically cut shipment time and costs, and connected cities and people separated by hundreds, even thousands, of miles. Even when the railroads offered a shipping alternative, the waterways still proved more efficient in many trades. At the beginning of the twentieth century, it cost 4.42 cents to move a bushel of wheat from Chicago to New York by water, while the same load cost 9.98 cents over rail.²⁰ For this reason, as settlers moved into the North American interior, cities sprang up along the banks and shores of rivers, canals, and lakes. The significance of settlement upon rivers and other waterways is apparent in United States geography today: 130 of the 150 cities in the country with populations over 100,000 are directly served by inland water systems.²¹ Access to navigable water determined the geographical position of nearly every major city in the Midwest.

More Water--Creating Geography

A coal mine may exist in the United States not more than ten miles from valuable ores of iron and other materials, and both of them may be useless until a canal is established between them, as the price of land carriage is too great to be borne by either.²²

United States Senate Committee Report (1816)

Before the 325-mile Erie Canal was completed in 1825, the largest canal in the United States stretched a mere 28 miles. Connecting Buffalo to the Hudson River, the Erie Canal tied New York City and the Atlantic Ocean to the cities around the Great Lakes,

²⁰ Ibid., 145.

²¹ Larry Murphy and Daniel Lenihan, "Lake Superior Maritime Tradition: Socioeconomic Context," in Daniel Lenihan (ed.) Shipwrecks of Isle Royale National Park (Duluth: Lake Superior Port Cities Inc., 1994), 16.

²² Taylor, The Transportation Revolution, 132.

providing a crucial artery for commerce and migration. Its opening immediately cut shipping rates. The freight rate from Buffalo to Albany dropped from \$100 to \$10 per ton.²³ The artificial waterway not only provided access to inland resources and made connections to deep-water ports, but encouraged western settlement. The first boat of immigrants reached Buffalo three days after the Erie Canal opened. In 1826, 1,200 migrants arrived in Buffalo on a single day, making it the new gateway to western settlement.²⁴ It has been estimated that over half of the immigrants arriving in the United States traveled west via the Erie Canal. By 1836, 3,000 canal boats operated on the waterway in the passenger business.²⁵

If Perry's victory and the pacification of the Native Americans represented the opening of the door to the West, then the completion of the Erie Canal laid down the welcome mat. A massive influx of settlers poured into the area around the Great Lakes. The result was dramatic; the population of cities on the Upper Lakes is said to have quadrupled in the eight years before 1840.²⁶ Over the next several decades, rapid growth characterized the region. Fostered by an efficient transportation system, commerce flourished. The rise in Great Lakes' trade in the decades after the canal opened illustrates the point. In 1841, commerce totaled \$65 million, while just ten years later, it climbed to over \$300 million.²⁷ These figures reflect the growing market for the movement of people and freight, a market serviced by the successful application of steam to maritime propulsion.

²³ Bauer, A Maritime History of the United States, 138.

²⁴ *Ibid.*, 139.

²⁵ Murphy and Lenihan, "Lake Superior Maritime Tradition," 17; J.H. Mansfield, History of the Great Lakes, 183-84.

²⁶ Mansfield, History of the Great Lakes, 634.

²⁷ Barry, Ships of the Great Lakes, 55.

Smoke on the Water

We have the power in our hands, moral, physical, and mechanical; the first, based on the Bible; the second, upon the wonderful adaptation of the Anglo-Saxon race to all climates, situations, and circumstances . . . the third, bequeathed to us by the immortal Watt. By his invention every river is laid open to us, time and distance are shortened. If his spirit is allowed to witness the success of his invention here on earth, I can conceive no application of it that would receive his approbation more than seeing the mighty streams of the Mississippi and the Amazon, the Niger and the Nile, the Indus and the Ganges, stemmed by hundreds of steam-vessels, carrying the glad tidings of "peace and good will towards men" into the dark places of the earth which are now filled with cruelty.²⁸

Macgregor Laird, *British Explorer* (1837)

With Robert Fulton's demonstration of the *North River Steam Boat* in 1807, steam propulsion entered American life, and its evolution radically changed the face of transportation.²⁹ Sailing vessels had carried passengers and freight since their appearance on the Great Lakes. Passenger and freight carriage, however, emerged as a specialized industry only after the steam engine proved a viable form of propulsion. Despite the problems of implementing steam technology in marine transportation (hull and engineering designs, safety issues, and increased construction and operation costs), steam powered vessels overcame various limitations of sail. Steam provided a level of speed and dependability that could not be harnessed from the wind alone. Built in 1817 on Lake Ontario, the sidewheelers *Ontario* and *Frontenac* were the first steamers on the Great

²⁸ Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981), 17.

²⁹ This vessel has been incorrectly remembered as the *Claremont*, but was actually named *Steam Boat*, until 1809, when it was changed to *North River Steam Boat*. Although remembered as the *Claremont*, Fulton's boat never carried that name, but Claremont was her port name at various times. Bauer, *A Maritime History of the United States*, 70.

Lakes. The *Walk in the Water*, built in Tonawanda, New York in 1818, was the first steamer on the Upper Lakes. From that time, Great Lakes steamboats developed rapidly. By the early 1840s, they garnered international attention with Englishman such as J.S. Buckingham, who described Great Lakes sidewheelers as:

. . . some of the largest and finest steamboats that exist in the United States. They are employed in the navigation of the Lakes from hence [Chicago] to Buffalo, a distance nearly a 1,000 miles. . . . They are accordingly built of large size, from 600 to 800 tons, of great solidity, equal to that of the ships navigating the oceans . . . of the best construction.³⁰

With settlers pouring west after the completion of the Erie Canal, the movement of people became a profitable industry. Thousands of passengers turned to the Great Lakes for passage to the west, and steamboats were the fastest and most convenient way to get there. In 1833 61,000 passengers traveled west on steamboats engaged in the trade across the Inland Seas.³¹ Although more expensive than sail, steam travel bequeathed a level of relative comfort and speed that made the fare well worth the cost. With time, technology and market competition made the voyage more affordable. The *Walk in the Water* carried passengers from Buffalo to Detroit for \$18 per person.³² By 1848, the fare to Detroit dropped to \$6 for cabin and \$3 for steerage passengers. Travel times declined just as dramatically. Buffalo-Detroit round trip took at least 10 days in the 1830s, by 1851 the voyage fell to as little as 3 days.³³

Mechanical navigation played an instrumental role in the region's development.

³⁰ J.S. Buckingham, Esq., *The Eastern and Western States of America Vol. 3*, (London, n.d.), 268 as quoted in John O. Jensen, "Transportation at the Time of Statehood: The History and Archaeology of the Palace Steam Boat *Niagara*" (Unpublished article to appear in the *Wisconsin Magazine of History*), 2.

³¹ Mansfield, *History of the Great Lakes*, 185.

³² Bauer, *A Maritime History of the United States*, 186; Murphy and Lenihan, "Lake Superior Maritime Tradition," 18.

³³ Bauer, *A Maritime History of the United States*, 189.

Writing in 1848, western booster James Hall left a description of steam's importance in the West:

The application of steam power to the purpose of navigation forms the brightest era in the history of the country. It is that which has contributed more than any other event or cause, to the rapid growth of our population, and the almost miraculous development of our resources.³⁴

Types of Steam Vessels

Over the last three centuries, vessels have carried several different types of cargoes across the Inland Seas. These have been categorized into three general types: bulk, passenger, and freight. Modern classifications provide useful definitions of these cargo classes. The *Transportation Act of 1940* defined bulk commodities as those that are "loaded and carried without wrappers or containers and received and delivered by the carrier without transportation mark or count."³⁵ The Interstate Commerce Committee added, bulk goods are "fungibles that can be poured, scooped or shoveled, and which generally are of such size that they cannot be handled piece by piece."³⁶ The definition for passengers is rather straight forward. It is simply "the movement of people." The passenger trade is often discussed in tandem with the package freight because of their similarities. Daniel Fletcher, in *A Study of Package Freighters on the Great Lakes*, distinguishes package freight, known elsewhere as general freight, from the predominate bulk cargoes: "Package freight is probably best defined as any goods that do not come under the special definitions of bulk freight....It refers to freight moved piece by piece in

³⁴ James Hall, *The West: Its Commerce and Navigation*, (Cincinnati: W.W. Derby & Co., 1848), 10 as quoted in John O. Jensen, "Bulwarks Against a Human Tide: Early Hospitals on the Maritime Frontier 1800-1831" (Ph.D. diss., Carnegie Mellon University, in progress), 12.

³⁵ U.S., *Statutes at Large*, LIV, 898, Section 303(b), 931 as quoted in Daniel O. Fletcher, *A Study of Package Freighters on the Great Lakes* (Ann Arbor: University Publications, 1960), 2-3.

³⁶ *John J Mulqueen Contract Carrier Applications*, 250 I.C.C. 436, 439 (1942) as quoted in Daniel Fletcher, *A Study of Package Freighters on the Great Lakes*, 3.

containers of some sort or by individual units."³⁷ Package freight then is a term used to differentiate between general merchandise such as flour, whiskey, livestock, and other goods, and bulk cargoes such as lumber, coal, ore, grain, or stone.

Land Propulsion

As steam altered the course of shipping, it did the same for land transportation with the introduction of the locomotive. Railroads, however, initially faced the disadvantage of needing to lay track. Major cities, exploiting sail and riverboats for decades, were already situated upon navigable waterways and did not need to make many modifications to exploit steam navigation. During the 1840s and 1850s, the rapidly expanding American railroad network web gradually connected many of the nation's cities and towns. Railroads also extended the reach of major Great Lakes ports by linking them to smaller communities and inland production centers.³⁸ For example, the tracks that radiated out of Chicago and Milwaukee brought grain from the fertile fields of the Great West to their ports for shipment east. Once in eastern ports, it could be transported to towns by rail or water.³⁹ The system worked the opposite direction as well. Fostering commerce and development, railroads at first enhanced maritime interests of all kinds. As the railroad network developed, it displaced much of the passenger and package trade on major routes. In places that lacked through rail connections, however maritime transport thrived.

The relationship between the railroads and the steamship lines was an incestuous one. Initially, they served one another, each using the geographic reach of the other to

³⁷ Fletcher, A Study of Package Freighters, 4.

³⁸ Murphy and Lenihan, "Lake Superior Maritime Tradition," 18.

³⁹ Bauer, A Maritime History of the United States, 191; Murphy and Lenihan, "Lake Superior Maritime Tradition," 19.

foster their trade. However, they eventually engaged in a strange form of "competition" for the same cargoes. Ultimately by the late nineteenth century, the railroads succeeded in controlling the steamship lines. Larry Murphy and Daniel Lenihan explain this odd relationship in a discussion on the socioeconomic context of Great Lakes maritime tradition:

At first, most railroads were not in direct competition with vessels and served as connecting lines for passenger steamers. However, some railroads went into steamship business to capitalize on the growing demand for passenger vessels. Package freight commerce on the lakes was taken over by the rail companies, which ultimately owned all of the package freighters.⁴⁰

Floating Palaces

During the 1840s and 1850s, the passenger and package service on the lakes, intimately connected with the rail concerns, boomed as steamers spanned the gap created by the absence of connecting railways. Although important developments occurred with steam propellers, a term used on the Great lakes to define propeller driven steamships, the years of 1844-1857 are characterized by large and luxurious sidewheelers. These vessels dominated the waters and public attention. Dubbed "the Era of the Palace Steamers," this period is looked upon by historians and maritime enthusiasts as the pinnacle of the Great Lakes passenger service.⁴¹

In excess of 1,000 tons each, the 25 palace steamers that operated during this period played a crucial role in the settlement and development of the Great Lakes region

⁴⁰ Murphy and Lenihan, "Lake Superior Maritime Tradition," 19. By 1850, Buffalo was a major rail center; 14 freight and 300 passenger trains arrived and departed from the city daily. Buffalo became a major hub and marked a transition point on a journey from the eastern seaboard (and beyond) to the country's interior. Thousands of people seeking passage to the west converged upon Buffalo, and its population almost doubled between 1850 and 1855.

⁴¹ Labadie, Picture Rocks National Lakeshore, 22.

and beyond. Sixteen of these vessels serviced the Buffalo-Chicago run, in which two departed from each port daily.⁴² In 1845 alone, Great Lakes passenger trade moved over a quarter million people across the Inland Seas.⁴³

Renowned for their speed, dependability, and comfort, palace steamers impressed observers with their size as well. Some reached lengths of over 300 feet and carried several hundred passengers. Since travel was no longer tied to the strength of winds, companies formed packet lines with regularly scheduled departures and dependable service. Speed became a bragging point for the lines. In June 1844, the palace steamer *Niagara* made a record run from Chicago to Buffalo with a 70-hour trip, 36 hours ahead of schedule--leaving angry passengers standing at the dock.⁴⁴ However, during this period of innovation and competition, such records did not stand long.

Although size and speed characterized palace steamers, their accommodations and luxuries distinguished them. After the initial wave of immigration in the early nineteenth century, a demand for first-class accommodations developed.⁴⁵ Nothing so extravagant has been seen on lakes before or after this era. "The palace steamers," wrote Great Lakes historian C. Patrick Labadie, "were the most beautiful appointed craft ever built on the Lakes."⁴⁶ Owners poured tremendous sums of money into luxurious appointments: fountains, stained-glass domes, parlors, saloons, fine carpets, and posh furnishings.⁴⁷ In 1854, Isabella Lucy Bishop, an English writer, described her astonishment with the

⁴² Barry, *Ships of the Great Lakes*, 79.

⁴³ Mansfield, *History of the Great Lakes*, 188.

⁴⁴ Jensen, "Transportation at the Time of Statehood," 11.

⁴⁵ Murphy and Lenihan, "Lake Superior Maritime Tradition," 23.

⁴⁶ Labadie, *Picture Rocks National Lakeshore*, 23.

⁴⁷ Barry, *Ships of the Great Lakes*, 79.

grandeur of the Great Lakes palace steamers in The Englishwoman in America:

My bewildered eyes surveyed a dairy scene, an eastern palace, a vision of the Arabian Nights. I could not have believed such magnificence existed in a ship. It impressed me much more than anything I have seen in the palaces of England.⁴⁸

The Palace Steamer Era ended abruptly in the summer of 1857 when the Ohio Life Insurance Company collapsed, and other financial institutions fell in the wake, triggering the Panic of 1857. The depression severely affected Great Lakes commerce, and J.B. Mansfield wrote of it that "commercial interests suffered greatly. Vessels in large numbers were laid up...[and] freight was down to the lowest margin, owners were despondent."⁴⁹ Although the country recovered quickly, the appearance of more efficient screw propellers and the completion of the east-west rail lines further sealed the fate of the expensive sidewheel palace steamers. Competition from propellers which were less expensive to build and operate, and railroads, unhampered by seasonal limitations, spelled the end for palace steamers. The largest steamers were all taken out of service and many palace steamers were scrapped. Others survived only to serve out their days as barges.⁵⁰

The Marine Propulsion Revolution

While the sidewheeled-luxury liners were stealing public attention, a revolutionary propulsion technology was being perfected on the Great Lakes--the screw propeller. Although suggested in the late eighteenth century, the propeller remained a vision until 1837 when John Erickson successfully demonstrated it on the Thames River.⁵¹ Not well

⁴⁸ Isabella Lucy Bishop, The Englishwoman in America (London, 1854) as quoted in Jensen, "Transportation at the Time of Statehood," 2-3.

⁴⁹ Mansfield, History of the Great Lakes, 678.

⁵⁰ Labadie, Picture Rocks National Lakeshore, 23.

⁵¹ Tre Tryckare, The Lore of Ships (New York: Crescent Books, 1972), 146-47.

received in Europe, Erickson brought his idea to America, and experiments soon began on Lake Ontario. In 1841, the 138-ton *Vandalia* became the first propeller-driven vessel on the Great Lakes and the first commercial vessel in the world to make use of this form of propulsion.⁵² Although rigged a sloop, the *Vandalia*'s success led to a class of early steam propellers known as steam schooners.⁵³ As the name implies, steam schooners were often originally built as sailing craft, and later fitted with engines, boilers, and screw-propellers. Machinery served as an auxiliary form of propulsion, and all of the early propellers also carried sails.

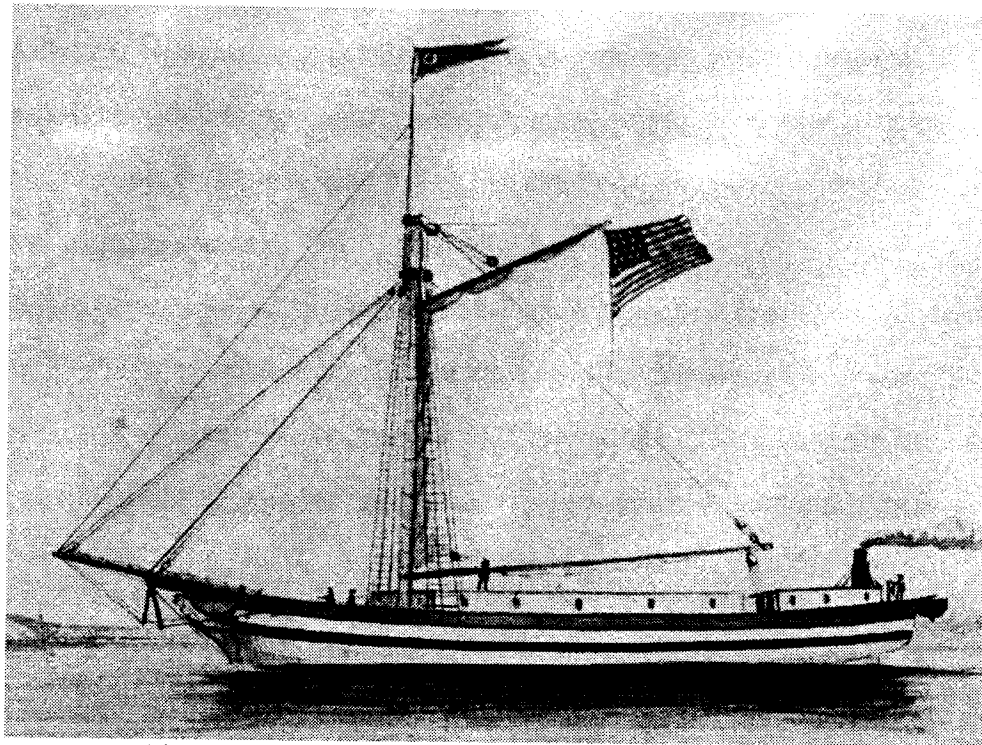


Figure 3: The *Vandalia* (Barry, History of the Great Lakes, 53.)

The engineering design and hull dimensions of early propellers gave them decisive

⁵² Barry, Ships of the Great Lakes, 52-53. The *Robert F. Stockton*, built in England in 1838, was the first commercial screw in America.

⁵³ Labadie, Picture Rocks National Lakeshore, 23.

advantages over the sidewheelers. Wide of beam, sidewheelers could not navigate through the locks at the critical Welland canal between Lakes Erie and Ontario, while the slender propellers could use the by-pass. The sprawling propulsion machinery of sidewheelers occupied an enormous volume of hull space, while propellers' compact machinery allowed for much greater cargo capacities in vessels of similar tonnages.⁵⁴ At cruising speeds, paddlewheel steamers consumed up to three cords of wood an hour--requiring between 24-36 cords of wood stored on board for a day's travel.⁵⁵ Propellers required one-quarter the fuel, and about half the crew of the sidewheelers. Because they were less expensive to construct and operate and their machinery took up much less cargo space, propellers lowered the cost of steam transportation. Faster and more dependable than sailing craft, propellers also handled better in heavy weather and were less susceptible to damage by ice or logs than the faster sidewheelers.⁵⁶ For these reasons, propellers offered rates between that of sail and sidewheelers.

Some observers quickly recognized the screw propellers revolutionary potential. The *Oswego Palladium* editorialized about the *Vandalia*, "We are firmly persuaded that this enterprise marks an epoch on the Progress of Western trade."⁵⁷ In 1842 the *Kingston Gazette & Chronicle* commented after observing another steam schooner: "these vessels

⁵⁴ Ibid. The *Vandalia* was the first Great Lakes vessel to house her machinery all the way aft, an arrangement that would be standard on future Great Lakes vessels.

⁵⁵ Bob Whittier, Paddle Wheel Steamers and their Giant Engines (Duxbury: Seamaster, Inc., 1987), 3.

⁵⁶ James Cook Mills, Our Inland Seas: Their Shipping and Commerce for Three Centuries (Chicago: A.C. McClurg & Co., 1910), 130; C. Patrick Labadie and Larry Murphy, "Major Vessel Types on Lake Superior: Sail to Steam," in Daniel Lenihan (ed.) Shipwrecks of Isle Royale National Park (Duluth: Lake Superior Port Cities Inc., 1994), 31.

⁵⁷ *Oswego Palladium*, 1 December 1841 as quoted in Labadie and Murphy, "Major Vessel Types on Lake Superior," 31.

fitted with the Erickson propellers . . . will form a new era in the history of navigation.”⁵⁸

The success of steam schooners demonstrated the practicality of screw propulsion and was an important turning point in the vessel design and economic history of the Great Lakes.

The *Monthly Nautical Magazine's* “Engineering Department” acknowledged the significance and popularity of the relatively young technology in October of 1854 .

The principle of propelling steam vessels by the instrumentality of screw-blades was only fairly brought into commercial notice fifteen years ago: and such has been the earnest attention bestowed on this favorite mode of propulsion by the eminent engineers of America and Europe . . . who claimed for its superiority over every other known mode, both for economy and efficiency. The screw was first applied as an auxiliary to sail . . . [used] in light weather or head winds. But it was soon discovered to be a specific mode of propulsion, and as such, capable of standing upon its own bottom, to the discarding of sail entirely. . . . A class of steam vessels, technically known as propellers . . . has no superior among commercial fleets.⁵⁹

The technology was revolutionary and is reflected in the number of vessels built implementing it. By the end of the 1860s, over 300 propellers had been constructed, not including the nearly 400 screw tugs built.⁶⁰

People and Packages

Early screw steamers, or propellers, competed directly with sidewheelers. Constructed with similar hull features as paddle wheelers, early propellers were generally double-decked. The 135-foot, 250-ton *Sampson* constructed in 1843 became the first

⁵⁸ *Kingston Gazette & Chronicle*, June, 1842 as quoted in Labadie and Murphy, “Major Vessel Types on Lake Superior,” 31.

⁵⁹ “Engineering Department” *The Monthly Magazine and Quarterly Review*, New York: Griffiths and Bates, October 1854, 25.

⁶⁰ Labadie, *Picture Rocks National Lakeshore*, 23.

screw steamer dedicated to package freight, and was the prototypical package freighter.⁶¹ Stored between decks and in the hold, cargo was often stowed in boxes, barrels, bags, bales, or other containers and referred to as "package freight." With gangways cut into their sides above the main deck to facilitate cargo handling, these steamers were loaded and unloaded by longshoremen using hand-trucks and tackle.⁶²

Little differentiated passenger propellers and package freight vessels, except the addition of passenger cabins on the spar decks. Also, vessels that carried passengers generally also carried package freight. With identical hulls and propulsion system configurations, package freighters and passenger propellers were interchangeable. A package freighter could be transformed into a passenger liner with the addition of cabins on the upper deck, while removing the cabins reversed the process. Daniel Lenihan's Shipwrecks of Isle Royale National Park offers further explanation of the close relationship between the vessel types:

Because there was so little difference between the two types, many ships were changed to package boat to [passenger] propellers or vice versa by the addition or removal of cabins. Changes of this nature were common during the the days of wooden ships, when cabins could be added or dismantled at modest cost as changes in the market required or deterioration of the ship dictated.⁶³

Such interchangeability makes it difficult to classify the Claflin Point Wreck. It could have been a package freighter or passenger vessel or both.

This adaptability was a principle advantage of wooden construction, allowing

⁶¹ Labadie and Murphy, "Major Vessel Types on Lake Superior," 32; Labadie, Picture Rocks National Lakeshore, 25.

⁶² Labadie and Murphy, "Major Vessel Types on Lake Superior," 31; Labadie, Picture Rocks National Lakeshore, 23, 25.

⁶³ Labadie and Murphy, "Major Vessel Types on Lake Superior," 32.

vessels to convert, at an affordable cost, with market demands.⁶⁴ Shifts in immigration and cargo demands are illustrated by a comparison of the number of each vessel type built. In the 1840s, 79 passenger propellers were built and only two package freighters, while the 1860s saw the addition of 72 passenger propellers and 16 package freighters. Over the following decade, 56 passenger propellers and 31 package freighters were constructed for Great Lakes service.⁶⁵

Before the development of specialized vessels for carrying bulk cargoes in the late 1860s, bulk commodities were simply poured into the holds of passenger/package freighters and unloaded by buckets. Dock workers arduously unloaded grain with shovels and wheelbarrows, taking two to three days to withdraw 5,000 bushels of grain from a ship's hold. After an early power grain elevator failed miserably in 1837, the frustrated investor commented in disgust, "Irishman's backs are the cheapest elevators ever built."⁶⁶ Five years later John Dart successfully introduced a steam powered grain elevator that unloaded 1,000 bushels of grain per hour and could store up to 55,000 bushels at one time.⁶⁷ As time and technology advanced, the bulk commodities claimed larger shares of the Great Lakes maritime market, and not only did machinery, like Dart's elevator, make the handling of bulk goods more efficient, but specialized ships developed specifically for the handling of these cargoes.⁶⁸

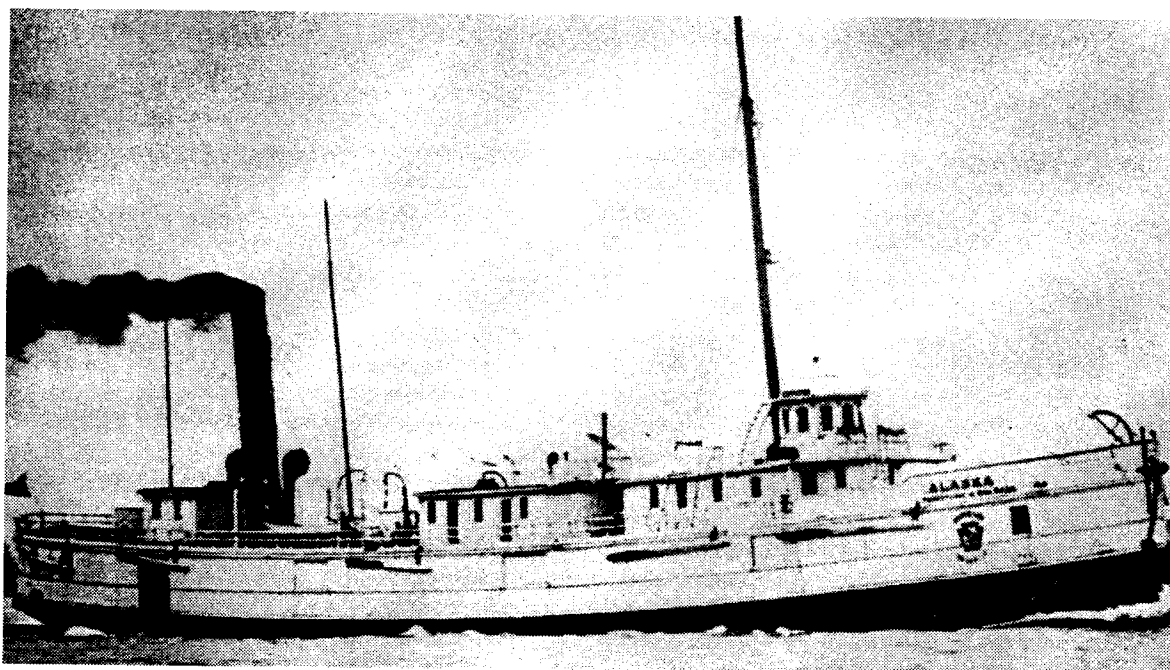
⁶⁴ Labadie, Picture Rocks National Lakeshore, 25.

⁶⁵ Labadie and Murphy, "Major Vessel Types on Lake Superior," 32.

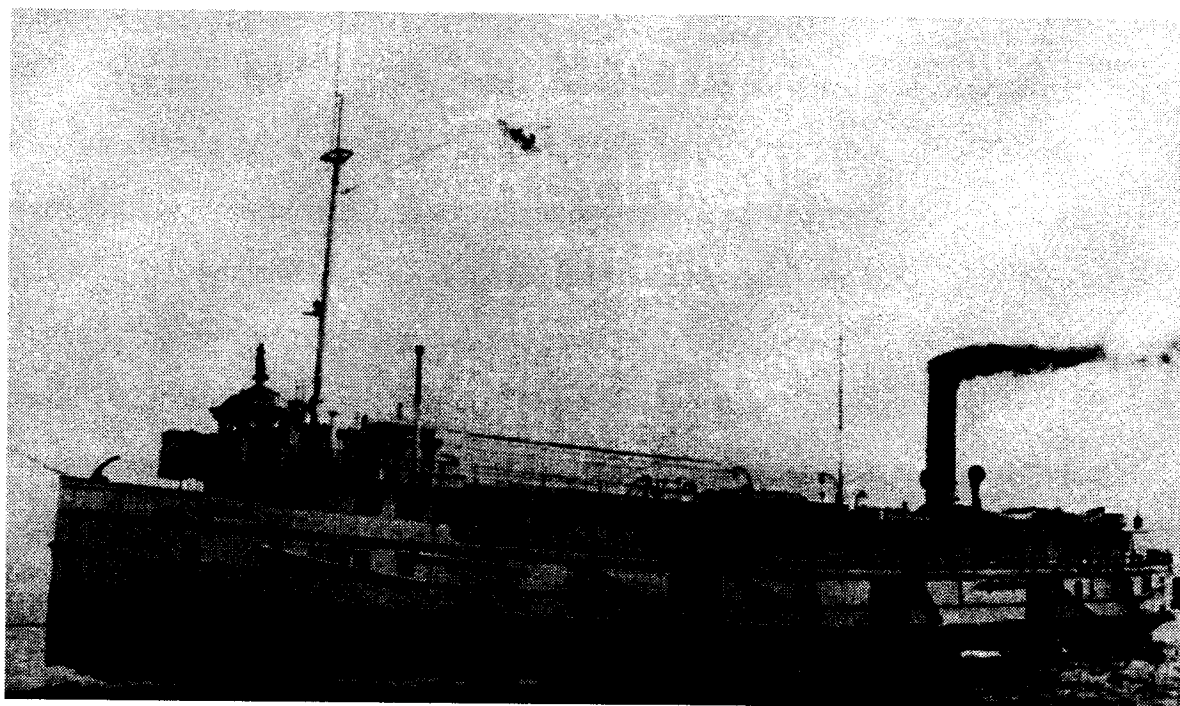
⁶⁶ David Cooper, 1986-1987 Archaeological Survey of the Schooner Fleetwing Site 47 DR168, Garrett Bay, Wisconsin (Greenville: ECU Research Report No.6), 42.

⁶⁷ Bauer, A Maritime History of the United States, 163.

⁶⁸ For a more information on the development, both historical and archaeological, of the bulk trade on the Great Lakes, see Labadie, Picture Rocks National Lakeshore, Daniel Lenihan (ed.) Shipwrecks of Isle Royale National Park, and Cooper, By Fire, Storm, and Ice.



Figures 4 and 5: Note the similarities of the passenger propeller *Japan* (below) and the package freighter *Alaska* (above). They have identical hulls and machinery, but the *Japan* is equipped with cabins to accommodate larger numbers of passengers, while the *Alaska* is suited to carry more package freight. (Photos from Barry, History of the Great Lakes, 111, 114.)



After the Civil War, the passenger service on the Great Lakes gradually recovered from the fall it took at the end of the Era of Palace Steamers, and over the next two decades it approached the levels of the 1850s.⁶⁹ As mentioned the rail companies gradually gained control of the passenger and freight trades, a profitable combination of trains and ships that stretched from the Great Lakes to the Atlantic coast.

Great Lakes passenger propellers and package freighters played important roles on the Great Lakes for over a half century. During this period, significant changes occurred in both shipbuilding and navigational improvements which influenced the designs of these vessels. By the late nineteenth century, passenger/package propellers increased in size, and many were built of iron/steel or utilized it to reinforce wooden hulls. The majority of the propellers built after 1850 were longer than 150 feet. In 1862, they averaged 182 feet, 15 years later 220 feet. Limited by the Welland Canal, which did not expand its locks for the 220-footers until 1884, most passenger/package propellers of the 1870s were Upper Lakes vessels.⁷⁰

The trend toward larger passenger vessels should not obscure the diversity in vessel size that marked the passenger/package propellers on the Great Lakes. These vessels varied in size, construction, and use. Smaller vessels tended to serve local routes such as in Green Bay, while larger ships made the long distance runs from Buffalo to Chicago or Duluth. The size and construction varied over the decades, but even passenger/freight vessels built around the same time could vary tremendously. The Northwest Transportation Company of Sarnia, Ontario contracted the construction of the 259-foot, wooden passenger/package freight vessel *Monarch* which was launched in 1890.⁷¹ Eight

⁶⁹ Labadie, Picture Rocks National Lakeshore, 29.

⁷⁰ Ibid., 25, 32.

⁷¹ The running mate of the *Monarch*, the *United Empire*, dubbed "Queen Vessel of the Inland Seas," carried more than 5,000 passengers and over 40,400 tons of freight in a single season in the 1880s.

years later, the 164-foot long, steel passenger vessel *America* was constructed at Detroit.⁷²

Many passenger/freight vessels of small to moderate dimensions. The *City of Grand Rapids*, built in 1879, had an overall length of only 122-feet and a gross tonnage of 336 tons. The 100-foot long *R.G. Stewart*, built in 1878, illustrates that smaller vessels did not have to compromise on the passenger comforts found on the larger ships. The *Duluth News Tribune* wrote of the *R.G. Stewart's* accommodations:

. . . one of the neatest and best arranged little passenger and freight propellers on the lakes. . . a full cabin has been built, containing fourteen staterooms, a kitchen, ladies' toilet room, and linen closet. A large wash room and smoking room, clerk's office, engineer's room, and lamp room have been fitted up on the main deck.⁷³

In the 1890s, some of the new passenger propellers constructed were built to solely accommodate passengers, with very little cargo space, while others were built as excursion boats, lacking overnight accommodations and cargo space. Only a dozen passenger propellers survived the opening of America's highway network in the 1930s, and although a few survived into the 1960s, passenger service, as it had been known on the lakes, had long since died.⁷⁴

The number of package freighters peaked in 1890, with 116 serving the lakes. As the nation's railroad network continued to expand, the role of package freighters rapidly dwindled, and by 1900 the number of package freighters on the Lakes dropped to 90. In

Larry Murphy and Thom Holden, "Shipwrecks of Isle Royale: The Historical Record," in Daniel Lenihan (ed.) *Shipwrecks of Isle Royale National Park* (Duluth: Lake Superior Port Cities Inc., 1994), 59.

⁷² For more information on the *America* and the *Monarch* see in Daniel Lenihan (ed.) *Shipwrecks of Isle Royale National Park*, (Duluth: Lake Superior Port Cities Inc., 1994).

⁷³ *Duluth News Tribune*, 5 September 1883 as quoted in Cooper, *By Fire, Storm, and Ice*, 59-60.

⁷⁴ Labadie, *Picture Rocks National Lakeshore*, 29.

1915 antitrust actions mandated that the railroads that operated all of the package freighters, dissolve their remaining fleets; many which never served on the Great Lakes again. Like the passenger propellers, the Great Lakes package freighter faded away into history.⁷⁵

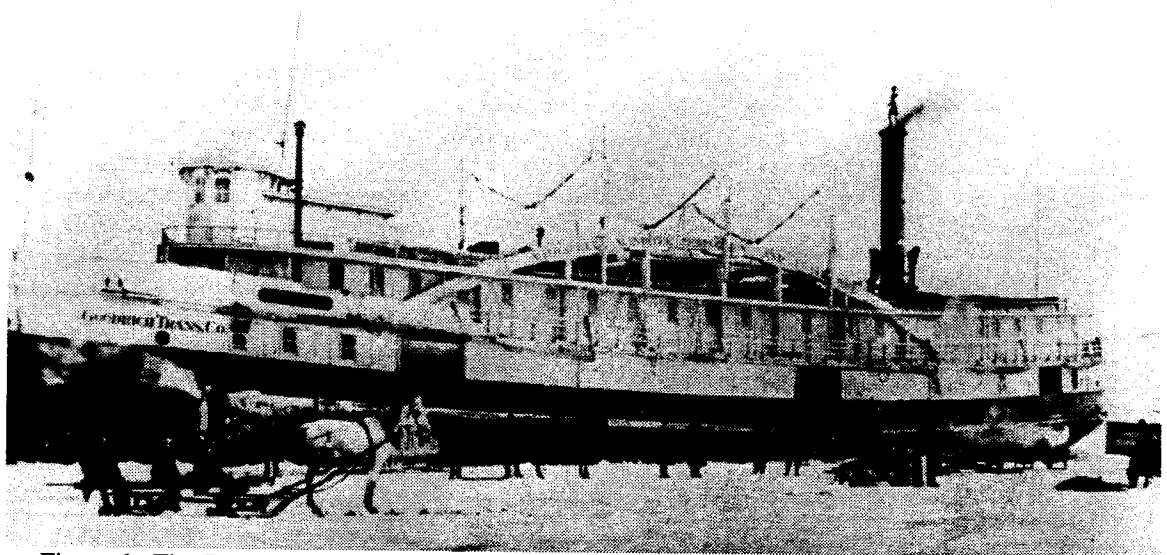


Figure 6: The *Depere* was a typical wooden passenger steamer of the 1880s. The *Depere* served the Goodrich Line and is shown here unloading cargo on the ice at Manitowoc, Wisconsin in 1885. (Barry, *Ships of the Great Lakes*, 133).

Regardless of size, construction, or use, all of the passenger/package vessels met the same fate. They simply could not compete in speed, economy, and year-round service with the railroad, and later highways and air service. Today, for most people, the passenger propellers and package freighter are unknown pieces of our past, and to others they are only a faded piece of history. Yet these vessels played key roles in the settlement and development of the Great Lakes region, and they deserve the historical recognition equal to their contribution. Not a single Great Lakes passenger/packet steamer from this era is afloat today, and plans for these vessels, especially those built of wood are extremely rare. Given this, the best source of construction and design data comes from wrecks preserved by the Great Lakes' cold, fresh water. Chapter IV, documents the

⁷⁵ Ibid.

archaeological investigation of the Clafin Point Wreck, an unidentified wooden vessel believed to have served as a passenger/packet freighter during the closing decades of the nineteenth century.

Chapter III An Industrial Outpost Little Sturgeon, Wisconsin

On the western shore of Lake Michigan, a jet of land survived the onslaught of the glaciers. Stretching nearly 75 miles, the limestone peninsula separates the Bay of Green Bay from Lake Michigan. Near the midpoint of western Door Peninsula's high limestone bluffs and rolling shores is Sturgeon Bay. Today it is the only industrial city in Door County. In the 1880s, with the completion of the Sturgeon Bay Ship Canal connecting Green Bay to Lake Michigan, the city's maritime activity surged. Not only did the canal shorten the distance between Green Bay and Chicago or Milwaukee, it allowed ships to avoid the treacherous waters of the peninsula's tip, known as Death's Door. Yet Sturgeon Bay has not always economically dominated the county. Just southwest of Sturgeon Bay is Little Sturgeon Bay. Beginning in the 1850s, Little Sturgeon, with its sheltered harbor and deep water access to Green Bay, emerged as the Door Peninsula's first center of commercial activity. This chapter documents Little Sturgeon as an industrial outpost, developed to supply urban centers with lumber, lime, and ice and lays the foundation for the archaeological study of the remains in Little Sturgeon Bay.

The country is a beautiful one, they have fertile fields planted with Indian corn. Game is abundant at all seasons, and in the winter they hunt bears and beaver. They hunt deer at all times, and they even catch wild fowl in nets. . . . All the year around they fish for sturgeon and for herring in the autumn; and in the winter they have fruits. . . . They also gather wild rice and acorns. The peoples of the bay can live in utmost comfort.¹

¹ La Potherie's *Amer. Suptentrionale*, as quoted in Holand, *The History of Door County*, 35.

A Jesuit missionary recorded these observations of the Door Peninsula's landscape in the late seventeenth century. Native cultures thrived for centuries by exploiting the resources and waterways of Door County, and others followed.

In 1835, a Mackinaw boat carrying new settlers landed on the eastern shore of Green Bay. Led by Increase Claflin, the small group settled at what would become Little Sturgeon. The first permanent white settler in Door County, Claflin ran a profitable fur post that traded with a nearby Menominee village. The point he settled upon now bears his name, and a granite monument commemorates the early settlement. Claflin stayed for nine years, trapping, trading, and working the land with his family, before relocating 30 miles north to present day Fish Creek.² Others followed Claflin's lead and settled along Little Sturgeon Bay. Over the next several decades, the area's pursuits included small-scale fur trading, fishing, and farming. These activities remained important staples in the village's economy, but lumber, lime, and ice made Little Sturgeon a valuable hinterland community in the second half of the nineteenth century.

**It Grows in Trees:
Little Sturgeon's Lumber Industry**

They looked down on . . . a dark, illimitable expanse of wilderness. It was a sea of solid treetops broken only by some gash where deep beneath the foliage an unknown stream made its way. As far as the eye could reach, this lonely forest sea rolled on and on till its faint blue billows broke against an incredibly distant horizon.

Excerpt from Conrad Richter's play *The Trees*

At one time, a vast unbroken forest stretched across the northern United States and southern Canada from the eastern seaboard to the western edge of the Great Lakes

² Holand, History of Door County, 82.

and beyond. In the early eighteenth century, French explorer Baron de Lahontan wrote in his *Descriptions of the Trees and Fruits Northern Countries* that trees of the Great Lakes stood "very tall, straight, and thick; and are made use of for Masts, which The King's Pinks do often times transport to France. 'Tis said, that some of these Trees are big enough, to serve for a mast to a First-rate Ship."³

As North America grew rapidly throughout the nineteenth century, the timber industry emerged as a product of expansion. The upper lakes region sent enormous amounts of wood east to expanding urban centers. The western lakes region, experiencing impressive new growth, also demanded lumber. With a mushrooming population, the market hungered for wood products, and thousands of men working in the seemingly endless forests attempted to satisfy it.⁴ In the 1880s, Saginaw, Michigan shipped out over 900 million board feet of lumber a year, and a mill in Michigan's Upper Peninsula produced 200,000 feet of lumber and 300,000 shingles in a single day.⁵ With such incredible outputs, the industry moved westward into the untapped forests of Wisconsin and Minnesota. By the turn of the century, the stress of consumption continued to devour the pinery. A single Wisconsin mill turned out an average of 75 million feet of lumber and 30 million shingles annually for 14 years.⁶

Wisconsin is divided into two general floristic provinces: the southwest, or

³ Barron de Lahontan, *New Voyages to North-America* (1703) as quoted in Susan L. Flader, (ed.), *The Great Lakes Forest: An Environmental and Social History* (Minneapolis: University of Minnesota Press, 1983), 279.

⁴ Michigan's Upper Peninsula alone had ten million acres of forest. Bauer, *A Maritime History of the United States*, 193.

⁵ *Ibid.*, 145.

⁶ *Ibid.*

prairie-forest province, and the northwest, or northern hardwoods province.⁷ S.A. Wilde, a professor of soil science at the University of Wisconsin-Madison, wrote that “natural forces divided . . . [Wisconsin] . . . into . . . the northern half [which] is covered by soils that have the world’s highest productive potentials under forest cover... and the southern half [that] is comprised of soils that contribute their full to the breadbasket of America.”⁸ Door County falls into the northern province.

The north woods contain a wide variety of vegetation types, both forest and non-forest. These are the result of an impressive variation in topographic ranges, from the very wet to the very dry and from sandy and thin rocky soils to deep loams and clays.⁹ Conifers such as pine, spruce, hemlock, fir, cedar, and tamaracks, and hardwoods like maple, birch, oak, and ash thrive in Wisconsin woodlands.

Pinus Magnifica

Spectacular stands of hardwood (broad-leaved trees) and conifers (needled-leaved trees) stood in the forests of northern Michigan, Minnesota, and Wisconsin. Although these other trees proved useful later (mainly after the depletion of virgin pine), they did not drive the logging industry across the continent like pine did. *Pinus strobus* or white pine dominated the lumber industry. According to the Wisconsin Geological and Natural History Survey of 1898, between 1840 and 1873, the lumber industry took 20 billion board feet of pine out of Wisconsin. Over the next 25 years, 66 billion board feet were

⁷ John T. Curtis, The Vegetation of Wisconsin: An Ordination of Plant Communities (Madison: University of Wisconsin Press, 1959), 15.

⁸ S.A. Wilde, Woodlands of Wisconsin (Madison: University of Wisconsin Extension, 1977), 8.

⁹ Curtis, The Vegetation of Wisconsin, 171.

cut.¹⁰ The woods became synonymous for the pine forests, the pinery, or the "Empire in Pine." S.A. Wilde expanded in Woodlands of Wisconsin:

White pine is the central figure of American folklore that features logging days and lumber camps.... "Pinus magnifica" would be more appropriate name for this tree than its present scientific label. More than any other member of the eastern American forest, this tree conveys a feeling of respect tinged with awe.¹¹

White pine has several desirable features that made it king of the lumber industry. The first is its ability to grow in diverse environments. John T. Curtis, a former professor of botanical studies at the University of Wisconsin, wrote in The Vegetation of Wisconsin that pine "is the only species which is present in appreciable quantities in all segments of the full moisture gradient from wet bogs to xeric sand plains."¹² Although the tree thrives in sandy soils, it can grow in just about any soil type, and can actually grow in the cracks of sandstone cliffs. Pine requires less moisture and food than most species in order to produce a given amount of wood, and therefore grows rapidly.¹³

White pine can grow up to seven feet in diameter and over 200 feet in height, with the average maximum size around 5-feet in diameter and 125-feet tall.¹⁴ In the 1920s, a single 113-foot tree, with a 3-foot diameter produced about 1,700 board feet of lumber.¹⁵

¹⁰ State of Wisconsin Executive Office, Bulletin No. 3 (Madison, 1936), 1.

¹¹ Wilde, Woodlands of Wisconsin, 102.

¹² Curtis, The Vegetation of Wisconsin, 294.

¹³ A 365 year old hemlock studied in Northern Wisconsin, was only 22" in diameter and 79' tall, while a 222 year old pine (found in similar soil conditions) was 44" in diameter and 126' tall. State of Wisconsin Executive Office, Bulletin No. 3, 3.

¹⁴ *Ibid.*, 8.

¹⁵ *Ibid.*, 19.

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 acre at 80 years, while virgin forests' production is estimated around 140 million board feet per acre.¹⁶

Many trades considered white pine an ideal building material. Pine's tendency to drop lower limbs as it grows (a typical stand will not spread branches until 50 feet or higher) results in a straight trunk with even-grained wood clear of knots.¹⁷ George Hotchkiss, a nineteenth-century historian and editor of the Lumberman's Directories, wrote of the species favorable characteristics:

Being of a soft texture and easily worked, taking paint better than almost any other variety of wood, it has been found adaptable to all the uses demanded in the building art. . . . No wood had found greater favor or entered more fully into supplying all those wants of man which could be found in the forests growths.¹⁸

Although Native Americans and early Euro-Americans utilized the forest of the Great Lakes for centuries, sweeping exploitation of the resource did not begin until the early nineteenth century. Facing shortages of domestic timber, in part due to urban growth and military consumption during the Seven Years and Revolutionary wars, the British initially turned to the Baltic to help relieve the situation. In the early 1800s, Napoleon cut the British off from the Baltic timber trade in an effort damage Britain's naval and maritime dominance.¹⁹ European forests, logged for centuries and poorly

¹⁶ Wilde, Woodlands of Wisconsin, 103.

¹⁷ Cronon, Nature's Metropolis, 152.

¹⁸ George W. Hotchkiss, History of the Lumber and Forest Industry of the Northwest (Chicago: G.W. Hotchkiss, 1898), 752.

¹⁹ Barry, Ships of the Great Lakes, 62.

managed, had been exhausted of premium timber. The British Navy desperately needed to find a new source of lumber and turned to their North American colonies, the great Canadian forests along the shores of St. Lawrence River, Ottawa River, and Lake Ontario.²⁰

The old growth, or virgin, forests of the New World produced a quality of wood not seen for centuries in Europe. Timber exporters flocked to Quebec and marked the beginning of the great timber and lumber trade of the Great Lakes.²¹ Although an “endless” supply of the highest quality timber existed, it had to reach a mill to earn a profit. Pine’s low density, unlike the hardwoods that co-existed with it, eased the burden of transporting such a bulky commodity through the wilderness--it floated.²² For those who worked in the frontier, the rivers, streams, and lakes provided the only efficient means for transporting saw logs any distance in a landscape void of roads and rail lines.

The greatest expense in nineteenth century lumber industry resided in transportation costs. Shipping timber to mills, excluding final shipment to market, accounted for anywhere from 52-75 percent of the total cost, even as late as 1913.²³ “Regardless of time, place, or type of operation,” wrote William Rector in Log Transportation in the Lake States, “the transportation of logs was a major pivot around

²⁰ Although important to Britain's urban and industrial growth, timber was an essential to the nation's navy. Between 1730 and 1787 the Royal Dock Yards consumed nearly 18 million board feet annually. With less and less local, quality timber available, Britain's naval power balanced in finding new supplies. Robert G. Albion, Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862 (Camden: Archon Books 1965), 104.

²¹ Barry, Ships of the Great Lakes, 62.

²² Cronon, Nature's Metropolis, 153.

²³ Cooper, Fleetwing, 49.

which the entire manufacturing process was forced to revolve.”²⁴ Mills employed railroads, streams, and rivers to extend reach into forests’ interiors, in an effort to keep the saws running.

Some mills turned to the Great Lakes to overcome the limitations set by the natural meanders of area tributaries or the economics of laying track in the frontier. Giant log rafts, or booms, provided an economical means of transporting saw logs over great distances. The boom or bag, a series of short logs (around 16 feet) with large diameters (three to four feet) fastened together end to end, made up the perimeter and provided the raft’s only structure. Filled with loose logs, these log rafts, reaching up to 25 acres in size, were towed by steamers to move tremendous amounts of timber. Over 25 million board feet moved across Lake Huron from Canadian forests to Michigan mills in 1890, and four years later the number jumped to 300 million board feet.²⁵ To the west, tugs towed colossal log rafts along the shores of Lake Michigan and Green Bay, supplying mills with legions of logs.²⁶

Ideal for the lumber industry, log rafts created chaos for the other waterway users. A United States House of Representatives report from the 51st Congress provides a “partial list of the casualties resulting from towing rafts during three months and a half of the year 1890.” The lake figures calculate to \$62,850 worth of damage, an amount that steadily rose over the next decade. One contemporary called log rafts the “greatest man made obstacles to navigation that ever were seen on the lakes.”²⁷ Poorly lit and often

²⁴ William Rector, Log Transportation in the Lake States Lumber Industry 1840-1918 (Glendale, CA: Arthur H. Clark Co.), 20-23, 25.

²⁵ Barry, Ships of the Great Lakes, 125.

²⁶ These were used to supply the mill at Little Sturgeon.

²⁷ Robert F. Fries, Empire In Pine: The Story of Lumbering in Wisconsin (Madison: State Historical Society of Wisconsin, 1951), 56.

invisible to other sailors, log rafts could entangle unsuspecting vessels through in a tow-line or entrap them in a sea of logs pounding upon their hull. Congress also reported:

[Log rafts have caused] serious collisions, and the displacement of buoys and stakes, and other aids to navigation which are absolutely necessary to mark the channel. . . . As the speed of the raft is much less than other boats, their passage through these narrow waters oftentimes not only cause damage by collision, but impedes navigation by preventing the passage of boats making a higher rate of speed.²⁸

A Felled Forest in the Prairie--Chicago

Winter months brought the legendary logging camps which dotted the pinery--big men, cutting bigger trees, producing even bigger tales. The spring thaw saw the river drives and lake rafting, which moved gargantuan amounts of wood to the mills. In some mills, machinery worked around the clock for months at a time, stopping only for repair: transforming logs to lumber--acres to board feet. In 1871, the mill at Little Sturgeon ran for three months without stopping for more than five minutes.²⁹ As trees fell, lumber barons accumulated impressive wealth. Ironically, it was the great prairie, not the great pinery, that profited most from the lumber industry. Chicago, "Nature's Metropolis," lacked significant local forests, yet it became the greatest lumber distributor in America, if not the world.³⁰ Without local forests, Chicago's market relied upon the trees and mills of Michigan and Wisconsin.

²⁸ Congress, House, "Lumber Rafts on the Lakes," 51st Con., 2nd Sess., H.R. 3759.

²⁹ Rohe, "Ghost of the Bayshore: Part I," 35.

³⁰ In 1895, Chicago's lumber industry employed nearly 20,000 people. *Sunday Inter Ocean*, 4 August 1895.

The Great Lakes allowed Chicago to profit from resources it lacked. Lake Michigan provided the city with convenient access to an arboreal ecosystem and its resources.³¹ Schooner, steamers, and barges brought the forest in droves to the prairie.³² Such a demand for lumber existed that a shortage of vessels to transport the commodity developed. The *Detroit Free Press* reported in 1864 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."³³

The Chicago lumber yards held over 400 million board feet in 1879 and controlled an estimated \$80 million in capital, and its lumber district had twelve miles of dockage devoted to handling lumber.³⁴ "One thing is for certain," wrote Chicago's *Sunday Inter Ocean*, in 1895, "those great lumber piles tower up to a height sufficient to excite the wonder and admiration of people not in the lumber business."³⁵ Astronomical amounts of lumber moved through Chicago. At times, the harbor received in excess of 200 vessels loaded with lumber in a single day. In 1872, over 9,000 of the 13,000 Chicago Harbor arrivals brought lumber to be stacked in the great yards.³⁶

³¹ Cronon, *Nature's Metropolis*, 151.

³² The *Sunday Inter Ocean* reported that "the *Scotia*, in August of 1894, brought in a cargo of 1,144,745 feet. Cargoes of 1,200,000 to 1,400,000 feet are not unusual.....Then there are the steam barges which carry a good sized cargo and tow two or three barges still more heavily laden with lumber. A tow of this kind often transport in round numbers 3,000,000 feet of lumber from the mill to the market in one trip." *Sunday Inter Ocean*, 4 August 1895.

³³ *Detroit Free Press*, 31 March 1864, as quoted in Labadie and Murphy, "Major Vessel Types on Lake Superior," 33.

³⁴ Cronon, *Nature's Metropolis*, 173,175.

³⁵ *Sunday Inter Ocean*, 4 August 1895.

³⁶ Cronon, *Nature's Metropolis*, 172.

In 1874, the *Wisconsin Lumberman* wrote of Chicago that “no lumber market but this could dispose of an average of three million feet a day.”³⁷ The scale and competition of Chicago lumber yards produced low prices, but virtually guaranteed that mill owners always found a willing buyer, and retail dealers a seller. The *Wisconsin Lumberman* later reported, “Chicago is not only the largest lumber market in the world, but it has always had an eminent reputation as a market upon which almost any amount of lumber could be placed at any time and sold for cash.”³⁸ Wholesalers purchased lumber by the shipload upon their arrival, an attractive draw to mill operators looking for quick turn-around times to maximize the number of shipments in a season. This enticed mill operators from ports around Lake Michigan, and even from as far as Lake Huron, to deal their goods there.³⁹

Consumption

[T]he abundance of wood enjoyed by Americans from the earliest settlements was a factor in making the material environment here different from that known abroad. . . . It was our first and long most important source of thermal energy. Still more important was its use as the primary material in all large construction from house framing to shipbuilding, and in much smaller craftsmanship from furniture to tools. . . . Wood permitted an extent of development that would not have been possible without it. It was cheap. . . . It was more easily worked than many other material.⁴⁰

³⁷ “Sound Advice from Chicago,” *Wisconsin Lumberman*, June 1874, 236 as quoted in Cronon, *Nature's Metropolis*, 171.

³⁸ “Chicago Lumber Market,” *Wisconsin Lumberman*, December 1874, 201 as quoted in Cronon, *Nature's Metropolis*, 171.

³⁹ Cronon, *Nature's Metropolis*, 175.

⁴⁰ Brooke, Hindle (ed.), *Material Culture of the Wooden Age* (New York: Sleepy Hollow Restorations, Inc., 1981), 3-4.

As previously stated, lumber production in the Great Lakes during the nineteenth century was both mammoth and profitable. But where was this wood going? What was it being used for? The answers are everywhere and everything, from farm to city, from ships to railroads. By the late 1880s, North America had laid almost 160,000 miles of railroad, each mile required 2,500 eight-foot rail road ties, which needed replacement at least once a decade.⁴¹ Great Lakes' cities were literally built during this period. An eight room house required roughly 20,000 board feet of lumber; meaning 1.3 billion board feet would have been required to house the city of Chicago in single family dwellings in 1870.⁴² The population consumed oceans of cord wood for heating (fuel), while early steamers burned up to 300 cords per trip.⁴³ For the last three decades of the nineteenth century, Chicago's lumber receipts by lake hovered around 1 billion board feet a year,⁴⁴ and it came from north woods hinterland outposts such as Little Sturgeon.

A Peninsula of Wood

Door County has unmistakable and not easily destroyed landscape beauty. It is wild and as yet unspoiled, with alternating interests of woodland and cliff; bay and land. . . . the shore with its many graceful indentations is a never-ending delight. It sweeps from point to point, here a beach of fine sand, there of gravel, then, in contrast,

⁴¹ Pierre Berton, The Great Lakes (Toronto: Stoddart Books, 1996), 97.

⁴² Murphy and Lenihan, "Lake Superior Maritime Tradition," 23.

⁴³ Mansfield, History of the Great Lakes, 400.

⁴⁴ Mansfield, History of the Great Lakes, 521. During this most of this period, Chicago's receipts by rail ranged between a quarter to a half that amount by rail. The exception, and peak of the city's lumber receipts was in 1892 when lake carriers brought in 1.4 billion board feet and rail .8 billion board feet.

precipitous limestone bluffs rising to a height of a hundred feet or more and covered with a heavy growth of native trees. . . . Extensive forests of pine, cedar, balsam, maple basswood, and birch, covering large tracts . . .⁴⁵

Increase Claflin may have founded the settlement of Little Sturgeon, but Freeland B. Gardner built it into a thriving commercial center. Born in Elbridge, New York in 1817, Gardner moved from New York to Kenosha, Wisconsin at age 27, where he operated a dry goods business. He later relocated to Chicago to run a lumber handling facility.⁴⁶ Around 1850, Gardner established a lumber mill in Pensaukee, Wisconsin, about 23 miles north of Green Bay. Seven years later, the enterprise included both a steam and water mill, a large boardinghouse, and a dock for small steamers.⁴⁷ Gardner, a savvy entrepreneur, also made plans to profit from the rich farm lands surrounding Pensaukee. His pattern of diversified holdings is evident at his Little Sturgeon operation.

Moving to Little Sturgeon in 1854, Gardner purchased Increase Claflin's old homestead. By the fall of 1856, Gardner constructed a large lumber mill in Little Sturgeon capable of cutting long timbers for bridges and vessels.⁴⁸ The following year, Gardner improved the mill by installing a larger engine, which enabled the facility to produce 4 million board feet of lumber.⁴⁹

During the great lumbering era, the construction of a saw mill often represented the first step in the evolution of a town or village. Inevitably other businesses followed,

⁴⁵ John Nolen's report to State Parks for Wisconsin as quoted in Holand, History of Door County, 8.

⁴⁶ Rohe, "Ghost of the Bayshore: Part I," Voyageur, Vol. 13, no. 1, (1996), 30.

⁴⁷ Hirthe, Schooner Days in Door County, 15.

⁴⁸ Ibid.

⁴⁹ Rohe, "Ghost of the Bayshore: Part I," 31.

and it did not take long for Gardner to expand his operations in Little Sturgeon. Soon a gristmill, boardinghouses, a general store, and rail extension from the mill to the bay's docks all operated in the village.⁵⁰ These developments marked the beginning of a period in Door County's history dubbed "The Golden Age of Little Sturgeon."⁵¹

Logs into Ships

On July 3, 1866, as part of the Independence Day celebration, the rebuilt vessel *F.B Gardner* slid into the waters of Little Sturgeon Bay. Over the previous winter and spring, crews lengthened the vessel 60 feet and converted it from a brig to a barque.⁵² This was the first vessel launched in Little Sturgeon. Gardner had obtained the services of Thomas Spear to manage the shipbuilding operations. Spear's sons, an expert caulker and carpenter helped run the yard. Later in 1866, Spear rebuilt the steamer *Union* and built the 92-foot *John Spry*. Supplied with timber felled from Gardner's lumber camps and towed to his lumber mill, the shipyard built or rebuilt a total of ten vessels, plus an unknown number of scows and barges, over its nine-year tenure. All but two of the ten served in his fleet.⁵³ Employing up to 60 workers, the yard remained the largest shipbuilding facility to operate in Door County before the twentieth century.⁵⁴

⁵⁰ The grist mill, with two runs of stone, was capable of producing more than 1,000 bushels of grain in eighteen hours. It was the first grist mill in the county, and it attracted large numbers of farmers from around the area. Ibid.

⁵¹ Holand, *History of Door County*, 429.

⁵² Hirthe, *Schooner Days in Door County*, 15, 16.

⁵³ Only the *Lake Forest* and *Halsted* were not built for Gardner. However, the *Halsted* was originally for Gardner, but because of financial reverses it was constructed for H.S. Halsted of Chicago. Hirthe, *Schooner Days in Door County*, 133.

⁵⁴ Ibid., 18.

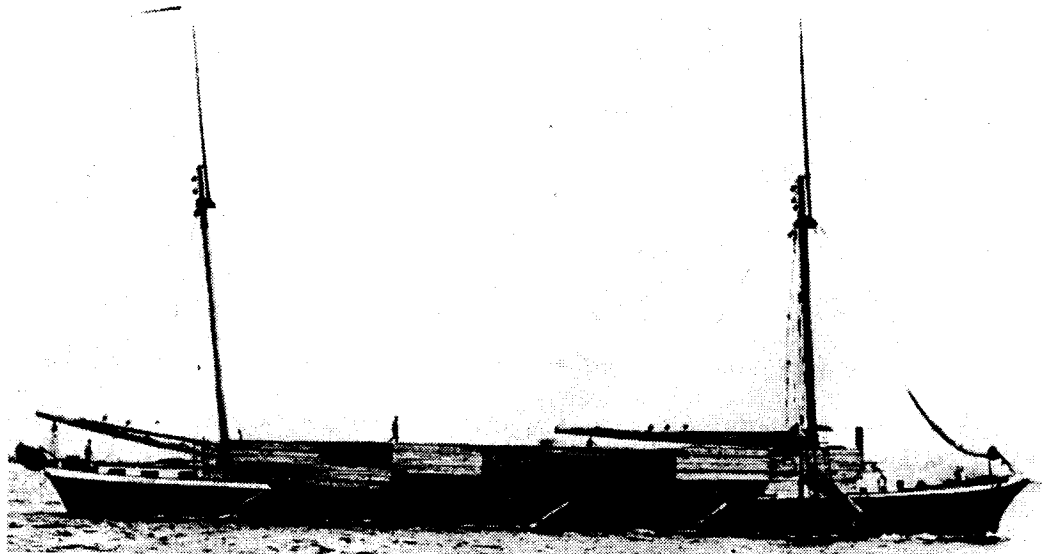


Figure 7: The *F.B. Gardner* (Hirthe, *Schooner Days*, 16.)

“A visit to the sawmills there,” the *Door County Advocate* wrote in 1865, “will repay those who desire to see everything about a sawmill as it should be. The arrangements in every department are so well managed for carrying on a large and successful business and for the comfort of the men.”⁵⁵ Under Gardner’s management, the mill produced over 4.5 million board feet of lumber in a single season, and he expanded the operation by adding a lath mill, shingle mill, and a circular saw.⁵⁶

In 1868, Gardner sold his Little Sturgeon holdings to Erastus Baily and Tristram Vincent, for an estimated \$100,000. Despite reports of favorable business and relations, Baily and Vincent ended their operation in Little Sturgeon in the fall of 1869. The firm sold the facilities back to Gardner, who ably took over and shipped out in excess of 5

⁵⁵ Rohe, “Ghost of the Bayshore: Part I,” 31. *Door County Advocate*, 7 December 1865.

⁵⁶ In 1871, the mill produced 11 million shingles, and its Valentine machine and a single circular saw cut 106,000 shingles or 6,100 board feet of lumbering only 75 minutes. Rohe, “Ghost of the Bayshore: Part I,” 34, 35.

million board feet, 8 million cut shingles, and 150 cords of wood that year.⁵⁷

Fire posed a real threat in the nineteenth century, particularly to lumber towns. Little Sturgeon was no exception. In 1857, a fire swept through Gardner's mill devouring 250,000 board feet of lumber, and causing \$65,000 worth of damage. Gardner had no insurance, but managed to rebuild the following year cutting 1 million board feet with 50 men.⁵⁸ These types of disasters were not uncommon in the world built of wood.

On October 8, 1871, after a winter with little snow and a long dry summer, devastating fires swept across the west shore of Green Bay and the southern half of Door County. Known as the Peshtigo Fire, it was the deadliest in American history. With more than one million acres and 1,200 people devoured by the flames, the inferno wreaked more damage than the Great Chicago Fire that occurred the same night.⁵⁹ Just south of Little Sturgeon sat Williamsonville, a small lumbering village of 76 people. The blaze completely destroyed the settlement, claiming every building and 59 residents.⁶⁰ The fire advanced to Little Sturgeon, where Gardner's laborers met it head on and battled the blaze with the bay's water. "The fire had come within a stone throw of the hamlet," wrote the *State Gazette*, "and when the scattering little population had made ready to plunge into the protecting shallows of the Bay, the flames were whirled off to the

⁵⁷ Ibid., 35.

⁵⁸ Ibid., 31.

⁵⁹ Also that same night devastating fires swept Michigan's upper and lower peninsula's. Although the loss of life (around 10 people) did not approach that of Peshtigo, the Michigan fires claimed nearly three times the timber land. Kris Beisser Olson, "The Great Fire of October 1871: A Nation Responds, Letters and Telegrams to Governor Fairchild," *Voyageur*, Vol. 13, no. 2, (1997), 10-11.

⁶⁰ Founded by the Williamson brothers, the town manufactured shingles, which were hauled to Little Sturgeon by wagon and shipped out from Gardner's docks. In less than three months in 1871, 6 vessels loaded shingles for Williamson Bros. Hirthe, *Schooner Days in Door County*, 22.

northward, and the town was saved.”⁶¹

Little Sturgeon thrived in the wake of the disasters, although much of the surrounding area had been ravaged by fire,. After the fire, the *Green Bay Advocate* wrote that Little Sturgeon had “the finest dock and sawmill left standing on the peninsula. It...has expended \$100,000 on piers, mills, shops, shipyards, store rooms, and tenement houses.”⁶² Business at the mill continued to boom, and in 1872 it produced 7 million board feet of lumber, and over 7 million shingles, with the hopes of yielding 10 million board feet that winter.⁶³

Feeding off the huge demand created by the Chicago, Peshtigo, and Michigan fires of 1871, lumber concerns enjoyed a major market boom. However, a market collapse followed, compounded by the Panic of 1873, caused many companies to fail. Gardner, also facing personal financial troubles, sold his entire Little Sturgeon holding to Spear for \$26,000 in November 1875. Cutting pine along the Peshtigo River and rafting it across Green Bay to Little Sturgeon, Spear’s mill, which just received a \$5,000 retooling, prospered.⁶⁴ The *Door County Advocate* reported on June 1, 1876:

Boards drop from the saw logs like shingles from a machine, and the men whose duty it is to “clear the saw” don’t loaf worth a cent. The amount of lumber turned out will average 65,000 feet a day in addition to the cants prepared for shingle bolts. The shingle machine . . . is managed by one of the best shingle sawyers in the West. the average drop is about 100,000 shingle a day. . . . We

⁶¹ *State Gazette*, 13 November 1871 as quoted in Rohe, “Ghost of the Bayshore: Part I,” 36.

⁶² *Green Bay Advocate*, 2 November 1871 as quoted in Rohe, “Ghost of the Bayshore: Part I,” 36.

⁶³ Rohe, “Ghost of the Bayshore: Part I,” 38.

⁶⁴ *Ibid.*, 36.

do not know of another machine doing this amount of work and doing it well.⁶⁵

Spear had the operation running more efficiently than ever, and cut over 13 million board feet of lumber in 1876, with over 1 million board feet shipped directly to Europe.⁶⁶ Aside from distant markets, the forests supplied Little Sturgeon's other industries. Spear used lumber for his ship yard. The town's lime kiln burned acres of cord wood, and mountains of saw dust provided crucial insulation for ice harvested by the A.S. Piper Co.

After escaping the flames of the Peshtigo Fire and the depression of 1873, the sawmill ran out of luck on February 22, 1877. Just north of the mill, smoke billowed from the blacksmith shop, and flames quickly engulfed the building. A strong wind pushed the blaze across the village. The mill and its contents were completely destroyed. This \$30,000 loss, with only a third insured, proved more than Spear could endure and he sold his holdings, ending Little Sturgeon's lumbering era.⁶⁷ William Anger, who ran the lime kilns, purchased Spear's interests, and soon sold the land to the A.S. Piper & Co. for their ice business.⁶⁸ In 1882 the *Door County Advocate* reported of the once prosperous mill:

The mill buildings all have the appearance of neglect and unless something is done to revive some of the old life into the place, it will go where the woodbine twineth in a few years. Nothing but a heap of stones and a few pieces of iron remain to mark the site of the mill, which was destroyed by fire five years ago this winter; and in a short

⁶⁵ *Door County Advocate*, 1 June 1876 as quoted in Rohe, "Ghost of the Bayshore: Part I," 39.

⁶⁶ Rohe, "Ghost of the Bayshore: Part II," 26.

⁶⁷ *Ibid.*, 38.

⁶⁸ Hirthe, *Schooner Days in Door County*, 30.

time this old familiar land mark will be obliterated.⁶⁹

“Timmmer”

In 1852, a Wisconsin Congressman spoke of the north woods as “interminable forests of pine sufficient to supply all the wants of the citizens . . . for all time to come.”⁷⁰ Two decades later, the words of a Chicago journalist indicated no foreseeable end, “Will our pine timber soon be exhausted? We say no. None of our generation will see our pine forests decimated.”⁷¹ Others, although few, managed to see the inevitable depletion of the resource. Surprisingly outspoken about deforestation of the Great Lakes region, a Canadian lumberman wrote in 1876 that the lumber barons were “not only burning the candle at both ends...but cutting it in two, and setting the match to the four ends to enable them to double the process of exhaustion.”⁷² No amount of track, not the rivers or streams, and not even the giant log rafts could keep the mills running; there simply was not enough forest. The same forces that ushered the timber industry into Wisconsin, drove it out.⁷³

⁶⁹ *Door County Advocate*, 22 March 1882.

⁷⁰ Berton, *The Great Lakes*, 98.

⁷¹ George Skaim, “Where Our Lumber Comes From,” *Western Monthly*, 3 (1970): 191 as quoted in Cronon, *Nature's Metropolis*, 200.

⁷² James Little, “The Timber Supply,” *NWL*, 29 July 1876, 243 as quoted in Cronon, *Nature's Metropolis*, 200.

⁷³ This can be seen at Little Sturgeon by examining an article in the *Door County Advocate* that offered an explanation of the extent of the cut-over. By comparing early timber quality and prices to those in the closing years of the lumber industry, the article illustrates the affect of the resource's depletion. “The finest growth of white oak timber that had ever seen was to be found . . . [around] the bay. It was regarded of so little value that builders readily obtained all the needed for the payment of \$1 for a tree. . . . of such a size that they would square 16 inches or more for a distance of 40 feet. . . . but before the industry was discontinued there was little of any size or kind left. . . . a tree . . . that went begging for a dollar then would now bring no less than \$70.” *Door County Advocate*, 26 September 1903.

Great Lakes' sawmills produced over 2.75 billion board feet of pine in 1869, 5 billion board feet in 1879. Ten years later, the region cut over 7 billion board feet, an onslaught that not even the vast woods of the Great Lakes could sustain.⁷⁴ Spoiled by the yields of virgin forests, initial waves of lumbering regularly bypassed pines 3-feet in diameter; in closing years mills were using logs as little as six inches. As time passed, smaller and smaller trees fell and loggers became less discriminative in species selection. Soon nothing remained, and in many places forests became wasteland. Observing the altered landscapes, the *Daily State Gazette*, commentated in an article about Little Sturgeon in 1871 that "nothing deforms the face of nature so swiftly as a lumbering community."⁷⁵

The importance of lumber can be seen in the industry created by the hinterland. Wisconsin mills cut nearly 1.25 billion board feet of lumber in 1873, twice that amount in 1882, and peaked with 4 billion board feet in 1892.⁷⁶ Although a small part of the effort, Door County, in peak years, had as many as 7,000 vessels moving more than 600 million board feet of timber through the area.⁷⁷ The largest employer in the state, the lumber industry utilized an estimated 14,479 workers in 1885, with the next highest employing only 1,431. That same year, the industry paid over \$4.6 million in wages out of a \$13.7 million total for the entire state.⁷⁸

⁷⁴ Rector, Log Transportation in the Lake States, 59.

⁷⁵ *Daily State Gazette*, 13 November 1871 as quoted in Rohe, "Ghost of the Bayshore: Part I," 37.

⁷⁶ Robert C. Nesbit, *Urbanization and Industrialization, 1873-1893* (Madison: 1985), vol. 3; *The History of Wisconsin*, 47. as cited in Jody Krejarek, "The Knights of Labor and Lumber Industry," 1 *Voyager*, Vol. 13, no. 1 (1996), 16.

⁷⁷ Holand, History of Door County, 150.

⁷⁸ Krejarek, "Knight of Labor and Lumber Industry," 16.

Owing so much to the mills that defined so many lives, one can understand a town or village watching with nostalgia as the last log came across the saw. A northern Wisconsin paper writing of the town's mill closing, spoke on behalf of many contemporaries, when it expressed this end-of-an-era sentiment:

[The mill] will be greatly missed. . . . The smoke will no longer be seen rising in the vast clouds, the whistle will no longer resound along the lake and through the hills; the thunder of the logs as they plunge into the bay and the sound of the woodmen's axe and saw as he fells lofty pine . . . may be spoken of in verses and story, but will be known only in memory.⁷⁹

As the lumbermen's axes tore through the great forests and worked across the pinery, another industry made its mark on region's landscape. Huge quarries were carved into the region's cliffs and outcrops in order to feed a nation's growing demand for lime and stone.

Burning Stone: Little Sturgeon's Lime Industry

This remarkable limestone ledge forms the Niagara Falls, then sweeping through Canada and upper Michigan, turns to the south along the west side of Green Bay and Lake Winnebago and is lost only at Ashippun in Dodge County, Wisconsin.⁸⁰

Increase A. Lapham, 1851

During the Silurian period of the Paleozoic, shallow seas covered much of the continent's interior. Over time, organic deposits, such as shells, corals, and other Paleozoic marine life, accumulated and formed massive formations of calcium carbonate

⁷⁹ *Bayfield County Press*, 27 August 1924.

⁸⁰ John C. Palmquist, *Wisconsin's Door Peninsula: A Natural History* (Appleton: Perin Press, 1989), 12.

or limestone (CaCO_3). The result was the Niagara Escarpment, a geologic feature that stretches nearly 900 miles from New York to Wisconsin.⁸¹

Limestone is a tremendous resource that literally forms the foundation of Door County. Reaching up to 800-feet thick in Door County, the dolomite formations are very erosion resistant and form the ridges that rise abruptly on the peninsula's western shore. Today, many of the post cards found in the area's gift shops prominently feature its geology. However, these cliffs had great economic value as a raw material. During the late nineteenth century, enormous blasts freed tons of limestone from cliff faces, and smoke and grit hung in the air from lime kilns. These outcrops were the scene of hard, intense labor of the limestone extraction and lime production industries.

Although limestone was processed around Wisconsin, large scale production concentrated along the Lake Michigan coast. In 1868, F.B. Gardner constructed a lime kiln at Little Sturgeon to supply Green Bay and the western shore of the Bay of Green Bay. By 1874, the expanded facilities also supplied Chicago, and other ports around the Great Lakes with high-quality lime. During peak years of production, crews worked around the clock to produce as much as 160 barrels of lime a day.⁸² This section examines the lime industry and its role in Little Sturgeon Bay.

⁸¹ Palmquist, Wisconsin's Door Peninsula, 12; After exposure to magnesium, possibly from ground water, limestone is subjected to a process called dolomitization--when magnesium replaces part of the calcium in limestone to become magnesium carbonate or dolomite [$\text{CaMg}(\text{CO}_3)_2$]. Resembling limestone in many ways, much of the "limestone" formations found in southern, eastern, and western Wisconsin are actually composed of dolomite. The Dictionary of Geological Terms points out that the technical definition of dolomite refers to a mineral. However, the term is often referred to the rocks that approximate the mineral dolomite. Some have proposed the use of the terms magnesian limestone or dolostone. For this discussion, it will all be referred to as, simply, limestone.

⁸² Rohe, "Ghost of the Bayshore: Part II," 37.

Burning Stone

Quarried, untreated limestone provided the building blocks for several industries. Harbors around the Great Lakes utilized the stone in the construction of piers and breakwaters. Buildings and bridges required giant rip rap slabs for foundations, while highways, streets, and railroad beds utilized crushed limestone in enormous quantities. Although limestone left Little Sturgeon's dock in an unprocessed form, as illustrated by the limestone seen today on the lakebed and Claflin Point Wreck, the majority fed the village's kilns to produce lime. When processed, limestone yields lime, a utilitarian chemical. Lime has a variety of important uses in agriculture. Most notably the chemical, an alkaline, is used to neutralize acidic soils.⁸³ Lime is also used for such things as whitewash, tanning leather, and plaster. Most significantly, lime is the primary ingredient of mortar and cement.⁸⁴ With all of these uses, lime production developed into a sizable industry, and by the mid-nineteenth century, large operations took hold in Wisconsin.

Lime, often referred to as the oldest chemical produced by man, may have been first used by the Egyptians. Archaeological analysis of the mortar suggests that they understood the subject nearly as well as early nineteenth century lime burners.⁸⁵ From the ancient Egyptians to the early American settlers, lime was produced generally the same way--burning limestone. Lime, also known as pure lime, burnt lime, caustic lime, or quicklime, is produced through the process of calcining, or burning, limestone

⁸³ Lime was also used to increase the fertility of soil by speeding the breakdown of both organic and inorganic material.

⁸⁴ Victor R. Rolando, 220 Years of Soot and Sweat: The History and Archaeology of Vermont's Iron, Charcoal, and Lime Industries (Dover: Dover Litho Printing Co., 1992), 205.

⁸⁵ *Ibid.*, 205.

without fusing, or melting, it. By subjecting limestone to very high, sustained temperatures, the carbonic acid (H_2CO_3) is driven off, producing calcium oxide (CaO), or lime.⁸⁶

Lime production in the early nineteenth century, often consisted of burning stacks of limestone and wood piled together. After the fire died, workers carefully sorted through the ash and separated the fresh lime.⁸⁷ Known as flare or field kilns, these kilns were labor and fuel intensive and did not yield a high-quality product. As demands for lime increased, a need for more efficient burning developed. Pot kilns, or intermittent kilns, were constructed to fulfill this need. As their name implies, these kilns produced lime in batches. Victor R. Rolando describes, in his discussion on the evolution of lime kilns, the operating procedure:

. . . the kiln was charged (loaded with limestone), burned, cooled, and emptied, and then the cycle repeated. The advantage here was that the kiln was operated only when demand existed; the disadvantage was the irregular quality of the product from burning to burning.⁸⁸

The next step in the lime burning evolution occurred in the mid-1800s with the appearance of the perpetual kiln, often referred to as continuous or running kiln. The simplest of these was the mix-feed or draw kiln. Operated in similar fashion as modern blast furnaces, draw kilns were charged with limestone and fuel in alternate layers. As burning progressed, workers employed long-handled shovels to remove processed lime

⁸⁶ John-David Yule, Concise Encyclopedia of the Sciences Science (New York: Facts on File, 1978), 98. The amount of heat and time needed to calcinate lime varies greatly. Factors such as the stone's density and humidity and the quality of fuel and kiln, are only a few factors that can cause variation in the procedure.

⁸⁷ Howard Kanetzke, "Lime One of Wisconsin's Oldest Industries," in Limestone: An Important and Valuable Manitowoc County Resource (Manitowoc County Historical Society, 1975 Series), 2.

⁸⁸ Rolando, 220 Years of Soot and Sweat, 207.

from the bottom of the kiln, while layers of limestone and fuel were continuously added at the top. The principle advantage of the draw kilns was their fuel efficiency: removing lime from pot kilns required the kiln to first cool, where draw kilns could run continuously. Vermont State Geologist, Charles B. Adams, commented in 1845:

In burning lime in intermittent kilns . . . there is of course a great waste of heat in cooling off the kiln for every charge of limestone. . . . Where wood costs \$2.00 per cord, the expense of burning lime in a intermittent kiln is about 8 cents a bushel. But in a perpetual kiln . . . the expense is about 2 cents a bushel.⁸⁹

Draw kilns overcame many of the limitations hindering pot kilns and helped advance commercial lime burning. More sophisticated than their predecessors, draw kilns appeared with different configurations to either increase efficiency and quality, and innovators patented their designs in Washington, D.C. The term patent kiln became a standard way of describing a general classification of lime kiln--vertical, draw kilns that, often, held a patent.⁹⁰

A little Lime with your Lumber?

Beginning in the 1830s, ships carried millions of tons of high-quality stone from Door County to cities around all five Great Lakes.⁹¹ Only two major facilities on the peninsula processed lime commercially. In 1857 the first appeared in Bailey's Harbor, however within two years, two separate operators failed to produce a profit.⁹² The other

⁸⁹ Ibid., 208.

⁹⁰ Roger L. Grindle, Quarry and Kiln: The Story of Maine's Lime Industry (Rockland: Courier-Gazette, Inc, 1971), 21.

⁹¹ Holand, History of Door County, 166.

⁹² Ibid., 386.

operation was located just north of F.B. Gardner's lumber mill in Little Sturgeon.

In Holand's History of Door County, a story is told of how Little Sturgeon's lime industry came to "fill the . . . wants of Chicago:"

One day in the fall of 1871 a steam yacht containing a party of Chicago business men with their ladies, floated by this cliff. They were the guests of F.B. Gardner. As they came abreast of this romantic headland a big contractor who was a member of the party exclaimed:

"See what a waste of good materials! Here is a mountain of limestone in and in Chicago we are at our wits end to get lime."

"No waste at all," replied Mr. Gardner. "this cliff stands here in reserve, awaiting our need. One kiln is ready and more can be built. If you need lime I will send you 1,000 barrels a week. I own that cliff."⁹³

As the story continues, Gardner struck a deal, and immediately started plans to expand his lime operation, which consisted of a single patent lime kiln built a few years earlier.⁹⁴ By late 1872, two additional kilns, with a maximum capacity of 200 barrels a day, were completed at a cost of approximately \$6,000. Gardner also added a boarding house and a road, leading to the bluff's top to provide easier access when charging the kilns. In addition, he constructed a 75 by 300 foot pier at the base of the lime kilns to better facilitate shipments.⁹⁵ Perhaps motivated by the increased demand for building

⁹³ Ibid., 429.

⁹⁴ Bailey and Vincent, in their one year tenure at Little Sturgeon, planned to construct a lime kiln, but the project never went through. The kiln that Gardner built was located off a bluff just north of Little Sturgeon. Rohe, "Ghost of the Bayshore: Part I," 35.

⁹⁵ This was in addition to the large dock at the lumber mill (the site of the Claflin Point Wreck). Ibid., 37.

materials due to the Chicago and Peshtigo fires,⁹⁶ Gardner's expansion also involved a commitment to Little Sturgeon. He diversified the village's economy as the lumber industry's future began to look bleak.

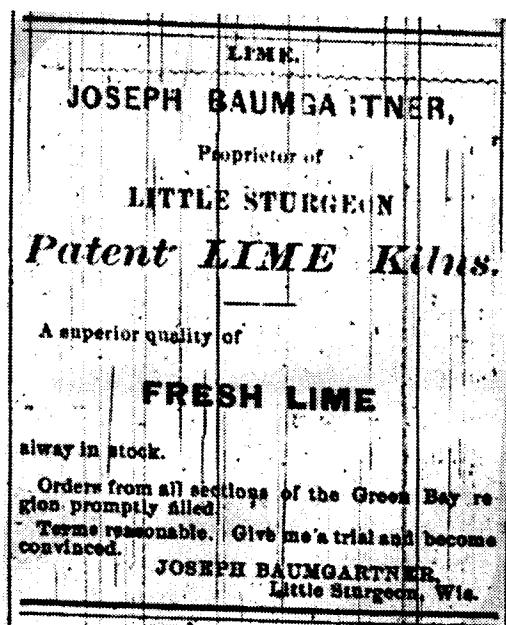


Figure 8: (*Door County Advocate*, 5 April 1883)

Gardner's financial trouble in 1875, when he sold all of his holdings to Spear, triggered a series of rapid ownership transfers of the lime kilns. Between Gardner in 1875 and the Piper Ice Co.'s acquisition in 1887, four others operated the kilns at Little Sturgeon.⁹⁷ Over this 12-year period, the kilns' production varied as much as its ownership. Taking a loss for several years in the late 1870s, the lime kiln's production peaked in early 1880s with one year's production reaching close to 10,000 barrels of

⁹⁶ In the wake of the great disasters, cities started to use more noncombustible material for construction purposes and often turned to lime (in the form of mortar) and limestone. *Ibid.*

⁹⁷ Gardner sold the operation to Spear in 1875, and Spear immediately sold the operation to William Anger. In 1880, Joseph Baumgther bought out Anger, and in 1883 Baumgther sold the kilns to Frank Simon. Finally, in 1887 the Piper Ice Co. purchased the kilns from Simon. *Door County Advocate*, 10 March 1887; Rohe, "Ghost of the Bayshore: Part II," 30, 31, 34.

lime. For the rest of the decade, production levels continued to fluctuate, running between 2,000 and 8,000 barrels.⁹⁸

Lime was shipped locally, as close as Sturgeon Bay, and around the Great Lakes. Much of it went to the western shore, Marinette, Menominee, and Escanaba, while Chicago and various Lake Superior ports were also major recipients of Little Sturgeon's lime. The small operation employed around 18 men when running at full capacity. The *Door County Advocate* provided a synopsis of the labor required to operate a single kiln at Little Sturgeon:

. . . two do the firing, three quarry, deliver and place the stone in the stacks, and the sixth heads the barrels after they are filled. The fireman work both day and night, twelve hours on and twelve hours off. This is hard work, it being necessary to put in a fire every fifteen minutes. The lime is drawn off every four hours, and one kiln will turn out from seventy-five to eighty barrels in twenty-four hours.⁹⁹

Up in Smoke

Although strong during the late 1880s, Little Sturgeon's lime industry faltered and then failed in the 1890s. Facing increasing competition from lime producers that were connected to consumers by rail, Little Sturgeon's high-quality lime had trouble competing against these larger operations.¹⁰⁰ Little Sturgeon's lime industry was small.

⁹⁸ Rohe, "Ghost of the Bayshore: Part II," 30, 31; *Door County Advocate*, 9 December 1886, 29 December 1888.

⁹⁹ *Door County Advocate*, 29 December 1888.

¹⁰⁰ The cost of barreling, a necessity when shipping lime by water, pushed up Little Sturgeon's prices when compared to those shipping by rail, which could send their product in bulk. Rohe, "Ghost of the Bayshore: Part II," 34.

It's peak production approached 10,000 barrels in the 1880s, while contemporaries J.A. Horlick of Racine produced 400,000 barrels annually, and the Pellon Lime Company in Pewaukee had a weekly output of 12,000 barrels.¹⁰¹ On October 23, 1897, the *Door County Advocate* had the unpleasant duty to report the end of this industry that ran for nearly a quarter century:

The lime business had been wholly abandoned, and the expensive patent lime kilns will probably never be operated again. This plant . . . at one time made considerable money for their owners, but the low price of lime put an end to the business.¹⁰²

Although the Little Sturgeon operation did not last long, the stone industry was not over in Door County. Just as Piper Ice Co. was closing their lime operation in Little Sturgeon, the Leathem & Smith Co. quarrying operation was booming in Sturgeon Bay boomed. Leathem & Smith operated well into the twentieth century, and at its peak was one of the largest in the state. However, with the closure of the lime kilns in Little Sturgeon, commercial lime production ended in Door Country. The lime industry left Door County just as it was peaking statewide. In the early twentieth century, Wisconsin ranked third in the nation in lime production. However, this was a temporary standing, and three decades later, barely 1% of the nation's lime was produced in Wisconsin.

The lumber and lime industries of Little Sturgeon relied upon its sheltered harbor which linked Little Sturgeon to the ports around the Great Lakes and allowed the village to develop as a hinterland outpost. All industries in Little Sturgeon depended upon the bay, but one industry continued to use the body of water when winter closed shipping lanes. The natural ice harvest made use of Little Sturgeon Bay as both a mode of

¹⁰¹ Kanetzke, "Lime one of Wisconsin's Oldest Industries," 1.

¹⁰² *Door County Advocate*, 23 October 1897

transportation and as a natural resource.

**Capturing the Winter:
Little Sturgeon's Ice Harvest**

[The natural ice harvest] is one of the greatest industries of the country at the present time. From coast to coast, from north to south, ice is consumed and used at all points. It is here as a necessity and no longer as a luxury, and it will be used for all time to come.¹⁰³

H.W. Bahrenberg, President of the
Natural Ice Association of America (1910)

With all the monumental changes occurring in the nineteenth century, it may be difficult to appreciate the historical significance of workers carving up frozen lakes. But in fact, the American commercial ice harvest had great social and economic effects. Up through the eighteenth century, except in some northern rural communities, refrigeration remained a luxury limited to the wealthy. Early in the nineteenth century, however, the natural ice industry started to emerge. By 1850, ice was becoming readily available to the general populace. Three decades later, some communities' ice expenditures equaled their fuels, and the American ice harvest approached eight million tons annually.¹⁰⁴ Natural ice extended winter's utility to new seasons and helped curb former limitations and nuisances caused by the heat of warmer months. Ice was used to cool buildings, chill drinks, treat the sick, and to produce, preserve, and transport perishables. Ice shifted from a luxury limited to small portion of the population to an integral part of everyday life for the masses in only a few decades. Giant concerns, employing thousands of workers, extracted staggering amounts of ice. Support enterprises, including equipment

¹⁰³ H.W. Bahrenberg, "Presidential Address," in Proceedings of the Natural Ice Association of America First Annual Meeting, New York, 12 April 1910, 6.

¹⁰⁴ Lee E. Lawrence The Wisconsin Ice Trade. (Madison: State Historical Society of Wisconsin, 1980), 2.

manufacturers, distributors, and home delivery services, and ice consuming industries, such as meat packers, breweries, bars, and refrigerated shippers, further drove the natural ice industry's expansion. The enormous demand for the cooling properties of ice ultimately led to the development of mechanical refrigeration and the downfall of the natural ice industry. Eclipsed by later developments, historians have overlooked the significance of ice harvesting. But, for decades, ice harvesting reigned as a major industry that greatly altered age-old patterns of American life. This section will explore the rise of Little Sturgeon's ice industry, and its significance to life and industry in Chicago and Milwaukee.

The Early Commercial Ice Harvests

In the early nineteenth century, large northeastern cities, such as Boston, New York, Philadelphia, and Baltimore began to establish sizable markets for natural ice. Vessels ballasted with ice began carrying the commodity to southern cities along the Atlantic coast. In 1818, consumers in Charleston, Savannah, and Atlanta paid up to 12 1/2 cents per pound for ice shipped from New York or Philadelphia.¹⁰⁵ Americans' love for ice fostered new markets. In 1830, New Orleans received its first shipment of natural ice. Although this maiden shipment traveled well, the initial effort did not turn a profit. The ice scared the Creole population so much that it caused a riot when it burned their fingers, and the frightened workers threw the ice overboard.¹⁰⁶ New Orleans later became a major consumer of Wisconsin ice.

Desired in foreign markets as well, American ice was first exported in 1807 when

¹⁰⁵ Richard O. Cummings, The American Ice Harvests: A Historical Study in Technology, 1800-1918 (Los Angeles: University of California Press, 1949), 12.

¹⁰⁶ Dewey D. Hill and Elliot R. Hughes, Ice Harvesting in Early America (New Hartford: New Hartford Historical Society, 1977), 5.

several brig-loads left Boston for the yellow-fever infested West Indies. Soon the ice trade expanded throughout the Caribbean. With monopolies in place, prices soared. In 1818, residents in Havana paid 25 cents per pound. By 1825, merchants exported 3,000 tons of ice from Boston alone, and in less than a decade, despite losing nearly 60 percent in transit, ice was profitably being shipped to India.¹⁰⁷

By revealing that lucrative markets existed for ice, these small, early operations contributed to the development of a much larger commercial harvest. Early ice harvesting not only established the evolution of harvesting techniques used by the industry, but it also began the American addiction to refrigeration. Each winter, local harvesting operations expanded in an effort to supply growing demands, and each spring more and more icehouses appeared throughout the nation's cities and towns.

With improvements in harvesting, storage, and shipping techniques, prices fell, markets grew, and the natural ice trade matured into a major industry. No longer a luxury limited to the wealthy, ice found its way to the masses. According to industry sources, by the beginning of the twentieth century, ice ranked as the ninth largest industry in the United States in terms of financial investments.¹⁰⁸ In 1900, summer ice had become as essential to homes and industry as winter coal. Typically delivered four times each week in 25-pound lots, ice cost the average household about \$2 per month.¹⁰⁹

Northern cities, like Chicago and Milwaukee, first exploited local resources to fulfill their ice needs. However, as urban populations grew and industrialization expanded, so did the demand for ice. Urban expansion also brought pollution and a

¹⁰⁷ Hill and Hughes, Ice harvesting in Early America, 3, 5.

¹⁰⁸ Joseph C. Jones, America's Icemen: An Illustrated History of the United States Natural Ice Industry 1665-1925 (Humble, Texas: Jobeco Books, 1984), 159.

¹⁰⁹ Hill and Hughes, Ice harvesting in Early America, 7.

decline in the availability of sanitary local ice. Ironically, two of the largest ice consumers, the meat packing and brewing industries, became the major water polluters.

[A]ll the drainage . . . of [the] packing houses empties into it, so that it is really a great open sewer a hundred or two feet wide. . . . and the filth stays there forever and a day. The grease and chemicals that are poured into it undergo all sorts of strange transformations . . . it is constantly in motion, as if huge fish were feeding in it, or great leviathans disporting themselves in the depths. Bubbles of carbonic acid gas will rise to the surface and burst, and make rings two or three feet wide. Here and there the grease and filth have caked solid, and the creek looks like a bed of lava; chickens walk about it feeding. . . . every now and then the surface would burn furiously, and the department would come and put it out.

Description of the Chicago River
Upton Sinclair, *The Jungle* (1906)

Ice harvesting in Wisconsin became an industrial enterprise after the ice production of Chicago and Milwaukee could no longer accommodate local demands. By the mid-1870s, ice concerns started to move away from urban areas, and the industry launched operations throughout the southern two-thirds of Wisconsin, with major points of production occurring in Pewaukee, Madison, Green Bay, and Little Sturgeon.¹¹⁰ Although residential consumption consumed large amounts of Wisconsin's ice, the Chicago meat packing and the Milwaukee brewing industries devoured the lion's share.

Porkopolis

Chicago's stockyards and slaughterhouses became one of the city's most infamous institutions of the nineteenth century, a wonder of the industrial world.

¹¹⁰ Ice companies had holdings throughout the southern two-thirds of Wisconsin. Lake Geneva, Racine County, Oconomowoc, Lake Mills, Fond du Lac, Oshkosh, and Madison were prominent ice-harvest areas. Other small independents (and local operations) conducted harvesting throughout the same region as well. Lawrence, *The Wisconsin Ice Trade*, 7.

William Cronon suggests meat packing's broader cultural significance:

Tourists might hesitate to subject themselves to the stench and gore of the place, but all knew that something special, something never before seen in the history of the world, was taking place. . . . [in which m]any saw in it the pinnacle of Chicago's social and economic achievement, the site, above all others, that made the city an icon of nineteenth century progress.¹¹¹

Characterized by its astonishing growth, Chicago's pork production increased sixfold between 1859 and 1863, and the city overtook Cincinnati as the meat packing center of the country, seizing the title "Porkopolis."¹¹²

Limited by summer heat which brought on rampant spoilage, early packing plants ran almost solely during the winter. As production increased, slaughter houses looked to industrialize; a "disassembly line" of men and machines resulted that could transform a hog into a box of meat with amazing efficiency. This modernization came with a cost, and in 1870, pork packing plant's capitalization quadrupled from its level just a decade earlier.¹¹³ Slaughter houses could no longer afford to sit idle during the summer; fiscal success required year-round butchering.

The industry turned to natural ice to help overcome the dangers of spoilage during processing and shipment. Used in insulated packing rooms and storage facilities, ice enabled packing to occur throughout the year. The refrigerated box car further revolutionized packing. These iceboxes-on-rails allowed for the long-distance shipment

¹¹¹ Cronon, *Nature's Metropolis*, 20.

¹¹² *Ibid.*, 230. The Civil War was key in Chicago's quest for dominance in the American pork packing. Cronon writes: "One and a half million men enlisted in the Union army during the war; while in the field they consumed over a half billion pounds of packed meat. At the same time, the Union blockade of the lower Mississippi closed off from western farmers their ordinary markets . . . in New Orleans and the southern cotton country. . . . Chicago benefited from increases in both supply and demand."

¹¹³ *Ibid.*

of fresh meat year round.¹¹⁴ Together, these techniques largely removed seasonal limitations but required a fantastic supply of natural ice. Chicago's Gustavas Swift Packing, America's largest ice consumer, used over 450,000 tons per year throughout the 1880s.¹¹⁵ The northern hinterland, including Little Sturgeon, provided the huge volume of ice required by the meat-packing industry.

Gim'me a Cold One

The American Binge represents a time, around the early 1830s, when the country drank over seven gallons of absolute alcohol per capita per year (the amount has not risen above three gallons since 1850).¹¹⁶ While whiskey was the overwhelming drink of preference, beer constituted a major and growing part of the American diet and social scene, as immigrants poured into the country. Beer production expanded in the years after the Civil War, and the American preference shifted from the heavier and more alcoholic malt liquors to lighter and more effervescent beers, such as lagers.¹¹⁷

Greatly influenced by the growing number of Germans entering the country, coupled with the high taxes on spirits to fund the Civil War, lager consumption increased dramatically.¹¹⁸ Although enjoyed by members of all social classes, lager's low price

¹¹⁴ Ibid., 234. Dominated by pork before the refrigerated boxcar, Chicago's packing industry processed very little beef due to the demand of the American palate for fresh steaks. Previously gathered at the Union Stock Yard and transferred to eastern butchers, western steers increasingly found Chicago to be their last stop. The refrigerated packing facilities and the insulated box-car permitted the long distance shipment of fresh beef year round. By the mid-1880s, beef surpassed pork as the dominant meat of Chicago's packing industry, and together they made meat packing an enormous industry.

¹¹⁵ Ibid., 234, 235.

¹¹⁶ W.J. Rorabaugh, The Alcoholic Republic: An American Tradition (Oxford: Oxford University Press, 1979), 232.

¹¹⁷ Lawrence, The Wisconsin Ice Trade, 3.

made it extremely popular with the growing urban working class. Mounting aggressive advertising campaigns, brewers portrayed the beverage favorably by stressing family, health, friendship, and national pride.¹¹⁹ Beer's popularity grew steadily; Americans drank twice as much beer in 1870 than ten years earlier and triple the 1860 amount by 1880.¹²⁰ Producing just over two million barrels of beer in 1863, American breweries turned out over thirty-three million barrels in 1893.¹²¹ Key to the higher production was the development of commercial breweries.

Lagers differ from other beers in that they are brewed with bottom-fermenting yeast and require low temperatures during the production and aging processes. Lacking mechanical refrigeration, brewers required enormous amounts of natural ice. Unpasteurized beers needed refrigeration during transit and storage. Natural ice was also used to serve the beverage chilled, a growing trend with the beer-drinking American public. The *Ice Trade Journal* estimated that American breweries used one million tons of natural ice annually in the production and storage of beer during the 1880s (Milwaukee alone consumed 335,000 tons), with an additional two million tons used to cool and serve the product.¹²²

¹¹⁸ Susan K. Appel, "Building Milwaukee's Breweries: Pre-Prohibition Brewery Architecture in the Cream City," *The Wisconsin Magazine of History*, (Spring 1995), 70.

¹¹⁹ Mark Edward Lender and James Kirby Martin, *Drinking in America: A History* (New York: The Free Press), 96.

¹²⁰ *Ibid.*, 97, 197.

¹²¹ Carolyn A. Chandre, "The Pewaukee Ice Industry," (Unpublished graduate seminar research paper, University of Wisconsin-Milwaukee, 1995), 7.

¹²² Lawrence, *The Wisconsin Ice Trade*, 1-2.



Figure 9: An early advertisement for lager beer. (Lender, *Drinking in America*, 96).

Aided by a large German population with considerable experience and knowledge of the art of brewing *lager beer*, and a hinterland of readily available resources, Milwaukee developed into one of the largest brewing cities in the world. With an annual production of 263,639 barrels of beer in 1877, the city ranked ninth in national production. By 1890, Pabst and Schlitz, the city's two largest breweries, brewed 650,000 and 500,000 barrels, respectively.¹²³ Over the next five years, Pabst and Schlitz would rank first and third in national beer production. Pabst became the first American company to brew over one million barrels a year, and Milwaukee was crowned the brewing capitol of the nation.¹²⁴ This success story directly depended upon hinterland outposts such as Little Sturgeon, for like Chicago, urban growth and industrial pollution quickly overwhelmed local ice sources.

¹²³ Appel, "Building Milwaukee's Breweries," 175.

¹²⁴ *Ibid.*, 180, 186. Anheuser-Busch of St. Louis ranked second.

Frozen Sewage

The explosive population growth that occurred during the nineteenth century resulted in increased levels of urbanization and industrialization which placed new stresses on the environment. Mass quantities of people living and working in closer proximities, coupled with the production of immense amounts of human, animal, and industrial waste, created major problems for these growing cities. Pollution wreaked havoc on nineteenth-century urban centers.

American cities had always faced problems with contaminated water, but the increased urbanization and industrialization of the nineteenth century resulted in an unprecedented situation. Anything tossed in the streets ultimately found its way into the water, and urban rivers contained just about everything foul that a city could produce. Amazingly, early ice-harvesting operations extracted their product from these polluted waterways, and health proponents dubbed the product "frozen sewage."¹²⁵

Water supplies suffered from inadequate systems of handling the astounding volume of human waste produced in cities. Privy vaults or cesspools, as opposed to pails emptying directly in the street, represented early attempts at sanitation control. As late as 1890, Milwaukee had over 20,000 vaults in use, with the majority improperly maintained or constructed, while those serviced often had their contents dumped in a lot or waterway.¹²⁶ Ironically, the installation of municipal sewer systems, designed to improve health and eliminate nuisances, actually polluted water supplies further for some time.¹²⁷ Incredible amounts of raw sewage dumped directly into rivers and lakes via

¹²⁵ Judith Walzer Leavitt, The Healthiest City: Milwaukee and the Politics of Health Reform (Madison: University of Wisconsin Press, 1982), 63.

¹²⁶ *Ibid.*, 63-64.

¹²⁷ Joel Tarr, The Search for the Ultimate Sink: Urban Pollution in the Historical Perspective (Akron: University of Akron Press, 1996), 104. Waste was just redirected out of the city limits. The water

sewers and often served as supply sources for the same and downstream communities.¹²⁸ Just before the twentieth century, 54 million gallons of raw sewage from Milwaukee's sewers poured directly into Lake Michigan daily.¹²⁹

Besides the catastrophic problems resulting from human waste and garbage, horses further complicated the situation. Playing a crucial role in the development of urban areas, these animals filled the streets. By 1900, Milwaukee's horse population reached 12,500 and Chicago's 83,000. This vital form of transportation came at a cost. The city horse produced, on average, about 22 pounds of manure a day. Milwaukee and Chicago received a daily bombardment of 133 and 913 tons of manure, respectively.¹³⁰ The carnage of fallen horses also littered the streets and compounded the pollution problem, and as late as 1912, Chicago carted away the remains of nearly 10,000 horses.¹³¹

The breweries and meat packing plants significantly contributed to the pollution of urban rivers and consumed more ice from these waters than any other industry. One scholar described the Chicago River as "polluted past all recognition, with a stench that visitors did not soon forget."¹³² Not to be out done by its rival to the south, a Milwaukee official in 1874 described the city's river as "thick inky, putrid water . . . in a state of violent commotion, produced by the fermentation existing at the bottom. . . . [consisting

movement was the only purification process; a treatment that was insubstantial for such large volumes of waste.

¹²⁸ Ibid., 104.

¹²⁹ Leavitt, *The Healthiest City*, 60.

¹³⁰ Tarr, *The Search for the Ultimate Sink*, 323-24.

¹³¹ Ibid., 327.

¹³² Cronon, *Nature's Metropolis*, 210.

of] grains, cow manure, and other filthy matter,"¹³³ while a later observer noted that the "decayed animal matter [which] commingles with the aroma from the marsh...could not be excelled in Chicago, the famed city of smells."¹³⁴

Out of the City and into the Country

With open sewers, city street run-off, and industrial waste contaminating nineteenth-century water supplies, authorities started questioning the use of "city" ice, based "on the feeling that what smelled intolerable in liquid form should not when frozen be added to drinks or brought into close contact with food in storage."¹³⁵ Soiled ice endangered the food it was employed to protect. Fostered by a typhoid scare, increased public pressure forced health officials to take regulatory action. By the next decade, both Chicago and Milwaukee enacted more stringent laws regarding the harvesting and use of urban ice. Although these measures took steps to control the problem, enforcement was difficult, and violations continued.¹³⁶

Under regulatory and supply pressures, Chicago companies initially relocated harvesting facilities to the lakes, ponds, and quarries around the city and to northern Indiana. The firms looked north after two unseasonably warm winters in the late 1870s resulted in a massive shortage of ice. This crop failure caused an influx of operations into Wisconsin.

Wisconsin's colder climate and lack of pollution made for higher quality ice and a

¹³³ Leavitt, *The Healthiest City*, 55.

¹³⁴ *Milwaukee Sentinel*, 10 October 1866 as quoted in Leavitt, *The Healthiest City*, 24.

¹³⁵ Lawrence, *The Wisconsin Ice Trade*, 3.

¹³⁶ Leavitt, *The Healthiest City*, 63.

more reliable harvest. Ice quality was also dependent on high water levels to eliminate the marshy, weed infested areas that produced "murky" ice and water movement to prevent "pond ice" by producing solid, clear ice without the inclusion of air bubbles. Wisconsin, along with Maine, yielded the best quality of ice in the country and set the standard (thick, solid, clear, pure, and reliable) for natural ice.¹³⁷

The transfer of the natural ice industry to the north created opportunity for Wisconsin towns and their residents. Ice harvesting employed thousands of people during a time of year when work was not easily found. In 1887, a Pewaukee firm employed 1,500 men that cut one-half million tons of ice.¹³⁸ During peak years, unemployment was non-existent, and in many places, hundreds of workers migrated into town for the harvest. The industry provided an important source of employment throughout the southern two-thirds of the state.

Albert Spear introduced ice harvesting to Door County on his holding in Little Sturgeon. Erecting a modest ice house near his wharf, Spear's crews first extracted ice in the winter of 1876. With the opening of the shipping lanes the following spring, the operation shipped the stored ice south.¹³⁹ Spear's operation ushered in a flood of other icing concerns into Door and Brown Counties over the next decade, and icing became the dominant, and final, industry to flourish in Little Sturgeon.¹⁴⁰

¹³⁷ Lawrence, The Wisconsin Ice Trade, 5.

¹³⁸ Chandre, The Pewaukee Ice Industry, 11.

¹³⁹ Holand, The History of Door County, 174.

¹⁴⁰ Rohe, "Ghost of the Bayshore: Part I," 39.

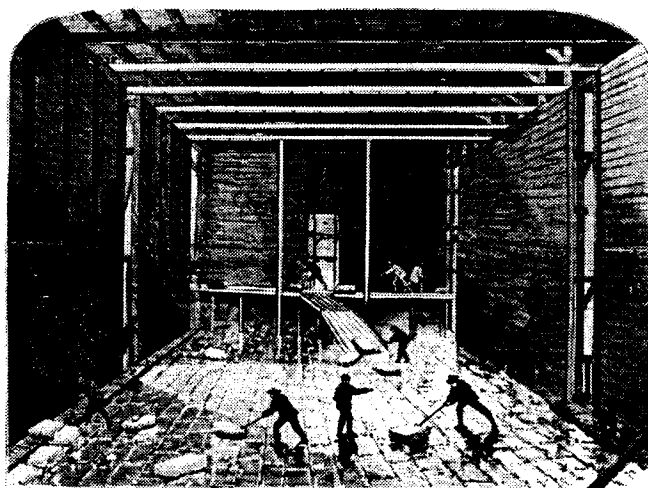


Figure 10: An ice house being filled. (Jones, *America's Icemen*, 48)

Like farmers, ice workers did not passively wait to gather their crop until it matured. Throughout the growing season, these harvesters spent long, hard hours preparing and their fields.¹⁴¹ During its industrial period, the axes, saws, and other simple tools of the early community ice harvests, were replaced by the specialized tools of mass production. Large work gangs utilized steam- and horse-powered machinery and tools for cultivating, harvesting and moving ice. These innovations helped transform ice harvesting into a productive and efficient industry.

Harvest preparations started long before the water began to crystallize. By late fall, workers started submerging poles to mark fields and removing weeds to improve the cleanliness and clarity of the ice. As winter progressed and the ice became thick enough to work upon, the crews took to the frozen fields. Throughout the winter, horse-drawn scrapers moved across the ice clearing unwanted snow which acted as an insulator and inhibited freezing. These early “zambonis” improved ice’s thickness and clarity while producing a smoother surface.¹⁴²

¹⁴¹ In 1890 A.S. Piper and Co. paid laborers at a rate of \$1.50 and teamsters \$3 per day to work the ice at Little Sturgeon. Those employed during the shipping season, were paid \$2 a day, work or no work, loading ice. Hirthe, *Schooner Days in Door County*, 31; Rohe, “Ghost of the Bayshore: Part II,” 34.

¹⁴² Hill and Hughes, *Ice harvesting in Early America*, 11.



Figure 11: Horse-drawn scrapers removing snow. (Jones, *America's Icemen*, 23)

When the ice reached a desired thickness, generally around 20-22 inches (varying from region to region), crews began the laborious harvest. Using scribes, saws, and augers, workers first carved shallow marker grooves into the ice, which separated the field into 22-inch squares or cakes. Because tightly packed blocks discouraged melting during storage, great care was taken to produce cakes of uniform size.¹⁴³

Next, ice floats, generally about eight cakes wide, needed to be separated from the rest of the field. Pulled by a horse-drawn sleigh, saw-toothed plows made several passes over the marker grooves. Each pass etched successively deeper through the ice. When the groove reached the appropriate depth, breaking-bars dislodged the float from the field.¹⁴⁴ A channel, kept open throughout the harvest, led from the fields to the storage facilities on shore. Pulled by teams of horses or poled by workers, the floats moved through the channel to the icehouses.

Workers, employing breaking bars, continued to divide the float into smaller sections until it reached the loading station on shore. Using grapples, workers removed

¹⁴³ *Ibid.*, 13.

¹⁴⁴ These cutting devices were horse drawn, but as technology progressed power saws were employed to cut ice. Hill and Hughes, *Ice harvesting in Early America*, 14; Jones, *America's Icemen*, 65.

individual cakes from the water and placed them upon the steam conveyer. The conveyer moved the ice to a storage facility, which included ice houses, insulated box cars, loading ramps, or wharves. After the ice was removed from the conveyer and carefully stacked, it was separated and insulated by sawdust, marsh grass, or hay.¹⁴⁵

Although he was successful in his first year, Spear found himself unable to handle his operation in Little Sturgeon and sold his ice interests to the A.S. Piper & Ice Co. of Chicago.¹⁴⁶ Piper was the third largest ice company operating in Chicago during the 1880s, and the company also supplied its Chicago icehouses with ice harvested from the Des Plaines River in Illinois and the Fox River in Wisconsin.¹⁴⁷ Immediately enlarging the facilities in Little Sturgeon, Piper constructed three new icehouses capable of storing 12,000 tons of ice and extracted 20,000 tons its first year. In the winter of 1878, the company employed nearly 100 men at Little Sturgeon to harvest ice for shipment to Chicago.¹⁴⁸

Piper's Little Sturgeon holdings continued to expand, with a harvest of over 30,000 tons and eight icehouses in operation in 1880, and four more houses built the next year.¹⁴⁹ The venture's success sparked the inception of other ice-cutting facilities in the

¹⁴⁵ During the years of large harvests, ice filled the houses of Little Sturgeon, and the excess inventory had to be stacked on the wharf. Covered with marsh grass and hay, the ice on the wharf was immediately dispatched when the shipping lanes opened. Rohe, "Ghost of the Bayshore: Part II," 27. For excellent primary accounts of early and late ice harvesting techniques see Jones, America's Icemen.

¹⁴⁶ Hirthe, Schooner Days in Door County, 174.

¹⁴⁷ This was a common occurrence as ice giants around the country brought smaller, locally run operations. Jones, America's Icemen, 118.

¹⁴⁸ Rohe, "Ghost of the Bayshore: Part II," 27; Holand, The History of Door County, 174.

¹⁴⁹ The icehouses used at little Sturgeon were constructed on and around the mill dock. There were several of these storage facilities constructed over the industry's tenure at Little Sturgeon. Part of this was due to the growth of the industry, but similar to lumber mills of the day, ice houses often fell victim to fire. There were at least four major fires at Little Sturgeon between 1876-1889. Some icehouses were built

area; in 1881, five other firms worked the ice around Sturgeon Bay. Over the next two decades, over 700 workers could be found extracting as much as 300,000 tons of ice in the winter. Since local labor could not fill the needs of the industry, men, horses, and equipment made migrations to icing towns each winter.¹⁵⁰ The introduction of these large-scale operations coincided with the opening of the Sturgeon Bay Ship Canal in 1879. The ship canal shortened the shipment time (an important factor in the ice trade) and by-passed the hazardous waters of Death's Door passage when sailing from the Bay of Green Bay to Chicago or Milwaukee.

The majority of Wisconsin's ice harvesting occurred in inland lake towns, mostly found in the southern third of the state and had direct rail connections to Chicago or Milwaukee. These companies could deliver a portion of their ice immediately after harvesting, and stockpile the rest on site for later shipments. Spurs ran adjacent to icehouses, and crews, with the aid of conveyers, poles, and grapples, transferred cakes from the icehouses to insulated rail cars. This set-up allowed ice from these operations to be delivered quickly to the market for redistribution or industrial use.

Ice harvesting in Door and Brown Counties differed from other Wisconsin operations primarily due to their geographic location. Located on the northern fringe of Milwaukee and Chicago's ice hinterland, they lacked direct railroad connections. Their extreme latitude produced an environment conducive for yielding high-quality natural ice--pure, thick, hard, and reliable. However, geography created a logistical challenge for delivering the commodity. Unable to transport ice by rail, concerns such as Little

on the north point of the bay (away from the mill) to provide better fire protection. Nonetheless, they too were destroyed in a fire, and the new houses were, again, built on and around the mill dock. Rohe, "Ghost of the Bayshore: Part II," 26, 27, 28, 33-34.

¹⁵⁰ Lawrence, The Wisconsin Ice Trade, 5.

Sturgeon's A.S. Piper exported their product to Chicago and Milwaukee via Lake Michigan. This presented a disadvantage to these operations in the form of a limited shipping season. Temperatures low enough for harvesting, also closed shipping lanes. This forced companies to hold their commodity until navigation opened, where competitors, connected by rail, could ship ice year round.¹⁵¹ With a fleet of up to five schooners dedicated to carrying Little Sturgeon's ice and additional vessels filling their holds with ice and loading their decks with lumber, Piper's wharf remained busy from ice-out until ice-in during prosperous years.¹⁵²

Among the goods that moved across the Great Lakes, ice was an enigma. Where the first shipments of grain yielded extremely high prices, ice was quite the opposite. The longer distributors held onto ice, potentially, the more money they would receive. As temperatures rose, so did the price. However, holding on to ice was a gamble. If a company held back shipping its inventory for stronger prices, and the ice went unsold, a huge loss could occur.

An Industry on Thin Ice

Operating on the geographical fringe, Little Sturgeon's ice industry fluctuated, and an examination of the yearly harvests illustrates the point. During the ice industry's stint in Little Sturgeon, despite the consistent presence of quality ice, there were several years in which little or no ice left the wharf.¹⁵³ Despite having eight full icehouses, only

¹⁵¹ In 1887, rumors started that Wisconsin Midland Railroad might build a line to Sturgeon Bay. A.S. Piper and Co. started planing a connection from Little Sturgeon to provide a more efficient means of shipping ice to Chicago and allow for expansion of their harvesting operation. It never happened. Rohe, "Ghost of the Bayshore: Part II," 32.

¹⁵² Hirthe, Schooner Days in Door County, 31; Rohe, "Ghost of the Bayshore:Part II," 30, 34.

¹⁵³ In these years small amounts of ice were harvested for local needs and the fishing industry. Rohe, "Ghost of the Bayshore: Part II," 28.

six cargoes of ice left Little Sturgeon in 1880, and Piper did not harvest any ice the following year. However, in 1882, the company extracted over 60,000 tons of ice. Again in 1884, no ice left the wharf at Little Sturgeon, but the following year the company extracted a record high of more than 100,000 tons. The 1890 season saw 49 cargoes of ice leaving Little Sturgeon to Chicago; reportedly that year the company moved ice as fast as possible, with a vessel loading at all times and a another waiting for the pier to clear.¹⁵⁴ No ice left Little Sturgeon's docks between 1891 and 1893, and only 20,000 tons in 1894.¹⁵⁵ Facing competition from huge harvesting operations in the southern part of the state, Door County's ice industry was ending.

In the summer of 1896, A.S. Piper and Co. closed its icing operations in Little Sturgeon, and by the end of 1897, all of the companies interests had left the village.¹⁵⁶ The following year, an eastern ice company, Knickerbocker Ice Company, bought-out some twenty companies nationwide, including Piper.¹⁵⁷ Knickerbocker did not commence harvesting at Little Sturgeon. With excellent grade ice still readily available, Little Sturgeon's operation could not survive the inefficiency of shipping ice by water. Loaded onto vessels by wagons, shipped, off-loaded at the docks, and then transported by wagons to city storehouses, ice shipped by water required double and triple handling. This resulted in large amounts of the original cargo, quite literally, slipping through the

¹⁵⁴ *Ibid.*, 34.

¹⁵⁵ *Door County Advocate*, 7 July 1894. The revival in Little Sturgeon's ice business was due to a the railroad operators strike of 1894. The *Advocate* reported that "it is a fortunate thing for somebody that they [Chicago] are not dependent wholly on the railroads for transporting. . .[ice] to market just at this time."

¹⁵⁶ *Door County Advocate*, 15 August 1896, 20 March 1897; Rohe, "Ghost of the Bayshore: Part II," 34.

¹⁵⁷ Cummings, *The American Ice Harvests*, 90; Jones, *America's Icemen*, 119.

cracks under the summer heat. Lake shipping provided the most economical way to move most bulk commodities, but not for those that melted.

PIPER ICE CO.

CLEARING SALE!

The undersigned are selling out
their large stock of . . .

**Clothing, Boots, Shoes, Dry
Goods, Clothing, Etc.**

AT

25 TO 50 PER CENT. BELOW COST

This is a bona fide Clearing Sale.
All kinds of Farm Produce taken
in exchange for goods.

PIPER ICE CO.,

• LITTLE STURGEON, WIS. •

Figure 12: (*Door County Advocate*, 15 August 1896)

Ice harvesting continued as an industry for a few decades after it left Little Sturgeon, but the end was in sight. In 1886, the industry peaked with a harvest of over 25 million tons, while less than four decades later, the country had no significant commercial harvest.¹⁵⁸ Advancements in mechanical cooling, which first appeared in the early-twentieth century, eventually eliminated the need for natural ice. A crucial step in the development of refrigeration, natural ice's success created a market which illustrated the demand for better cooling technology.

Often, modern workers look back upon employment opportunities of the past with

¹⁵⁸ Jones, *America's Icemen*, 14.

envy. People look at the work of the sailors and cowboys and dream of the purity of the labor. Such illusions are often easily dismissed by the personal accounts of someone who actually wore the hat. "Looking back," wrote a man describing his experiences working the ice fields, "I can not see any romantic side to the ice harvest. It was just cold, hard work, that was necessary to protect milk and food during the hot summer months. . . . The ice harvest . . . has gone . . . but it is one industry that is not missed."¹⁵⁹

In the closing days of Little Sturgeon's industrial era, the peninsula's residents had no false hopes for a revival of its industries. They understood that Little Sturgeon's role as an industrial outpost was over. In the same article that reported representatives from Chicago in town, "closing up affairs of the Piper Ice Co.," the *Door County Advocate* optimistically predicted a future much different from its past:

The property of the Piper Ice Co. . . . would make the finest summer resort that can be found in this region, if the right man got hold of it. There is nothing equal to it anywhere in Green Bay county. But it will take capital . . . to make the place what nature evidently intended it to become at some time.¹⁶⁰

The individual industrial contributions of Little Sturgeon and other comparable communities may seem insignificant, however collectively they supplied the resources critical to the Midwest's development, particularly in rapidly growing urban areas. These outlying communities supplied cities with a source of natural resources that they could not supply locally. By utilizing its access to Lake Michigan, Little Sturgeon was able to become part of a regional network where urban and rural economies became intertwined.

¹⁵⁹ I. Sheldon Posen, *You Hear the Ice Talking: The Ways of the People and Ice on Lake Champlain* (Plattsburgh, New York: The Clinton-Essex-Franklin Library System, 1986), .24.

¹⁶⁰ *Door County Advocate*, 20 March 1897

Larger cities called upon the Little Sturgeon to help fill their demands. Steamers, schooners, and barges carried the lumber, lime, and ice from the outpost to the city. The industries of Little Sturgeon were by no means the largest or most important of the hinterland community. The lumber, lime, and ice that left Little Sturgeon's docks, however, made the village part of a collection of other industrial outposts that contributed to nineteenth century growth by servicing urban demands for raw materials.

Chapter IV Little Sturgeon's Submerged History

To observers on land, the remains of the nineteenth-century commercial lime kiln operation, now overgrown with foliage, provide the only evidence of Little Sturgeon's industrial past. A short distance from the kilns remains and several feet underwater, Little Sturgeon's forgotten industrial era can be seen more clearly. The water is an appropriate setting for observing the village's historic remnants considering Little Sturgeon's dependence upon maritime trade. Nearly all of Little Sturgeon's surviving industrial features reside on the lake bed. The same water that connected Little Sturgeon to the markets around the Great Lakes now preserves the tools, commodities, and other artifacts from industries that sustained the village nearly a century ago.

Discovered by recreational divers in the 1970s, the Claflin Point Wreck has been identified as a wooden-hulled steam propeller which, at some point before its sinking, was converted into a barge. Along with the wreck archaeologists found tons of quarried limestone, logs, timbers, slab wood, edging, and a giant 400-foot rock crib pier, which broadened the historical investigation of Little Sturgeon. Although the wreck piqued the interest of archeologists, the other remains scattered along the lakebed prompted a larger study of Little Sturgeon.

The cold, fresh water of the Great Lakes has helped preserve remnants of this village's industrial heritage, but the harsh environment has also damaged the site over time. Ice and waves have transported pieces of wreckage hundreds of feet from the main hull section and spread debris over a wide area. The wreck and surrounding debris are the foundation for this study of Little Sturgeon. The archaeological remains, supplemented by the historical record, tell the story of mid to late nineteenth-century Little Sturgeon.

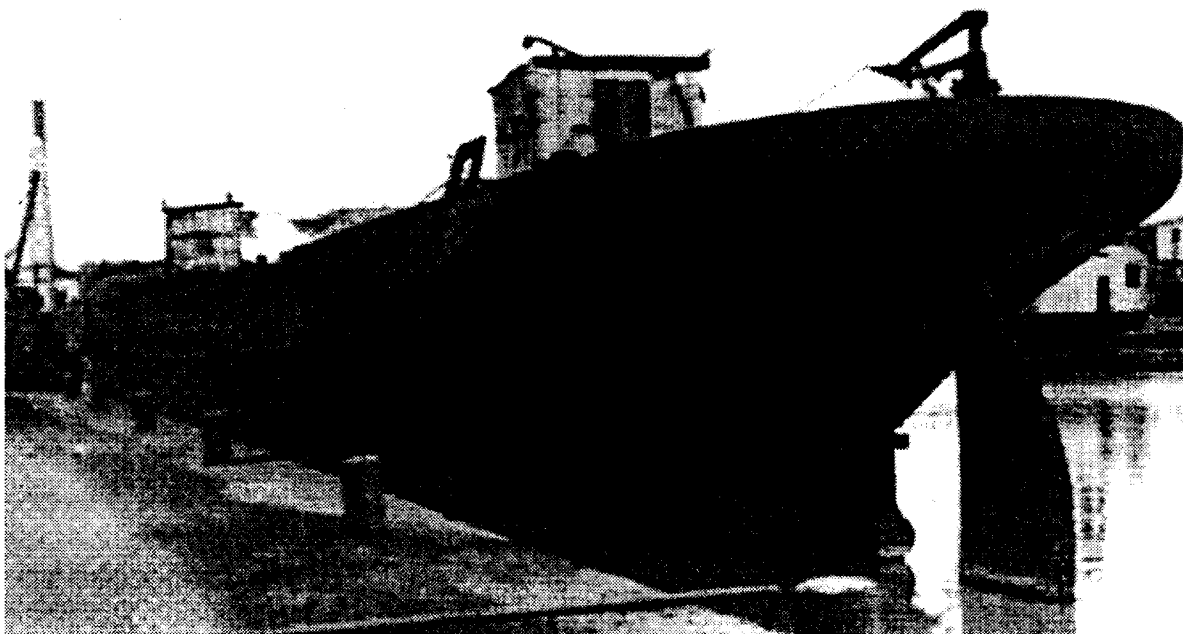


Figure 13: A stern view of the package freighter *Alaska* after it was converted into a barge. Note the through-hull shaft bung (Van der Linden, *Great Lakes Ships We Remember*, 11.).

Project Genesis

More than a decade has passed since the U.S. Abandoned Shipwreck Act of 1987, Public Law 100-298, conceded ownership and management responsibilities of historic shipwrecks to the states in whose boundaries they lie. Under state statutes 44.02, 44.30-31 and 44.47, the State Historical Society of Wisconsin (SHSW) has been mandated with the responsibility of the research, protection, restoration, and rehabilitation of historic properties, as well as the identification, evaluation, and preservation of archaeological resources in Wisconsin.¹ Realizing the importance of these fragile resources, the state legislature moved to protect its submerged cultural resources by augmenting SHSW's State

¹ David J. Cooper and John O. Jensen, *Davidson's Goliath: Underwater Archaeological Investigations of the Steamer *Frank O'Connor* and the Schooner-Barge *Pretoria** (Madison: State Historical Society of Wisconsin, 1995), 1.

Historic Preservation Office with an underwater archaeology program. Working under the Office of the State Archaeologist, Wisconsin's underwater archaeology program became one of the first full-time programs dedicated to the management of submerged cultural resources on the Great Lakes.

With Lake Michigan to its east, Lake Superior to the north, and the Mississippi forming its western border, Wisconsin sits in a unique geographic position within the United States. Bordering on the continent's two greatest inland waterways, Wisconsin exploits the Great Lakes and their east-west thoroughfare to the Atlantic, and the Mississippi River and its north-south access to the Gulf of Mexico. Individually, these waterways provide Wisconsin with a natural corridor for efficient transportation and economic gain. Compounded, they make Wisconsin North America's maritime crossroads.

Given Wisconsin's strong maritime heritage, as demonstrated by the nautical symbols adorning the state seal and flag, it is not surprising that the SHSW underwater archaeology program has identified over 700 historic wrecks and countless other submerged sites in the 10,000 square miles of bottom lands which make up nearly 22 percent of the state. The Wisconsin underwater archaeology program is charged with the task of cataloging, surveying, inventorying, and developing management plans for the state's submerged cultural resources.

Over the past decade, the SHSW's underwater archaeology program has forged an important partnership with another organization that has an explicit interest in maritime history and historic preservation, East Carolina University's (ECU) Program in Maritime History and Nautical Archaeology. One of only two programs in the United States offering a graduate degree in underwater archaeology, ECU provides students with a variety of professional experiences. Graduate students, staff, and faculty conduct field semesters designed to provide hands-on training and experience in underwater archaeology. ECU

field schools conducted in Wisconsin have made significant contributions in the state's effort to survey and document its submerged cultural resources.²

In 1994, SHSW archaeologists conducted an initial archaeological reconnaissance on the Claflin Point Wreck. The archaeologists recognized the historic value of the wreck, and began plans for a detailed study. In September 1995, ECU was invited to conduct an archaeological field school in cooperation with the SHSW to thoroughly investigate and document the Claflin Point Wreck. ECU project director Dr. Bradley Rodgers, designed a Phase II predisturbance archaeological survey for this unidentified wooden vessel. Phase II documentation utilizes still photography, videography, underwater mapping, and measured sketches to record a site as it lies, and in this case without any excavation or artifact recovery (see Field Methodology). This method recovered substantial data, with minimal impact on the environment and site. It is also a very cost effective form of research in comparison to Phase III excavations. Students received valuable experience by working fin to fin with professional archaeologists, while the SHSW utilized ECU's labor to assist in documenting the state's rich heritage.

This joint effort resulted in a preliminary report by the project's principle investigator. This research report, *The 1995 Predisturbance Wreck Site Investigation at Claflin Point, Little Sturgeon Bay, Wisconsin*, includes a brief summary of the project's findings and some historic background, while it also provides the archaeological drawings, measurements, and reconstructions utilized in this thesis.³

² See David J. Cooper (ed.), By Fire Storm, and Ice: Underwater Archaeology in the Apostle Islands (Madison: State Historical Society of Wisconsin, 1991); David J. Cooper, Survey of Submerged Cultural Resources in Northern Door County: 1988 Field Season Report (Madison: State Historical Society of Wisconsin, 1989); David J. Cooper and Bradley A. Rodgers, Report on Phase I Marine Magnetometer Survey in Deaths Door Passage, Door County, Wisconsin, 1989 (Madison: State Historical Society of Wisconsin, 1989); Cooper, Fleetwing.

³ Bradley Rodgers, The 1995 Predisturbance Wreck Site Investigation at Claflin Point, Little Sturgeon Bay, Wisconsin (Greenville, NC: East Carolina University; Program in Maritime History and Nautical Archaeology, Research Report No. 10, 1996).

Project Location and Environment

Just over 200 feet offshore from Claflin Point in Little Sturgeon, Wisconsin, lies the Claflin Point Wreck in 5 to 15 feet of water. North of the vessel (inshore), sits the submerged foundation of a huge wharf. Lumbering and other industrial debris such as slab, edging, logs, lumber, and quarried limestone is found throughout the site. Collectively, these make up the Claflin Point Site.

Mainly composed of sand and silt, the natural bottom type that surrounds the Claflin Point Wreck becomes increasingly rocky inshore and around the point. However, the great heaps of quarried stone from the wharf's foundation are clearly man-made features. Located in the surf zone, the site is subject to water turbulence. Northeasterly winds complicate diving operations due by intensifying wave activity and reducing visibility through sediment distribution. Thus, visibility varies greatly with water conditions. During the 1995 field investigation of the Claflin Point Wreck, visibility ranged between 5 and 25 feet.

An abundance of various freshwater flora and fish species inhabit the site. With large numbers of bass and pan fish around the wreck, the site is popular among anglers. Infesting 25-30 percent of the wreck during the 1995 field investigation, zebra mussels have spread and claimed over 50 percent by 1997. These freshwater mussels thrive in the Great Lakes' environment and cling to smooth surfaces, often piling up several inches. Their long term impact on shipwrecks and underwater archaeology is unclear. By blanketing large sections of wreckage, zebra mussels are a visual barrier for archaeologists, however they are believed to be responsible for the increased water clarity being observed in many parts of the Great Lakes.⁴

⁴ A diver reported to the author in the spring of 1998 that she observed visibility in excess of 60 feet at Claflin Point.

Methodology/Field Work

Designed as a Phase II predisturbance archaeological survey, the field investigation of the Claflin Point Wreck called for documentation and archaeological assessment of the site as it lies. Exposed diagnostic artifacts and features were examined and recorded to provide archaeological data with very little physical impact upon the site or environment.⁵ This research design provided crucial data for questions dealing with the site's management and historical significance. Phase II predisturbance archaeological evaluation consists of:

1. Documentation using still photography, underwater videography, and measured sketches of the architectural and architectural elements which are diagnostic of (a) vessel type (b) vessel age (c) vessel construction style and method (d) vessel propulsion (e) vessel use (f) vessel identification (through a comparison with inventory records of historically-known vessel losses) (g) vessel cargo (h) shipboard human activity broadly indicative of occupation, status, ethnicity, subsistence or other questions allied with the study of maritime anthropology and Great Lakes social and economic history.
2. Provide a preliminary assessment of a site's environmental and cultural context for determining its historical significance and archaeological potential (according to National Register of Historic Places criteria) as well as recreational potential, and management requirements.⁶

Diving operations at Claflin Point were conducted from two small workboats, a 22-foot Boston Whaler and a 17-foot inflatable. The Whaler served as the main platform for the majority of diving operations, while the inflatable provided support by ferrying researchers and equipment around the site. Divers utilized scuba gear fitted with wireless communication gear allowing diver-to-diver and diver-to-surface communication, which improved research efficiency and diver safety.

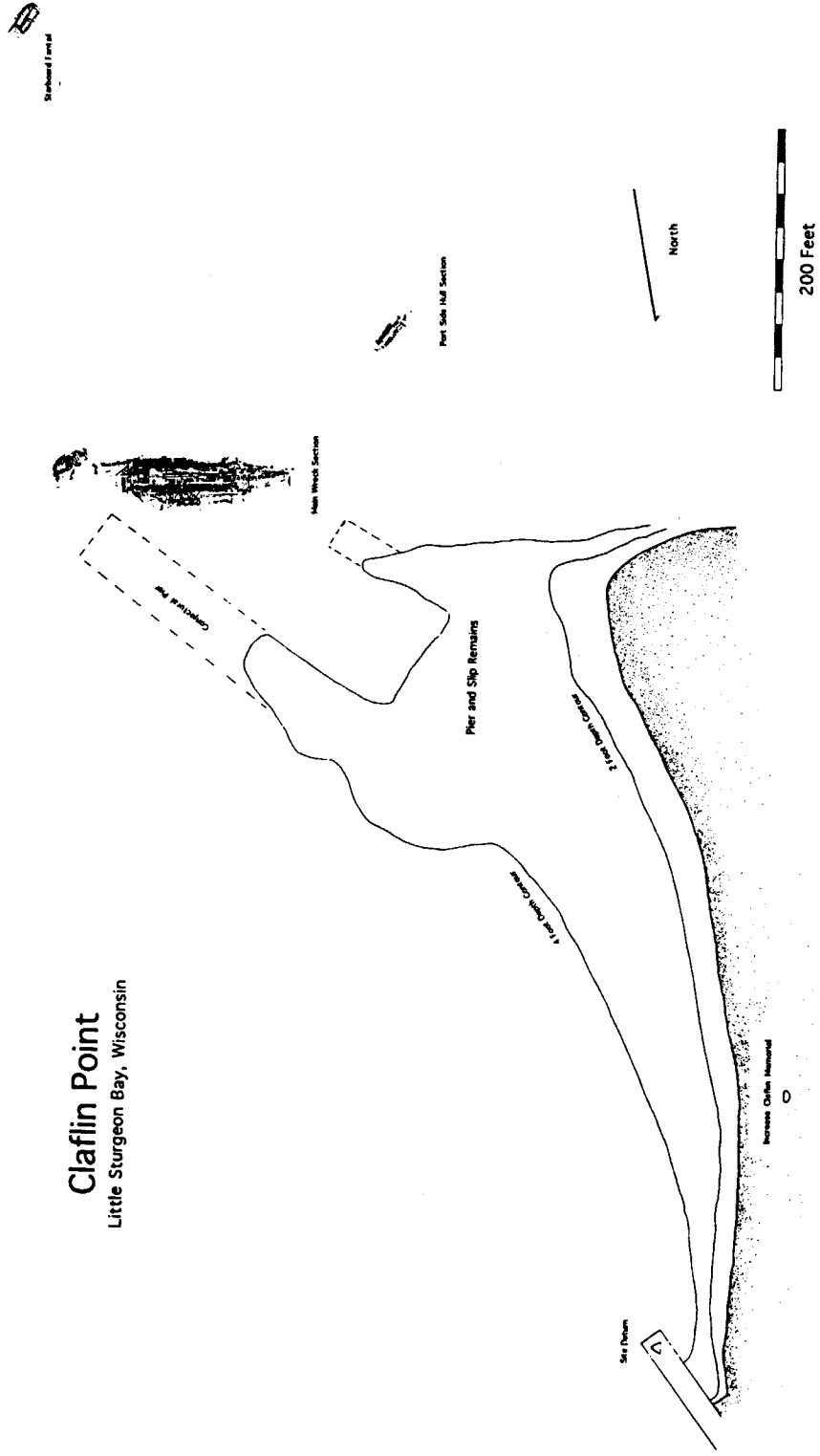
⁵ Rodgers, Claflin Point, 9.

⁶ Cooper (ed.), By Fire, Storm and Ice, 5.

The 1995 field work began with the relocation of the main hull section on September 12, 1995. A baseline was established, using the extreme bow as the wreck's datum. From this position, divers ran the baseline aft along the centerline keelson of the main hull section. The baseline continued, jetting off to cover nearby associated wreckage and consisted of a scaled surveyor's chain. The baseline provided a reference point for all archaeological documentation.⁷ By using this positioning system, researchers could easily relocate and accurately plot features of the site. The bow served as baseline point 0 feet (BL 0 feet). Any point aft of the bow has a higher baseline position. For example, the aft end of the main wreck section is located at BL 137 feet, and the forward section of the boiler beds is located around BL 95 feet, or 95 feet aft of the bow or BL 0 feet.

Cross lines were placed perpendicular to the baseline at 10-foot intervals along the main hull section. Crew members systematically recorded each of these "squares" using manual mapping techniques (measured sketches, offset measurements, and trilateration) with still photography and underwater video. After completing the individual underwater drawings, these field notes were brought together and oriented into a site map. The site was mapped piece by piece underwater during the day, and in the evening, these fragments were plotted on the drafting table. Gradually, a plan view of the wreck appeared, providing the team with extended views of the wreck. After all of the field notes were brought together and the site map completed, all of the various sections of the Claflin Point Wreck were "seen" in their relative positions for the first time by the team of archaeologists (see Figure 14).

⁷ Rodgers, Claflin Point, 9.



Claflin Point
Little Sturgeon Bay, Wisconsin

Figure: 15 Claflin Point Main Site Plan

Systematic underwater searches revealed other pieces of wreckage in the area, some hundreds of feet away from the main section. As with all wreck sites, disarticulated wreckage needed to be analyzed to determine if all pieces in the area represented a single or multiple vessels.⁸ By analyzing scantling measurements and construction details, these were identified as disarticulated portions of the Claflin Point Wreck. Divers recorded these pieces in the same detail as the main section of wreckage.

The site datum point was established above water on the seaward end of a concrete pier overlooking the site. Serving as a central reference point to orient the various site features separated by large distances, this datum also allowed archaeologists to plot the site with area geographic features. An electronic distancing meter allowed the team to accurately plot the shoreline, the 2- and 4-foot depth contours, and the various wreck sections onto a single map (see Figure 15). The result was an accurate representation of the spatial relations between the major features of the Claflin Point Site.

All of the above mentioned data from the 1995 field investigation was gathered in the course of a 103 dives in 12 field days by a crew of 4 to 8 divers, for a total bottom time of 122.3 hours. An additional 4 dives were conducted in 1996 and 1997. The main objective of the later visits was to obtain better photographic and video documentation of the site, although some time was spent confirming scantlings and other details unclear from the initial data collection. The data generated from the field research resulted in the measurements, drawings, and archaeological reconstructions used in this analysis of the Claflin Point Wreck.

⁸ Ibid., 13.

Site Description

The Docks

The surviving dock foundation off Claflin Point is an impressive artifact in its size and significance. Stretching nearly 400 feet into Little Sturgeon Bay, it provided the critical link between land and water that allowed the resources of Little Sturgeon to reach markets around the Great Lakes. The *Door County Advocate* heralded the wharf "one of the most substantial landings anywhere in the Green Bay region, the utmost care having been used in its construction."⁹ Simply put, without Little Sturgeon's access to the Great Lakes transportation system, enhanced by this dock, the community would not have developed into a significant industrial outpost.

The history of the dock structure at Claflin Point is incomplete, but some documentation of its past has surfaced. Freeland Gardner constructed the first dock at the site in 1856. By 1862, Gardner had improved the facilities by laying track from his lumber mill to the outer dock. Gardner continued to maintain and improve his water access, and in 1871 he purchased a steam dredge to deepen the channel to the docks.¹⁰ In 1876, A.S. Piper had the wharf substantially expanded to accommodate the growing ice trade by extending driving piles and filling the area with slab and refuse to extend the old dock. This work reportedly doubled the frontage and created a slip for smaller craft.¹¹ After the ice industry abandoned Little Sturgeon and A.S. Piper closed operation in the village, the *Door County Advocate* reported that the "dock on which the ice houses are located will be fenced to prevent steamers from landing."¹² A latter written account, December 28, 1905,

⁹ *Door County Advocate*, 28 December 1905.

¹⁰ Rohe, "Ghost of the Bayshore: Part I," 31, 35.

¹¹ Rohe, "Ghost of the Bayshore: Part II," 27.

¹² *Door County Advocate*, 20 March 1897.

in the *Advocate* reported that a recent storm had caused:

the loss to the Knickerbocker Ice Co. wharf at Little Sturgeon . . . nothing in the way of wood, iron, and stone could withstand the onslaught of winds and waves and it may be said to be a total wreck. Whether the company will rebuild the pier is extremely doubtful, as there is very little use for it at present. Neither is there likely to be any in the time to come.¹³

In Hjalmar Holand's 1917 county history, he reported the "big piers built of huge pine logs have crumbled down." During the 1995 survey, longtime residents of Little Sturgeon told stories of their youth playing on the remains of the docks as late as 1940.¹⁴ Today when viewed from shore, after decades of ice and storms, there is no sign of the structure that loaded up to six vessels a day nearly a century ago.

The wharf's underwater remains, constructed out of log cribs that are filled with quarried limestone, served as the foundation of the dock system, which included storage buildings.¹⁵ The 4-foot depth contour line plotted in the 1995 survey clearly illustrates a slip to admit and load vessels (see Figure 15). The pier is angled to provide protection from northeasterly winds. Today, the private docks located off Claflin Point are constructed on the same orientation.¹⁶

A second dock facility was constructed in 1871 at the kilns to better serve Gardner's lime business. Sprawling 214 feet by 150 feet into the bay, the heavily built structure is reported to have had 150 feet of frontage with a wing extension. The dock had 17 feet of water on one end and 24 feet on the other. Built of "squared timbers and logs

¹³ *Door County Advocate*, 28 December 1905.

¹⁴ Pers. comm, Norm Gustafson, 15 September 1995.

¹⁵ The historical record is unclear of the exact layout of the docks, however ice houses are frequently referred to as being located on the docks.

¹⁶ Rodgers, *Claflin Point*, 8.

filled with stone, secured with iron bolts, anchored with piles, and protected by boiler iron from the action of ice. The dock contained pockets and chutes after the style of ore docks”¹⁷ Lime was barreled to protect it from interacting with water, therefore the presence of pockets and chutes indicate that more than lime was leaving Little Sturgeon. A good deal of stone needed to leave the village in order justify the cost of these additional loading facilities. Archaeologists and local divers have been unable to locate any physical remains of this second structure, which undoubtedly served barges similar to the Claflin Point Wreck.

The Claflin Point Wreck

Today, the hull of the Claflin Point Wreck is substantially broken up, typical of wrecks located in the high-energy surf zone of the Great Lakes. Subjected to decades of ice and wave action, the deck beams of shallow wrecks frequently weaken during the site formation process causing the ship’s sides to fall outward.¹⁸ The result is an aerial view of the hull with the sides of the hull fallen outward and flattened. Often breaking along the turn of the bilge, wrecks subjected to these conditions are flattened overtime, leaving very limited vertical features. This is true of the Claflin Point Wreck. The vessel’s sides lie flat alongside the lower hull and are partially held in place by the limestone which has spilled over onto them. Although the hull of the Claflin Point Wreck is not intact, most of the pieces, and thus data, are still present. With archaeological data collected from the broken hull, the team was able to reconstruct the hull’s shape, while gaining access to interior-construction details, generally unobservable on intact wrecks.

The main section of wreckage consists of the lower hull. The bow points almost

¹⁷ Rohe, “Ghost of the Bayshore: Part I,” 37.

¹⁸ Rodgers, Claflin Point, 15.

due west and the main wreckage continues east to the stern 137 feet with a maximum width of around 40 feet. Moving from the bow to stern, a linear pile of quarried dolimitic limestone flanks each side of the keelson. These piles begin around BL 40 feet and run parallel across the wreck into the stern. Each pile of limestone is located about 5 feet off the starboard and port sides keelson. Further aft, around BL 95 feet, the heavy timbers of the boiler and engine beds stand out from the litany of frames and ceiling planks found forward. In this area, there appear to be two boiler beds indicating that the vessel was originally fitted with two boilers.¹⁹

Just aft and to the port of the main wreckage, the stern assemblage, over 30 feet long, lies on its port side. Slightly further aft, measuring 30 foot by 16 foot, the port half of the Claflin Point Wreck's fantail marks the eastern extreme of the wreckage, while the starboard half has moved nearly 500 feet south from the main section from "where it belongs" (see Figure 16). A 40-foot by 10-foot portion of the port side lies 150 feet southwest of the bow.

The bow section of the Claflin Point Wreck is very broken up, probably as a result of its location in a shallow 5 feet of water. However, construction details can be determined through the surviving timbers and the disarticulated stem. The stem is 15 inches molded at the lower curve, while just aft of the scarf where it joins the keelson, the measurement drops to 9 inches molded and 7 inches sided. The apron, 8 inches sided and 5 inches molded, is edged fastened to the deadwood with 1-inch diameter fasteners. The deadwood consists of 3 timbers, which range from 13-20 inches molded and 9 inches sided. Archaeological evidence also reveals that the bow of the Claflin Point Wreck was fitted with .125-inch iron sheathing to protect the hull from ice.

The vessel's major longitudinal is the centerline keel/keelson structure which acts as

¹⁹ Ibid., 23.

the vessel's backbone (see Figure 17). The keelson is 13 inches sided and molded, while the slightly smaller keel is 12 inches sided and 10 inches molded. The aft section of keelson on the main wreckage has broken at the flat scarf joint. The joint begins at BL 119 feet and continues until the end of the main hull section, BL 137 feet.

**Clafin Point Starboard Fantail Section
Plan View 1995**

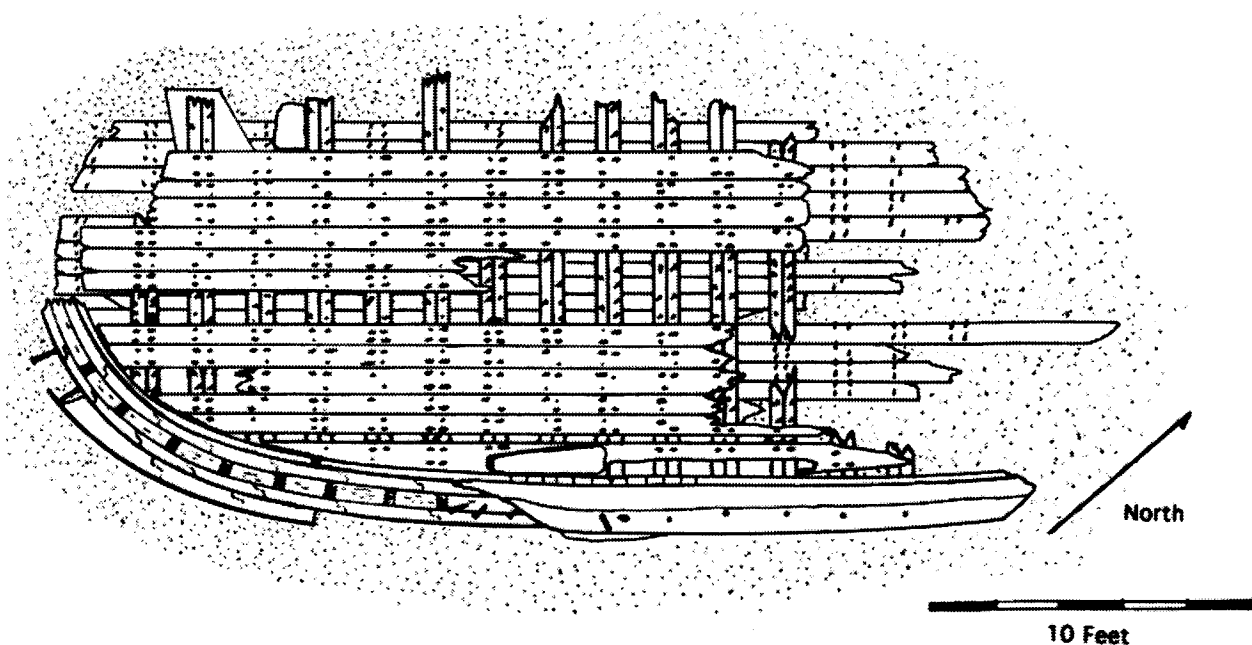


Figure 16: Starboard Fantail Section

The Clafin Point Wreck is double framed and butt scarfed with a variation of between 7 to 10 inches room and 13 to 15 inches space throughout most of the hull. However, floor spacing drops to almost zero around the boiler and engine beds, where the nearly solid framing provided additional support for the vessel's heavy machinery. The Clafin Point Wreck's double-floor timbers are 12 inches molded and 3.5 to 5 inches sided at the keelson, while the futtocks scantlings range from 8 to 10 inches molded and 3.5 to 5 inches sided.

Clafin Point Vessel Cross Section

At 70 Feet From The Stem

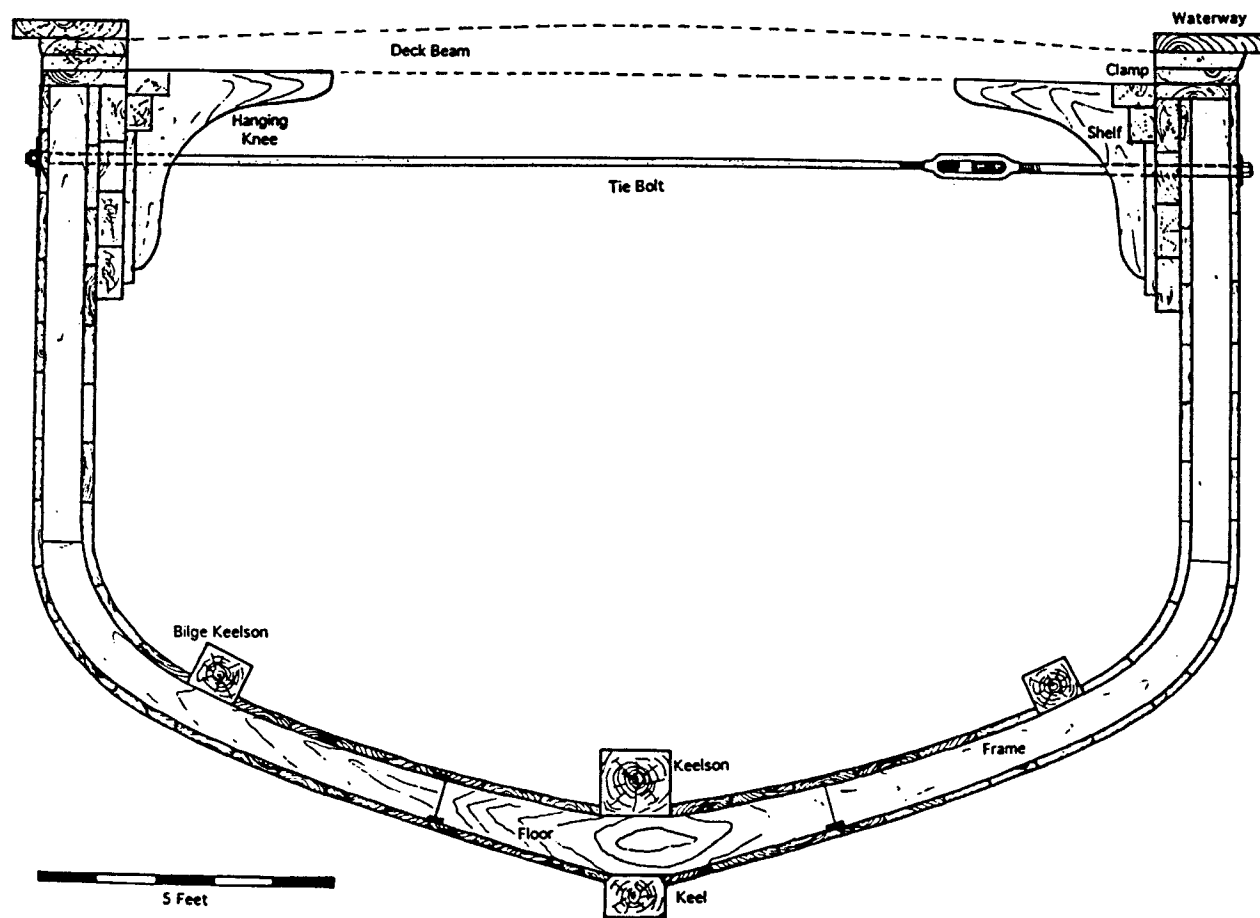


Figure 17: Clafin Point Wreck's Cross Section, (70 feet from the stem). Note the 4 timbers that make up the ceiling arch (illustrated at the deck level) hanging knee and frame.

Ceiling planking thickness ranges between 2 to 2.5 inches, while the hull planking is slightly thinner, ranging between 1.5 to 2 inches. The vessel's ceiling is fastened with .375 and .5-inch square spikes with compression washers. Ceiling planking ranges in width from 8 to 15 inches, while observable bottom planking varies from 7.5 to 14 inches wide, excluding the 16-inch rabbeted garboard strake.

Large timber chocks are found between many of the floors, presumably to separate the port and starboard bilge. Periodically blocks, 12 inches by 12 inches, are stepped into

the keelson. Two stringers, 3 inches sided and 6 inches molded, run 10 feet along the keelson amidships. A 1-foot gap separates a nearly identical set. The blocks and stringers are possibly part of a removable bulkhead used to separate the port and starboard sides of the hold.²⁰

As the size of wooden vessels on the Great Lakes surpassed 150 feet, additional hull structure was needed. Where ocean vessels could be built with deeper hulls and wider beams to compensate for the greater length, Great Lakes vessels were limited in this regard by shallow spots and locks.²¹ So as vessels were built longer, their length to beam and length to depth ratios increased, which in turn increased their flexibility. This could lead to hogging and sagging conditions brought on by the drooping of the bow and stern because of the lack of water displacement in these areas. Lacking the rigidity of shorter hulls, longer vessels need to compensate with longitudinal strengthening devices in order to maintain their watertight integrity. These additions were designed to literally keep vessels' seams from opening.

Although smaller than many wooden vessels of the time, the Claflin Point Wreck employed several hull reinforcement devices to battle the problems of hogging and sagging.²² The archaeological record reveals some of the vessel's longitudinals and transverse reinforcements that countered the stresses inherent in larger wooden ships. In addition to the keel/keelson assemblage, the hull received additional longitudinal strength from a parallel set of single bilge keelsons. Just over 6 feet to the port and starboard of the centerline keelson, the bilge keelsons, 10 inches molded and sided, are sandwiched

²⁰ Ibid.

²¹ Larry Murphy and Thom Holden, "Shipwrecks of Isle Royale: The Historical Record" in Lenihan (ed.), *Shipwrecks of Isle Royale National Park*, 32-33.

²² See Cooper and Jensen, *Davidson's Goliaths* for a historical and archaeological study on two Great Lakes wooden vessels that exceeded 300 feet.

between ceiling planking and run the length of the hull atop the frame sets. A robust ceiling arch also identified on the wreck served as an important component of the vessel's longitudinal support system. Consisting of four planks, with widths between 10 and 12 inches, this device is a structural arch for longitudinal support built into the ceiling planking (see Figure 17).²³ The curved timbers of the ceiling arch were probably tied into the bow and stern deadwood, from where it arched upward along the inner hull. This arch crested at the deck level, where the four planks run under the hanging knee, clamp and shelf structure (see Figures 17 and 18).

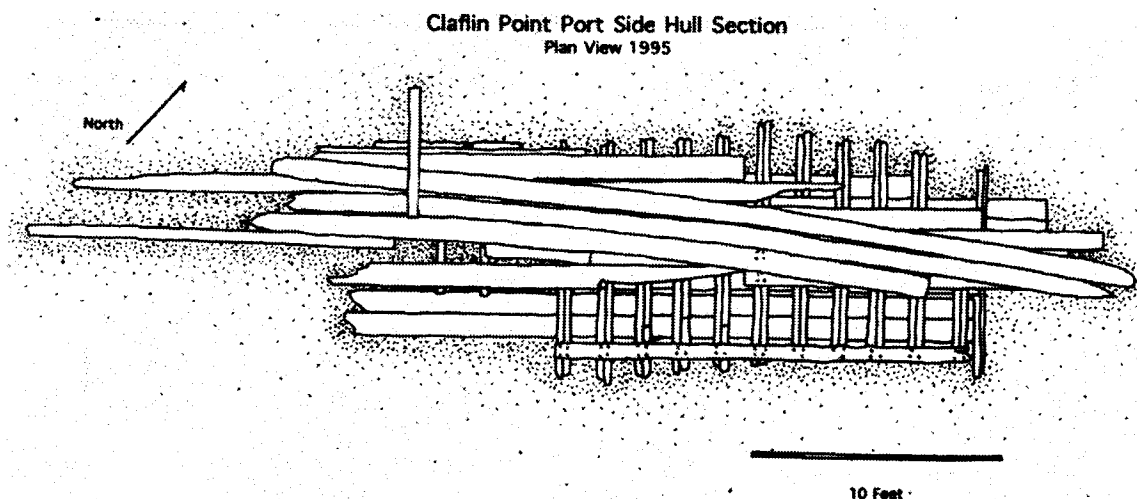


Figure 18: Claflin Point Wreck's Port Hull Section.

Besides being heavily fastened, the Claflin Point Wreck employed iron in its hull strengthening system. Evidence of various types of iron strapping and bracing are observed on the wreck. Iron strapping, 8.5 inches wide, is periodically found running adjacent to the bilge keelsons, while other small sections of iron reinforcements are located on the outer fantail. Also, disarticulated sections of strapping are found along the keelson and starboard bilge. An iron tie bolt and turn buckle assemblage provided transverse reinforcement to the hull (see Figure 17). The tie bolt, 1.5 inches in diameter, extended

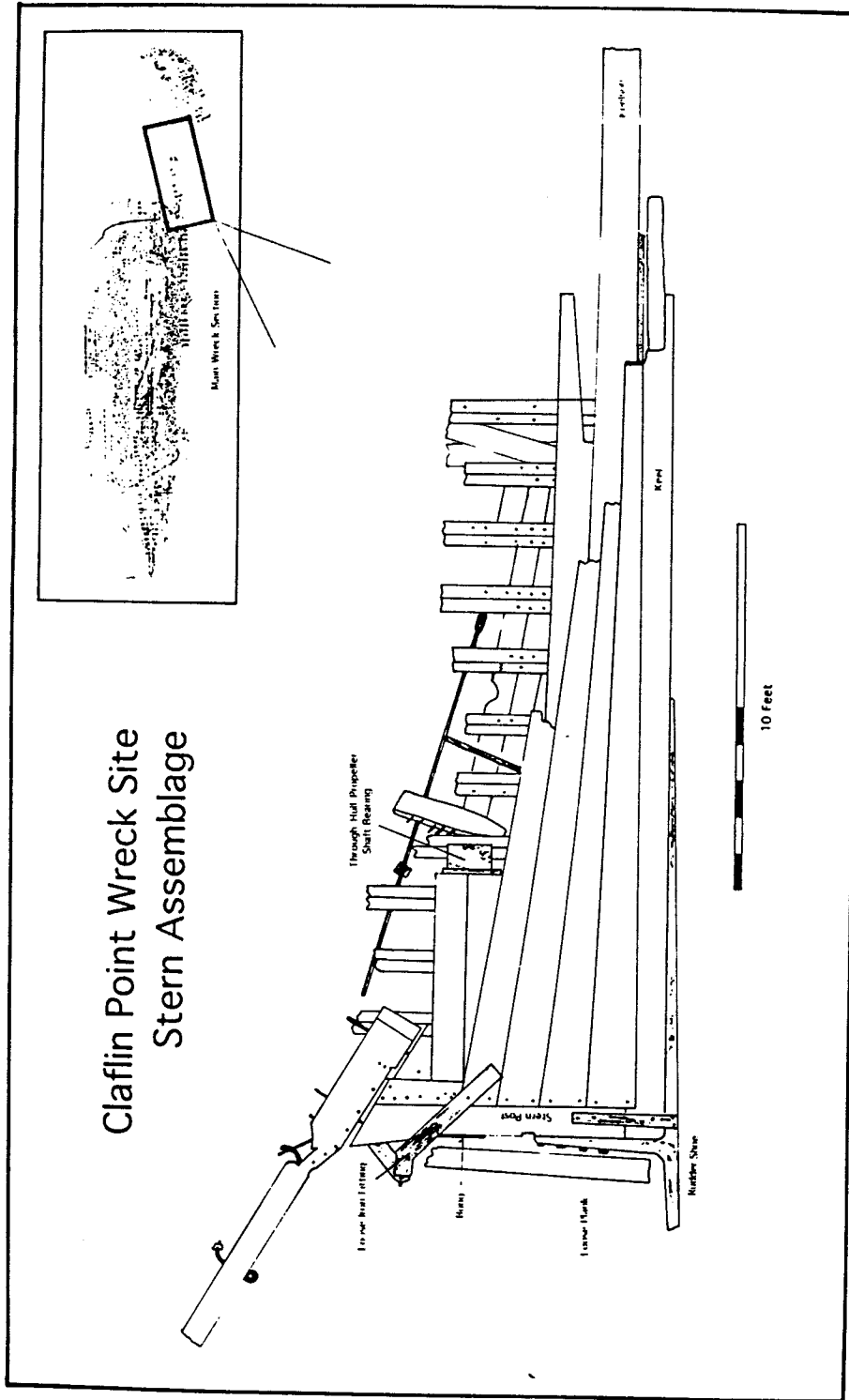
²³ Larry Murphy, Daniel Lenihan, and C. Patrick Labadie, "Shipwrecks of Isle Royale: The Archaeological Record," in Lenihan (ed.), *Shipwrecks of Isle Royale National Park*, 131.

athwartships from shelf to shelf. The tension of the device could be modified by adjusting the turnbuckle.

The stern assemblage is well preserved and reveals a wealth of construction detail. The lower timbers are pronounced in this assemblage, which consist of keel, the lower deadwood, and keelson (see Figure 19). These extend 23 feet, 29 feet, and 22 feet forward from the sternpost, respectively. The garboard strake runs almost the length of this section of keel, but the forward end of the garboard is missing. This absence reveals the rabbet in the keel in which the missing length of garboard set. The lower deadwood is 12.5 inches molded and sided, while the keelson matches the scarf joint from the main wreckage. The surviving sternpost is 8 feet 9 inches long, running from the rudder shoe to just below the horn timber. The upper sternpost is 29 inches molded and 11.75 inches sided, while the lower end, just above the rudder shoe, is 17 inches molded and 18.5 sided. Missing starboard hull planking reveals a 9.5-inch rabbet in the sternpost assembly to receive the after ends of the lower planks, which terminate in the stern.²⁴ The horn timber has a length of 10 feet 6 inches and has 12.5-inch sided and 14.25-inch molded dimensions at the bevel. The sided dimension of this timber drops to 8.25 at the aft end.

An iron plate extends around the keel and nearly 3 feet up the port and starboard faces of the sternpost. Likewise, the rudder shoe runs 3 feet 11 inches up the aft face of the sternpost and is 11 inches sided and 1.125 inches molded. The shoe stretches 11 feet 5 inches forward of the sternpost (under the keel) where it is 12 inches sided and 1 inch molded. The shoe is fastened with 2.125-inch square head bolts with 2.25-inch washers.

²⁴ Charles Desmond, Wooden Ship-Building (New York: Rudder Publishing Company, 1919), 51.



Clafin Point Wreck Site Stern Assemblage

Figure 19: Clafin Point Wreck's Stern Assemblage.

Interpretations

The Wreck

Sufficient data was collected for substantial interpretation of the hull's original dimensions and features in the form of reconstructions and projections. The wreck lying off Claflin Point was single decked and had an original length between 168 to 173 feet, a beam of between 22 to 24 feet, and a depth of hold of approximately 12 feet 6 inches. These dimensions give the Claflin Point Wreck a gross registered tonnage between 275 and 300 or approximately 500 tons burthen.²⁵

The through hull propeller shaft bearing and stuffing box, located on the stern assemblage section, are diagnostic features that indicate the vessel was built as a propeller driven vessel. This is reinforced by the boiler saddle and boiler and engine beds found on the main section of wreckage. These observations reveal that the Claflin Point Wreck served, at some point, as a steam propeller.

There is no machinery present on the site. It is not uncommon to find the hull of a steamer stripped of its machinery, particularly in shallow water. The expensive and robust engines and boilers of lost vessels were prime candidates for salvage. Archaeological evidence, however, suggests that the Claflin Point Wreck's machinery was not salvaged after the vessel sank at Little Sturgeon. Instead, the data indicates that the machinery was removed before its sinking. Through hull fittings below the waterline, including the 9.5-inch shaft alley, are plugged with wooden stoppers. Because the machinery was removed and the fittings were plugged to make the hull watertight, it has been concluded that the Claflin Point was not serving as a propeller in its final days, but was an unpowered barge.

²⁵ Rodgers, *Claflin Point*, 15.

Clafin Point Vessel Lines

Repositioned and Justified
Archaeological Data

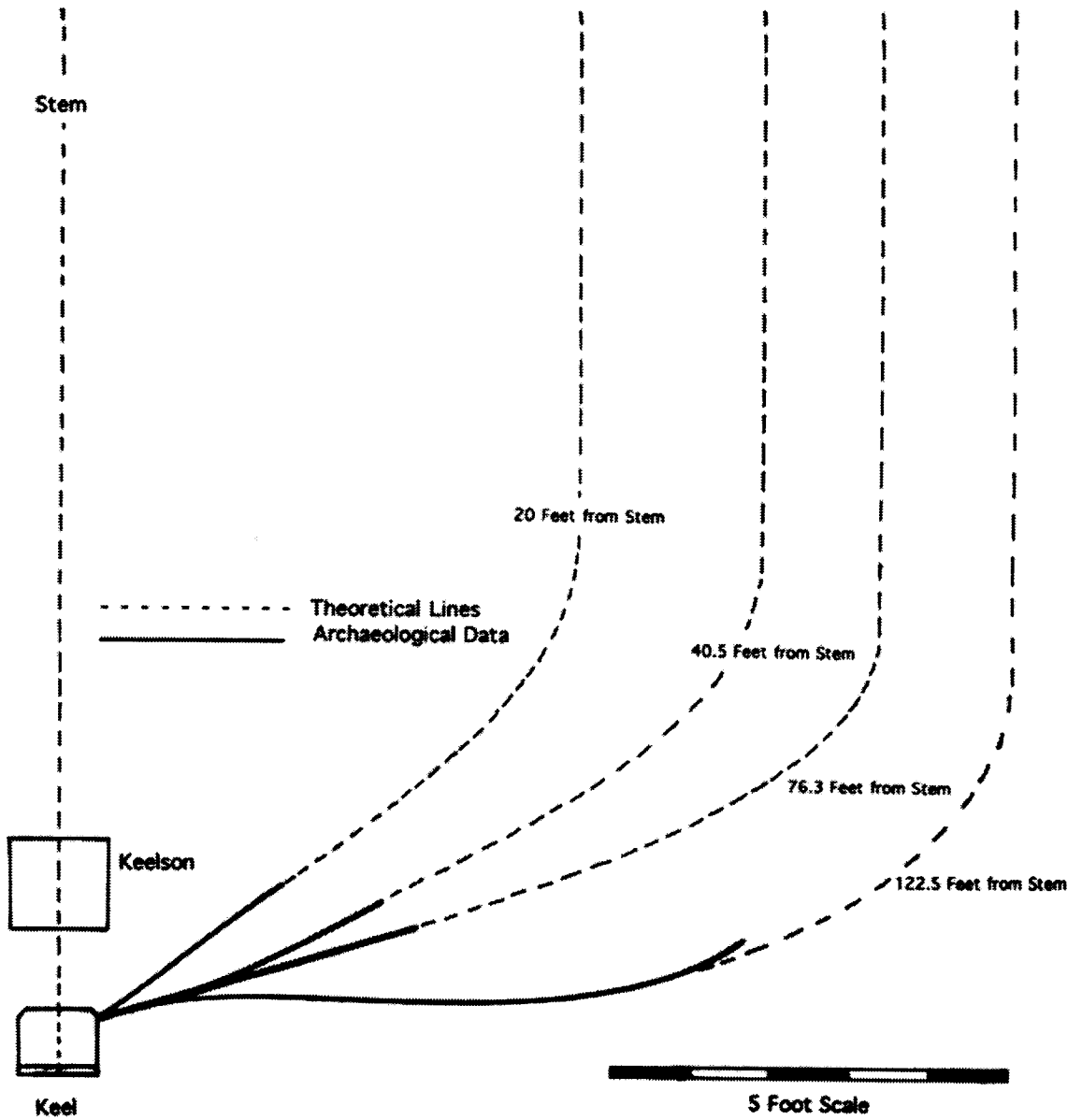


Figure 20: Clafin Point Vessel Lines, Repositioned and Justified.

As mentioned earlier, despite the fact that the Claflin Point Wreck is broken up, many of the key pieces are still present, enough to reconstruct a cross-sectional view of the hull (see Figure 17). This was achieved by combining detailed recordings of the flattened wreck with the hull's projected-faired lines. Faired lines were plotted by stretching a level line perpendicular to the keelson and systematically measuring the vertical fluctuation with a plumb bob to the ceiling and hull planking.²⁶ By recording this athwartships variation, the deadrise profiles were recorded and illustrated (see Figure 20). From this data, theoretical projections of the hull's cross-section and shape were illustrated (see Figures 17 and 21). With these archaeological techniques, the team was able to give shape to a flattened hull.

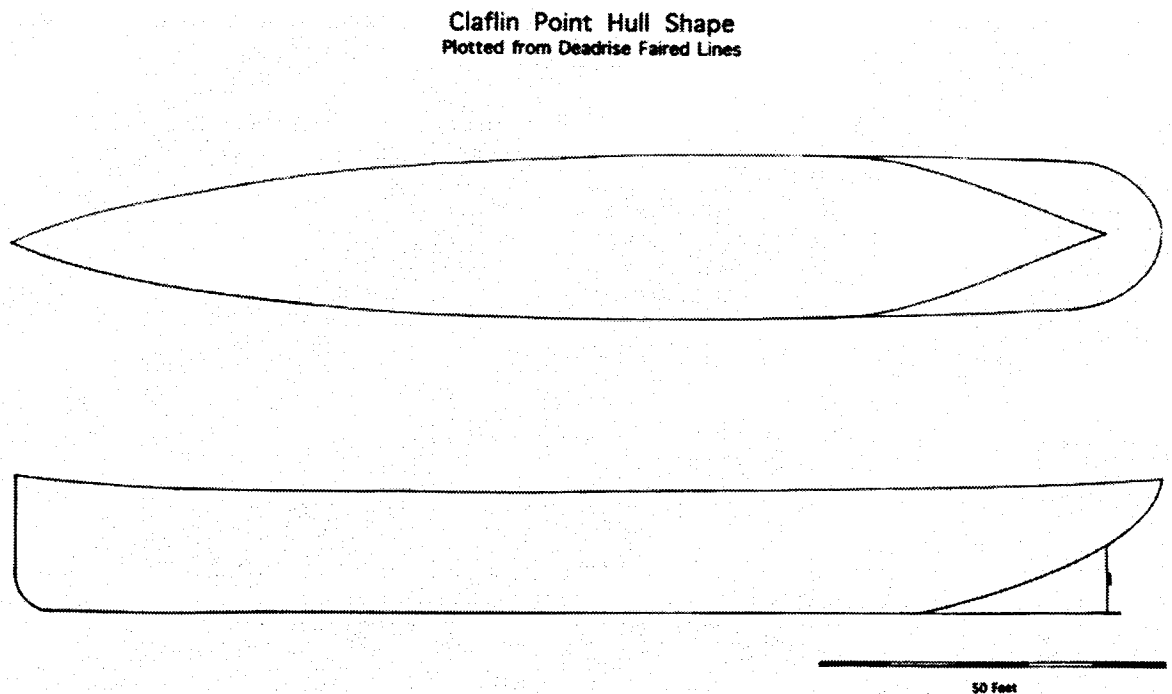


Figure 21: Claflin Point Hull Shape, (Plotted from Deadrise Faired Lines).

²⁶ Ibid., 11.

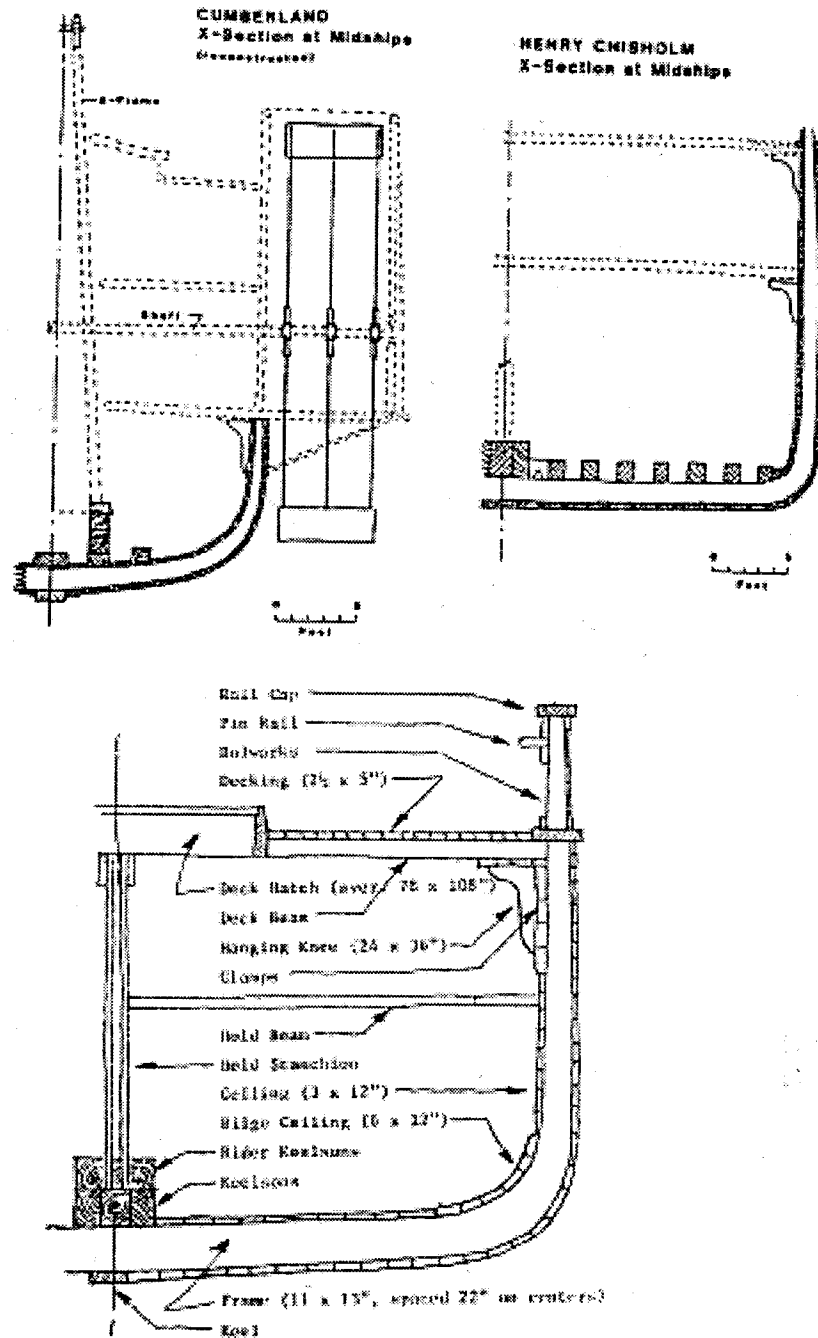


Figure 22: Various Cross-sections of Great Lakes Vessels. The *Cumberland* (top left) a sidewheel steamer built in 1871, the *Henry Chisolm* (top right) a steam barge built in 1881, and the *S.P. Ely* (bottom) a three-masted schooner built in 1869. (Murphy, Lenihan, and Labadie, "Shipwrecks of Isle Royale," 130; Labadie

Investigation of the Schooner S.P. ELY Shipwreck Remains at Two Harbors, MN, 38).

The cross-section of the Claflin Point Wreck (see Figure 17) demonstrates the graceful sharp lines of a vessel built for speed and economy. The deadrise, or “V” of the hull, is quite different from the more common boxy hulls of typical Great Lakes steam barges, bulk freighters, and schooners (see Figures 22). The boxy hulls are typical of vessels engaged in the bulk trade and allowed for increased cargoes, while the sharper hull of the Claflin Point Wreck indicates a vessel built for speed in the package and passenger trades.²⁷ Another feature that stands out about the Claflin Point Wreck is its keel size. By comparing the various cross sections, it is apparent that many Great Lakes ships had shallow (small molded dimensions) keels, another concession in dealing the limited depths of the Great Lakes. The Claflin Point Wreck, however, has a very pronounced keel (10 inches molded). By comparison to the typical boxy hull, the vessel lying off Little Sturgeon probably rolled more in heavy seas, and this deeper keel would have provided additional stability.

In many ways, the Claflin Point Wreck’s hull closely resembles the sidewheel steamer *Cumberland* (see Figure 22).²⁸ Both vessels display a tremendous amount deadrise when compared to Great Lakes ships engaged in the bulk trade. The *Cumberland* had a beam to length ratio of 1:7.8,²⁹ where the Claflin Point Wreck’s ranged between 1:7 and 1:7.9. While these characteristics generated greater speeds, both vessels utilized relatively pronounced keels for added stability and ceiling arches for longitudinal hull strengthening. The *Cumberland* was used in the passenger and package trades and the similarities in hull designs suggests that the Claflin Point Wreck was as well. The Claflin

²⁷ Ibid., 23,15.

²⁸ For a detailed discussion of the *Cumberland*’s history and archaeology see Lenihan (ed.), Shipwrecks of Isle Royale National Park.

²⁹ Murphy, Lenihan, and Labadie, “Shipwrecks of Isle Royale: The Archaeological Record,” 129.

Point Wreck's lines and construction details reveal a vessel built for speed and freight carrying capacity.³⁰ Archaeological analysis, has identified the Claflin Point Wreck as a passenger/package propeller before its conversion to a barge.

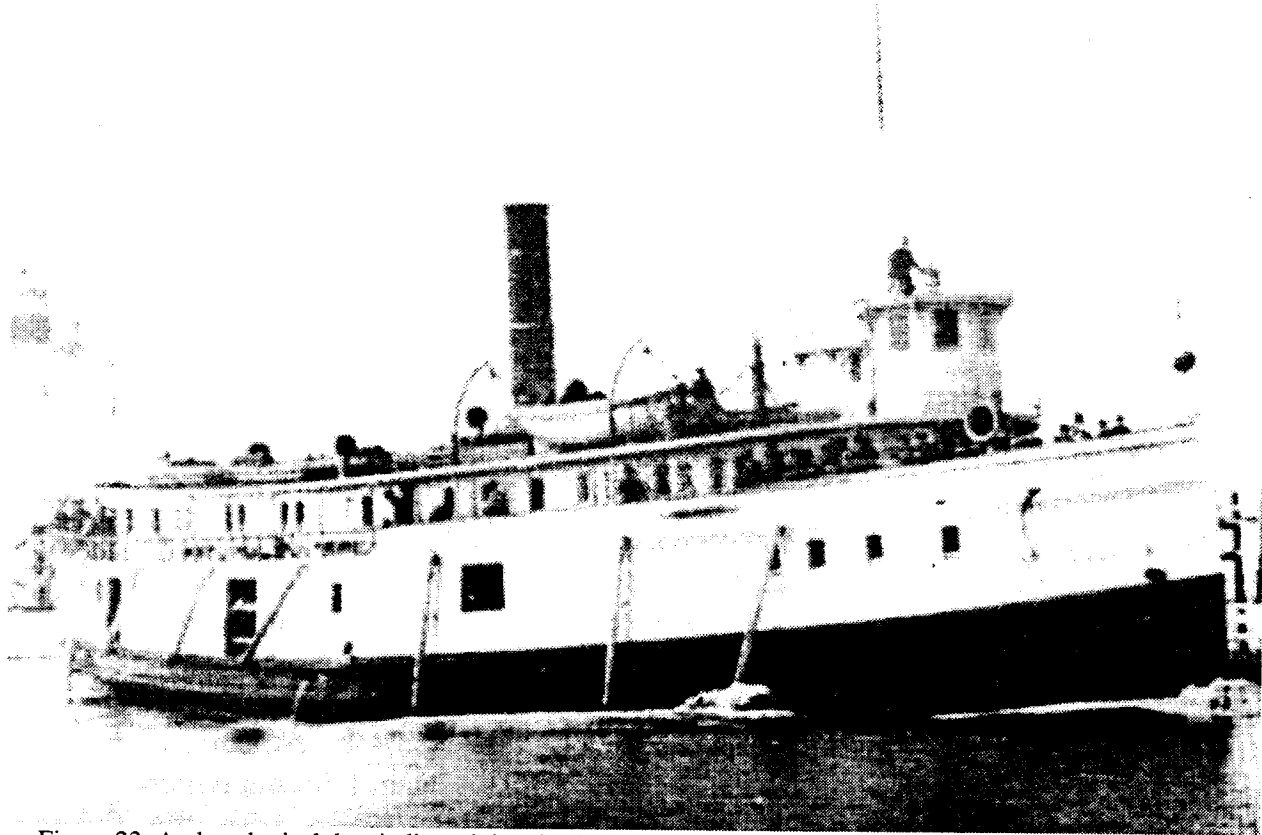


Figure 23: Archaeological data indicated that the Claflin Point Wreck was probably very similar to the passenger propeller *Puritan* that was built in 1887. (Van der Linden, *Great Lakes Ships We Remember*.)

A very small amount of diagnostic artifactual material was found during the 1995 survey of the Claflin Point Wreck. However, a ceramic fuse buss and brass lamp collar were recorded during the investigation. The fuse buss indicates the ship was fitted with electrical lighting. Electrical lighting first appeared on the Great Lakes passenger and package steamers in the early 1880s and likely became standard by the mid to late-1880s.³¹

³⁰ Rodgers, *Claflin Point*, 23.

³¹ *Ibid.*

The hull features, such as the vessel's high length to beam ratio, the plumb bow, reinforcement systems, and fantail are consistent with late-nineteenth century propellers.³² Together, the construction details and diagnostic evidence indicated that the Claflin Point Wreck was built in the 1880s or early 1890s.

The Sinking

An analysis of the site's spatial relation led to an interesting discovery. During the field investigation, one of the possible "sinking theories" was that someone intentionally sank the wreck to extend the wharf. This was dismissed when the overall site map began to take shape (see Figure 15). This map illustrates that the Claflin Point Wreck is not an extension of the wharf. In fact, it is quite the opposite. The hull is nearly aligned to block the wharf's slip. Thus, after the vessel's sinking, the main slip would have been rendered useless for large vessels.³³

One of the major questions surrounding the Claflin Point Wreck is how it came to its final resting-place off Claflin Point. One possible explanation is a shallow-water abandonment or intentional sinking. This may have been done by the Piper Ice Co. (as referred to on page 103) or someone else in an attempt to prevent other vessels from using the dock. The *Door County Advocate* reported in 1897 that the dock "will be fenced in to prevent steamers from landing."³⁴ It is also possible that the barge was purposefully scuttled because it was deemed unprofitable, and Little Sturgeon was simply a convenient location to lay the vessel to rest.

³² Ibid.

³³ It is possible that the dock's outer footage could still have been used. Also, it may have been possible for fish tugs could have utilized the slip after the sinking. However, it seems likely that industrial use of the dock did not occur, for one reason or another, after the vessel sank.

³⁴ *Door County Advocate*, 20 March 1897.

Another possible explanation is that the vessel may have wrecked during a violent storm while tied-up in the wharf's slip. Although a protected area, storms could still create major problems for a vessel in the slip. For example, the lumber and supplies stored on the dock "left on their own account and headed for Green Bay," during a storm in May of 1871.³⁵ When the gales of November struck in 1873, the storm tore out a section of the dock and deposited stone and timber far up on shore.³⁶ Therefore, such storm conditions are conceivable and could be responsible for the wreck. A possible sinking scenario could be recounted as follows: the vessel was docked in the slip when a storm hit, the barge broke free, and the storm pounded it against the dock. As a result, the ship broke apart and sank in its present position.³⁷ Although the wreck's position in the slip supports this theory, nothing has been found in the historical record confirming such a dramatic sinking.

The piles of quarried limestone found on the wreck are also a mystery and can be interpreted to support any of the probable sinking scenarios. Arranged in two linear piles, the stone is not haphazardly spread around site. The vessel may have been unloading or loading stone, or using the stone to repair the dock and was overtaken by the storm. Or, the stone may have been used as ballast to sink a derelict hull.

Although there are strengths and weaknesses to each of the sinking theories, there is not yet enough archaeological or historical evidence to eliminate any of these options, much less make a definitive statement. The same can be said for the time of sinking. Although, it seems likely that the sinking probably occurred after or around the time the Piper Ice Co. abandoned Little Sturgeon (1897) and the storm of 1905, it can not be stated definitively at this time.

³⁵ *Door County Advocate*, May 11, 1871; Rohe, "Ghost of the Bayshore: Part I," 36.

³⁶ Rohe, "Ghost of the Bayshore: Part I," 38.

³⁷ Rodgers, Clafin Point, 26.

Even with detailed archaeological research, there is not enough evidence to make a definitive statement about how or when the vessel resting off Little Sturgeon, Wisconsin became the Claflin Point Wreck. For the time being these questions remain, along with the vessel's name, as mysteries that continue to surround the Claflin Point Wreck.

Recommendations

Lime Kilns

Although this thesis has taken steps to historically document Little Sturgeon's lime industry, it has done very little to document it archaeologically. Two team members returned to the site in 1996 to photograph and record general measurements of the kiln. Today, the kilns consist of two furnaces in which one still has its iron stack in place. The kiln structure is constructed of cut limestone, with cream firebrick arching over the furnace openings, is approximately 75-feet long and 17-feet high. The stack sits on a semi-circular base and stretches the structure's height to nearly 40 feet. The iron stack is corroded at the base, but appears to be stable.

The state of preservation and historical significance of the kilns warrants a detailed archaeological analysis of the site to provide a better understanding of Little Sturgeon's industry and the technology of the lime industry. The kilns should be evaluated for eligibility for the National Register of Historic Places.

The Docks

Aside from the depth-contour map, very little documentation was conducted on the dock at Claflin Point. A detailed survey of the dock and surrounding area is recommended. With 50 years of industry conducted at the site, there is a high potential for artifacts associated with Little Sturgeon in the area, despite the likelihood that many have already been removed by looters. The site should be evaluated for eligibility for the National

Register of Historic Places.

Although a systematic survey was not conducted, the 1995 field team did attempt to locate remains of the dock off the lime kilns. Also, local divers have reported that no identifiable features or remains of this dock are in the area. An organized survey of the area is needed to determine the location and extent of any remnants of this dock.

The Claflin Point Wreck

In the research of this thesis, the *Door County Advocate* was exhausted in search of information on Little Sturgeon and potential candidates for the wreck. The *Door County Advocate* thoroughly reported local events of varying significance, such as the return of a town resident from a vacation.³⁸ However, the paper routinely provided detailed coverage of maritime topics due to the county's strong connection with the Great Lakes. Also, lists of merchant ships were searched for vessels of similar dimension as the Claflin Point Wreck. Historic identification of the vessel remains elusive, yet continued systematic searching through the historic record may yield the vessels name and details of its loss.

Much has been revealed and much can be learned about late nineteenth-century ship architecture, even without the Claflin Point Wreck's name. There has been very limited documentation of wooden passenger/package propellers archaeologically.³⁹ The work at Claflin Point has enhanced the archeological record, and as more vessels are documented, the utility of the data recovered will expand. Thus, further archaeological investigations of other passenger/package propellers need to be conducted to supply comparative data. Likewise, more research is needed on the refitting of hulls to barges. By gathering

³⁸ *Door County Advocate*, 15 August 1896.

³⁹ Lenihan (ed.), *Shipwrecks of Isle Royale National Park*, has a detailed historical and archaeological analysis of the passenger/package propeller *Monarch*. However, the *Monarch* was built in 1890 and was 252-feet long, nearly 50 percent longer than the Claflin Point Wreck.

archaeological data, comparisons can be made on the modifications used to convert a vessel built for speed into a vessel for use in the bulk trades.

Finally, the Claflin Point Wreck is eligible for inclusion on the National Register of Historic Places under Criterion A and D of the U.S. Department of Interior's National Register Bulletin. Criterion A, association with "events that have made a significant contribution to the broad patterns of history," makes the Claflin Point Wreck eligible through its association with several historic themes, namely commerce, industry, and transportation. Under Criterion D, wrecks that "have yielded, or may be likely to yield, information in prehistory or history," the wrecks architectural data, both as a barge and propeller, make the wreck eligible for inclusion on the Register. The Claflin Point Site may be eligible due to its significance to local history.

Conclusion

Wooden-passenger/package propellers are not well represented in the archaeological record, despite their historical significance. These vessels provided expedient service for passengers and freight across the Great Lakes in a time that the region was experiencing unprecedented growth. As part of an international transportation system, these vessels connected people and places and played a key role in the settlement and development of the Great Lakes.

Without any wooden-passenger/package propellers still afloat, archaeologists must now turn to the lakebed. Shipwrecks provide a rich source of primary data that aids in uncovering the secrets of our maritime past and increases our knowledge of shipbuilding and technology. Where most see a haphazard pile of timbers and planking, these fragmented hulls actually preserve valuable information that open windows to the past.

This research did more than simply document the wooden remains resting off Little Sturgeon, Wisconsin. Enough data was gathered and interpreted to archaeologically

reconstruct the Claflin Point Wreck's hull. Although the identity of the vessel did not come out of this project, research determined it to be a late nineteenth-century, mid-sized passenger/package propeller converted into a barge. The archaeological analysis of the Claflin Point Wreck has proved an important source of data on passenger/package propeller construction. And as further underwater archaeological investigations are conducted on other passenger/package propellers, this study of the Claflin Point Wreck will supply valuable comparative data.

Although the Claflin Point Wreck is the focal point of this thesis, its position and use as a barge has highlighted the contributions of Little Sturgeon as a hinterland community. The presence of the wreck, the submerged dock structure, and the abundance of processed raw materials (wood and stone) underwater all reflect the bygone activities of Little Sturgeon as an industrial outpost.

From the very beginning, those living in Little Sturgeon exploited the area's waterways, resources, and landscape for subsistence and economic pursuits. Freeland Gardner opened his sawmill in the 1850s. For the next half century, Little Sturgeon's dependency upon its resources and harbor peaked and was never matched. The lumber, limestone, and ice industries dominated the village's economy. Barges, schooners, scows, and steamers converged at Little Sturgeon to fill their holds with natural commodities funneled through the village. These industries were crucial to Little Sturgeon, as evidenced by the town's collapse after their demise. Lumber, lime, and ice were shipped around the ports of the Great Lakes to fill the needs of cities experiencing extraordinary economic and physical growth.

Urban growth during the nineteenth century placed incredible stress on young, expanding cities. Lacking crucial resources, while depleting and polluting others, urban centers developed an unquenchable thirst for natural resources to supply growing populations and industries. Forced to look farther, cities turned to a network of smaller

communities. Often utilizing lake and river transportation, the hinterland developed, in part, to supply food, building materials, and other resources. Little Sturgeon was one of many communities developed during this period to quench urban demand for natural resources that cities could not supply themselves.

When studying the growth and significance of the Great Lakes, it is crucial to understand the essential contributions of hinterland communities like Little Sturgeon. Individually, they supplied only a fraction of the resources needed by developing urban centers, but collectively, they fueled the fire for nineteenth-century growth. Industrial outposts like Little Sturgeon were key to regional development. With detailed accounts of Little Sturgeon's lumber, lime, and ice industries and documentation of the industrial site, this thesis used the village as a case study to illustrate the relationship between the city and hinterland. Together, this historical and archaeological investigation has produced not only a more complete account of Little Sturgeon and the Claflin Point Wreck, but a better understanding of the Great Lakes region in the second half of the nineteenth century.

Bibliography

Primary Sources

- Andrews, Israel D. Secretary of the Treasury Report on Trade on the Great Lakes. Washington, D.C.: Robert Armstrong, 1853.
- Bahrenberg, H.W. "Presidential Address." Proceedings of the Natural Ice Association of America First Annual Meeting. New York. 10 April 1912
- Dudly, William S., and Michael J. Crawford. The Naval War of 1812: A Documentary History. Vol. 1-2. Washington: Naval Historical Center, 1985.
- U.S. Congress. House. Lumber Rafts on the Lakes. 51st Cong., 2nd sess., H.R. 3759.
- U. S. Congress. Senate Committee on Commerce. Loose Logs, Steamboats, and Rafts on Certain River and Streams. 56th Cong., 1st sess., S. R. 1035.
- Wisconsin. Bulletin No. 3. Madison: State of Wisconsin Executive Office. 1936.

Archaeological Reports

- Aerts, Danny. Report on the Leathem & Smith Rock Quarry Site, 1990-1993. Unpublished Archaeological Report distributed by the Wisconsin Underwater Archaeology Association, 1994.
- Cooper, David J. and John O. Jensen. Davidson's Goliaths: Underwater Archaeological Investigations of the Steamer *Frank O'Conner* and the Schooner-Barge *Pretoria*. Madison: State Historical Society of Wisconsin, 1995.
- Cooper, David J. 1986-1987 Archaeological Survey of the Schooner Fleetwing Site 47 DR168, Garrett Bay, Wisconsin. Greenville, N.C.: ECU Research Report No.6, 1987.
- Cooper, David J. (ed.). By Fire Storm and Ice: Underwater Archaeology in the Apostle Islands. Madison: State Historical Society of Wisconsin, 1991.
- Cooper, David J. Survey of Submerged Cultural Resources in Northern Door County: 1988 Field Season Report. Madison: State Historical Society of Wisconsin, 1989.

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

Labadie, C. Patrick, Investigation of the Schooner S.P. ELY Shipwreck Remains at Two Harbors, MN. Detroit: U.S. Army Corps of Engineers Detroit District, 1989.

Labadie, C. Patrick. Submerged Cultural Resources Survey: Picture Rocks National Lakeshore. Southwest Cultural Resources Center Professional Papers No 22. Santa Fe, New Mexico. Washington D.C.: U.S. Government Printing Office, 1989.

Rodgers, Bradley A. The 1995 Predisturbance Wreck Site Investigation at Claflin Point, Little Sturgeon Bay, Wisconsin. Greenville, N.C.: East Carolina University, Research Report No. 10, 1996.

Secondary Sources

Albion, Robert G. Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862. Camden: Archon Books, 1965.

Appel, Susan K. "Building Milwaukee's Breweries: Pre-Prohibition Brewery Architecture in the Cream City." Wisconsin Magazine of History. Madison: State Historical Society of Wisconsin, 1995.

Barry, James P. Ships of the Great Lakes: 300 Years of Navigation. Berkeley: Howell-North Books, 1970.

Bauer, K. Jack. A Maritime History of the United States: The Role of America's Seas and Waterways. Columbia: University of South Carolina Press, 1988.

Berton, Pierre. The Great Lakes. Toronto: Stoddart Books, 1996.

Chandre, Carolyn A. "The Pewaukee Ice Industry." Unpublished graduate seminar research paper. University of Wisconsin-Milwaukee, 1995.

Cronon, William. Nature's Metropolis: Chicago and the Great West. New York: W.W. Norton and Company, 1991.

Cummings, Richard O. The American Ice Harvests: A Historical Study in Technology, 1800-1918. Los Angeles: University of California Press, 1949.

- Curtis, John T. The Vegetation of Wisconsin: An Ordination of Plant Communities. Madison: University of Wisconsin Press, 1959.
- Desmond, Charles. Wooden Ship-Building. New York: Rudder Publishing Company, 1919.
- Flader, Susan L. (ed.). The Great Lakes Forest: An Environmental and Social History. Minneapolis: University of Minnesota Press, 1983.
- Fletcher, Daniel O. A Study of Package Freighters on the Great Lakes. Ann Arbor: University Publications, 1960.
- Fries, Robert F. Empire In Pine: The Story of Lumbering in Wisconsin. Madison: State Historical Society of Wisconsin, 1951.
- Garraty, John A. The American Nation: A History of the United States to 1877. New York: Harper Collins Publishers, 1991.
- Grindle, Roger L. Quarry and Kiln: The Story of Maine's Lime Industry. Rockland: Courier-Gazette, Inc, 1971.
- Hatcher, Harlan and Erich A. Walter. A Pictorial History of the Great Lakes. New York: Crown Publishers, 1963.
- Headrick, Daniel R. The Tools of Empire: Technology and European Imperialism in the Nineteenth Century. New York: Oxford University Press, 1981.
- Hill, Dewey D. and Elliot R. Hughes. Ice Harvesting in Early America. New Hartford: New Hartford Historical Society, 1977.
- Hindle, Brooke, (ed.). Material Culture of the Wooden Age. New York: Sleepy Hollow Restorations, Inc., 1981.
- Hirthe, Mary K. and Walter M. Schooner Days in Door County. Minneapolis: Voyageur Press, 1986.
- Holand, Hjalmar R. History of Door County, Wisconsin: The County Beautiful. Chicago: S.J. Clarke Publishing Co., 1917.
- Hotchkiss, George W. History of the Lumber and Forest Industry of the Northwest. Chicago: G.W. Hotchkiss, 1898.

- Jensen, John O. "Transportation at the Time of Statehood: The History and Archaeology of the Palace Steam Boat Niagara." Unpublished article to appear in the Wisconsin Magazine of History, Spring 1999.
- Jensen, John O. "Bulwarks Against a Human Tide: Early Hospitals on the Maritime Frontier 1800-1831." Unpublished Ph.D. diss., Carnegie Mellon University, 1998.
- Jones, Joseph C. America's Icemen: An Illustrated History of the United States Natural Ice Industry 1665-1925. Humble, TX: Jobeco Books, 1984.
- Kanetzke, Howard. "Lime One of Wisconsin's Oldest Industries," Limestone: An Important and Valuable Manitowoc County Resource. Manitowoc: Manitowoc County Historical Society, 1975.
- Kilar, Jeremy W. Michigan Lumber Towns: Lumbermen and Laborers in Saginaw, Bay City, and Muskegon, 1870-1905. Detroit: Wayne State University Press, 1990.
- Krejarek, Jody. "The Knights of Labor and Lumber Industry," Voyager. Vol. 13, no. 1, 1996.
- Lawrence, Lee E. The Wisconsin Ice Trade. Madison: State Historical Society of Wisconsin, 1980.
- Leavitt, Judith Walzer. The Healthiest City: Milwaukee and the Politics of Health Reform. Madison: University of Wisconsin Press, 1982.
- Lee, Robert E. Ships of the Great Lakes: A Pictorial History. Detroit: Wayne State University Press, 1976.
- Lender, Mark Edward and James Kirby Martin. Drinking in America: A History. New York: The Free Press, 1982.
- Lenihan, Daniel (ed.). Shipwrecks of Isle Royale National Park. Duluth: Lake Superior Port Cities Inc., 1994.
- Lotz, M. Marvin. Discovering Door County's Past: A Comprehensive History of the Door Peninsula Volume One: From the Beginning to 1930. Fish Creek, Wisconsin: Holly House Press, 1994.
- Mansfield, J.H. History of the Great Lakes in Two Volumes. Vol. 1, Chicago: J.H.Beers & Co, 1899.
- Miller, Roberta Balstad. City and Hinterland: A case study of urban growth and regional development. Westport: Greenwood Press, 1979.

- Mills, James Cook. Our Inland Seas: Their Shipping and Commerce for Three Centuries. Chicago: A.C. McClurg & Co, 1910.
- Olson, Kris Beisser. "The Great Fire of October 1871: A Nation Responds, Letters and Telegrams to Governor Fairchild." Voyageur. Vol. 13, no. 2, 1997.
- Palmquist, John C. Wisconsin's Door Peninsula: A Natural History. Appleton: Perin Press, 1989.
- Posen, I. Sheldon. You Hear the Ice Talking: The Ways if the People and Ice on Lake Champlain. Plattsburgh, New York: The Clinton-Essex-Franklin Library System, 1986.
- Rector, William. Log Transportation in the Lake States Lumber Industry 1840-1918. Glendale, C.A.: Arthur H. Clark Co., 1953.
- Rodgers, Bradley A. Guardian of the Great Lakes: The U.S. Paddle Frigate Michigan. Ann Arbor: University of Michigan Press, 1996.
- Rohe, Randel. "Ghost of the Bayshore: Little Sturgeon: Part I" Voyageur. Green Bay: Brown County Historical Society, Vol. 13. no. 1, 1996.
- Rohe, Randall. "Ghost of the Bayshore: Little Sturgeon: Part II" Voyageur Green Bay: Brown County Historical Society, Vol. 14, no.1, 1997.
- Rohe, Randall. "Star Lake: From Boom Town to Ghost Town." Seventeenth Annual Meeting of Forest History Association of Wisconsin. 1992.
- Rolando, Victor R. 220 Years of Soot and Sweat: The History and Archaeology of Vermont's Iron, Charcoal, and Lime Industries. Dover: Dover Litho Printing Co., 1992.
- Rorabaugh, W.J. The Alcoholic Republic: An American Tradition. Oxford: Oxford University Press, 1979.
- Rosenberg, Max. The Building of Perry's Fleet on Lake Erie, 1812-1813. Harrisburg: Pennsylvania Historical and Museum Commission, 1950.
- Stonehouse, Frederick. Wreck Ashore: The United States Life-Saving Service on the Great Lakes. Duluth: Lake Superior Port Cities, 1993.
- Tarr, Joel. The Search for the Ultimate Sink: Urban Pollution in the Historical Perspective. Akron: University of Akron Press, 1996.

Taylor, George Rogers. The Transportation Revolution. New York: Rinehart & Company, 1951.

Turner, Frederick Jackson. "The Significance of the Frontier in American History" Frederick Jackson Turner: Wisconsin's Historian of the Frontier. Madison: The State Historical Society of Wisconsin, 1986.

Whittier, Bob. Paddle Wheel Steamers and their Giant Engines. Duxbury: Seamaster, Inc., 1987.

Wilde, S.A. Woodlands of Wisconsin. Madison: University of Wisconsin Extension, 1977.

Yule, John-David. Concise Encyclopedia of Science. New York: Facts on File, 1978.

Newspapers

Bayfield County Press

The Door County Advocate

Duluth News Tribune

The Monthly Magazine and Quarterly Review. "Engineering Department," New York: Griffiths and Bates, 1854.

Sunday Inter Ocean