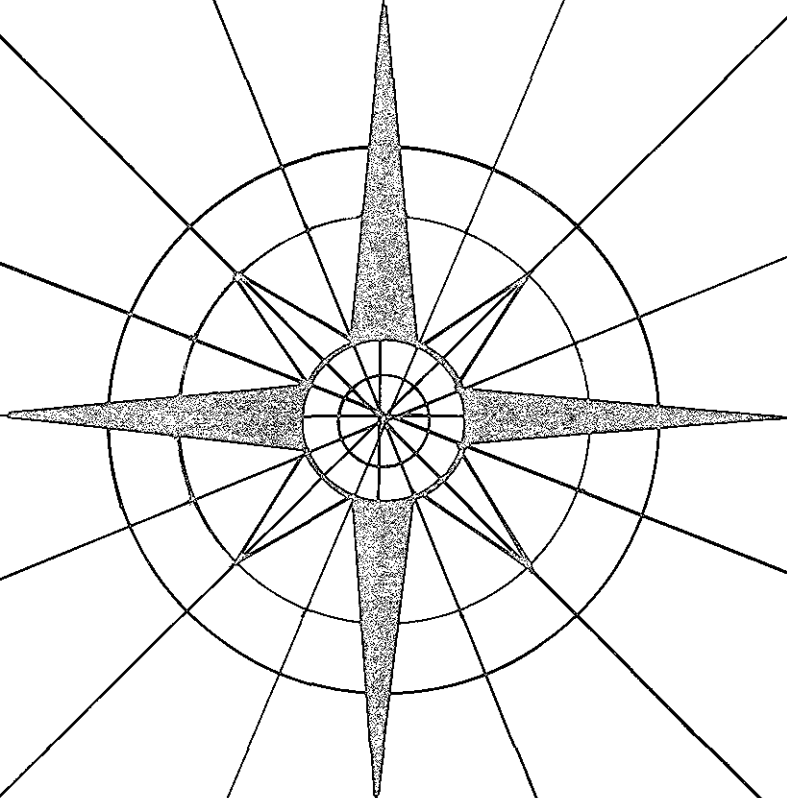


Submerged Cultural Resources Study

D-31

PICTURED ROCKS NATIONAL LAKESHORE



C. PATRICK LABADIE

B&W Scans

9.10.2002

PICTURED ROCKS NATIONAL LAKESHORE



D-37

SUBMERGED CULTURAL RESOURCES STUDY
PICTURED ROCKS NATIONAL LAKESHORE

by
C. Patrick Labadie

Southwest Cultural Resources Center Professional Papers
No. 22

Santa Fe, New Mexico
1989

RETURN TO:
TECHNICAL INFORMATION CENTER
DENVER SERVICE CENTER
NATIONAL PARK SERVICE

ON MICROFILM

Submerged Cultural Resources Unit
Southwest Cultural Resources Center
Southwest Region
National Park Service
U.S. Department of the Interior

**PUBLISHED REPORTS
OF THE
SOUTHWEST CULTURAL RESOURCES CENTER**

1. Larry E. Murphy, Editor. Submerged Cultural Resources Survey: Portions of Point Reyes National Seashore and Point Reyes-Farallon Islands National Marine Sanctuary. Submerged Cultural Resources Unit, 1984.
2. Toni Carrell. Submerged Cultural Resources Inventory: Portions of Point Reyes National Seashore and Point Reyes-Farallon Islands National Marine Sanctuary. Submerged Cultural Resources Unit, 1984
3. Edwin C. Bearss. Resource Study: Lyndon B. Johnson and the Hill Country, 1937-1963. Division of Conservation, 1984.
4. Edwin C. Bearss. Historic Structures Report: Texas White House. Division of Conservation, 1986.
5. Barbara Holmes. Historic Resource Study of the Barataria Unit of Jean Lafitte National Historical Park. Division of History, 1986.
6. Steven M. Burke and Marlys Bush-Thurber. Southwest Region Headquarters Building, Santa Fe, New Mexico: A Historic Structure Report. Division of Conservation, 1985.
7. Toni Carrell. Submerged Cultural Resources Site Report: NOQUEBAY, Apostle Islands National Lakeshore. Submerged Cultural Resources Unit, 1985.
8. Daniel J. Lenihan, Editor. Submerged Cultural Resources Study: Isle Royale National Park. Submerged Cultural Resources Unit, 1987.
9. J. Richard Ambler. Archeological Assessment: Navajo National Monument. Division of Anthropology, 1985.
10. John S. Speaker, Joanna Chase, Carol Poplin, Herschel Franks, R. Christopher Goodwin. Archeological Assessment: Barataria Unit, Jean Lafitte National Historical Park. Division of Anthropology, 1986.
11. James E. Ivey, Marlys Bush-Thurber, James T. Escobedo Jr., Tom Ireland. The Missions of San Antonio: A Historic Structures Report and Administrative History. Divisions of Conservation and History, 1987.
12. Roger E. Coleman. The Arkansas Post Story. Division of History, 1987.
13. Toni Carrell, Editor. Submerged Cultural Resources Site Report: Charles H. Spencer Mining Operation and Paddle Wheel Steamboat, Glen Canyon National Recreation Area. Submerged Cultural Resources Unit, 1987.

14. Hal Rothman. The Bandelier National Monument: An Administrative History. Division of History, 1988.
15. James E. Ivey. In the Mist of A Loneliness. Division of History, 1988.
16. Richard W. Sellars and Melody Webb. An Interview with Robert M. Utley on The History of Historic Preservation in the National Park Service--1947-1980. Santa Fe, 1988.
17. Laura S. Harrison and Beverley Spears, Historic Structures Report, Chinle Trading Post, Thunderbird Ranch and Custodian's Residence. Division of History, 1988.
18. James P. Delgado and Stephen A. Haller. Submerged Cultural Resources Assessment: Golden Gate National Recreation Area, Gulf of the Farallones National Marine Sanctuary and Point Reyes National Seashore, 1989.
19. Judith K. Fabry. Guadalupe Mountains National Park: An Administrative History. Division of History, 1988.
20. Peter J. McKenna and Scott E. Travis. Archeological Investigations at Thunderbird Lodge. Division of Anthropology, 1989.
21. Peter J. McKenna and James E. Bradford. The T. J. Ruin, Gila Cliff Dwellings. Division of Anthropology, 1989.
22. C. Patrick Labadie. Submerged Cultural Resources Study: Pictured Rocks National Lakeshore. Submerged Cultural Resources Unit, 1989.
23. Daniel J. Lenihan, Editor. Submerged Cultural Resources Study: USS Arizona Memorial and Pearl Harbor National Historic Landmark. Submerged Cultural Resources Unit, 1989.

SUBMERGED CULTURAL RESOURCES UNIT REPORT AND PUBLICATION SERIES

The Submerged Cultural Resources Unit was established in 1980 to conduct research on submerged cultural resources throughout the National Park System with an emphasis on historic shipwrecks. One of the unit's primary responsibilities is to disseminate the results of research to National Park Service managers, as well as the professional community, in a form that meets resource management needs and adds to our understanding of the resource base. A report series has been initiated in order to fulfill this responsibility. The following are the categories of reports that comprise this series.

Submerged Cultural Resources Assessment

First line document that consists of a brief literature search, an overview of the maritime history and the known or potential underwater sites in the park, and preliminary recommendations for long-term management. It is designed to have application to GMP/DCP's and to become a source document for a park's Submerged Cultural Resources Management Plan.

Submerged Cultural Resources Survey

Comprehensive examination of blocks of park lands for the purpose of locating and identifying as much of the submerged cultural resources base as possible. A comprehensive literature search would most likely be a part of the Phase I report but, in some cases, may be postponed until Phase II.

Phase I -- Reconnaissance of target areas with remote sensing and visual survey techniques to establish location of any archeological sites or anomalous features that may suggest the presence of archeological sites.

Phase II -- Evaluation of archeological sites or anomalous features derived from remote sensing instruments to confirm their nature and, if possible, their significance. This may involve exploratory removal of overburden.

Submerged Cultural Resources Study

A document that discusses, in detail, all known underwater archeological sites in a given park. This may involve test excavations. The intended audience is managerial and professional, not the general public.

Submerged Cultural Resources Site Report

Exhaustive documentation of one archeological site which may involve a partial or complete site excavation. The intended audience is primarily professional and incidentally managerial. Although the document may be useful to a park's interpretive specialists because of its information content, it would probably not be suitable for general distribution to park visitors.

Submerged Cultural Resources Special Report Series

These may be in published or photocopy format. Included are special commentaries, papers on methodological or technical issues pertinent to underwater archeology, or any miscellaneous report that does not appropriately fit into one of the other categories.

Daniel J. Lenihan

TABLE OF CONTENTS

LIST OF FIGURES	xi
FOREWORD	xv
ACKNOWLEDGEMENTS	xvii
I. INTRODUCTION	1
Project Rationale	1
Previous Research	2
Project Goals	3
Research Methodology	3
II. MARITIME HISTORICAL CONTEXT	5
Fur and Fishing	5
Copper and Iron Ore	7
Soo Locks	11
Grain and Flour	13
Gogebic, Vermillion and Missabe Iron Ranges	15
Lumber Trade	15
20th-Century Patterns, Summary	16
III. DEVELOPMENT OF COMMERCIAL SHIPS ON LAKE SUPERIOR	17
Sailing Craft	17
The Canals	21
Propellers, Sidewheelers and Package Freight	22
Steam Barges, Consort System	25
Bulk Freighters	26
IV. SHIPWRECKS	31
Introduction	31
Analysis	31
Murray Bay: Schooner BERMUDA	35
East Channel: Bulk Freighter SMITH MOORE	43
Trout Point: Bulk Freighter MANHATTAN	48
Trout Point: Steambarge HERMAN H. HETTLER	51
Sand Point (West): Schooner MARY M. SCOTT	54
Sand Point (East): Unidentified Schooner	60
Miner's Castle Area: Steambarge MICHAEL GROH	62
Schooner-barge ELMA	67
Mosquito Beach: Schooner GEORGE	70
Chapel Beach: Schooner WABASH	75
Spray Falls: Steamboat SUPERIOR	79
Twelve Mile Beach: Freighter KIOWA	85
Hurricane River: Bulk Freighter MARY JARECKI	95
Au Sable Point Area: Schooner ONEIDA CHIEF	105
Bulk Freighter SITKA	108

Bulk Freighter GALE STAPLES	121
Propeller UNION	132
Log Slide: Steamer SOUTH SHORE	138
Grand Marais: Schooners GALATEA and NIRVANA	143
Steambarge H.E. RUNNELS	146
Schooner SAVELAND	149
Propeller MANHATTAN	153
Steamer HUNTER	158
Chronology of Accidents	161
V. CONCLUSIONS AND RECOMMENDATIONS	175
Overview	175
Retrospective	175
Management Recommendations	176
Law Enforcement	177
Interpretation	179
Further Research Needs	185
Relative Significance	188
BIBLIOGRAPHY	193
APPENDIX	227

LIST OF FIGURES

2.1.	Grand Island Harbor, May 1867	6
2.2.	Marquette in 1859	6
2.3.	<i>Iron ore carried in schooners and steamers</i>	8
2.4.	CITY OF TRAVERSE, at Munising 1870s	8
2.5.	Comparison of iron ore to total freight, 1855-1919	9
2.6.	State Locks at Sault Ste. Marie circa 1860s	12
2.7.	Indians fishing at Sault Ste. Marie	12
2.8.	Fleets at Soo Locks 1880s	14
2.9.	Lumber steamers and barges at Grand Marais	14
3.1.	Merchant schooners circa 1837	18
3.2.	An 1870s typical schooner	18
3.3.	Steambarge with pilot house aft	24
3.4.	Lumber hooker built after 1880	24
3.5.	Early bulk freighters averaged about 200 feet	27
3.6.	500-foot steel bulk carriers	27
4.1.	Analysis of causes for shipping accidents	34
4.2.	Analysis of vessel-types involved in accidents	34
4.3.	BERMUDA deck arrangement	37
4.4.	The canal schooner OLIVER MITCHELL	39
4.5.	The canal schooner BERMUDA deck	39
4.6.	Munising Channel wreck site locations	41
4.7.	The SMITH MOORE deck arrangement	45
4.8.	Silhouette of the SMITH MOORE	47
4.9.	The SMITH MOORE's two-cylinder engine	47
4.10.	Original silhouette of the MANHATTAN	50
4.11.	The MANHATTAN owned by Gilchrist	50
4.12.	Original profile of the WALTER VAIL	52
4.13.	The HERMAN H. HETTLER	52
4.14.	The HETTLER during 1913 rebuilding	53
4.15.	A modernized HETTLER	53
4.16.	The MARY M. SCOTT site plan	58
4.17.	The MARY M. SCOTT rudder	59
4.18.	The MARY M. SCOTT forward of the centerboard trunk	59
4.19.	Outline of the "Sand Point East" schooner	61
4.20.	The MICHAEL GROH engine bed	65
4.21.	Steambarge with its tow of barges	66
4.22.	The old steamer PASSAIC towing the ELMA	69
4.23.	Site plan of the GEORGE	72
4.24.	The schooner GEORGE transverse section	73
4.25.	The ANNIE M. PETERSON at Green Bay in 1873	74
4.26.	Heavy 6-inch bilge ceiling on the GEORGE	74
4.27.	The tug SAMSON	77
4.28.	Spray Falls, the SUPERIOR wreck site	83
4.29.	Keelsons and frames from the SUPERIOR	83
4.30.	The SUPERIOR's old-style locomotive-type boilers	84
4.31.	Diver at the SUPERIOR wreck site	84

4.32.	Plan of Frederickstad-type ocean cargo ships	89
4.33.	Typical ocean freighter silhouette	90
4.34.	The sunken and abandoned KIOWA wreck	90
4.35.	Overtaken windlass lies in ship's bow wreckage	91
4.36.	Diver examines details in KIOWA wreckage	91
4.37.	the KIOWA site plan	93
4.38.	The MARY JARECKI site plan	99
4.39.	The MARY JARECKI cross-section	100
4.40.	The JARECKI (third from left) in late 1870s	102
4.41.	Internal portion of boiler from the MARY JARECKI	102
4.42.	Wreckage near Hurricane River	103
4.43.	A 1966 view of same wreckage	103
4.44.	The SITKA hull	112
4.45.	The SITKA site plan	113
4.46.	The SITKA in the Wilson fleet	116
4.47.	An 1891 advertisement of Wilson's steamers	116
4.48.	Plans for W.H. GRATWICK and F.W. WHEELER	117
4.49.	Steel reinforcing straps on SITKA	117
4.50.	The SITKA in 1903	118
4.51.	The SITKA's bottom with parallel keelsons	118
4.52.	Au Sable wreck site locations	119
4.53.	The GALE STAPLES site plan	127
4.54.	The GALE STAPLES cross section	127
4.55.	The W.B. MORLEY in 1888	128
4.56.	The MORLEY as the CALEDONIA	128
4.57.	The GALE STAPLES' oak rudder	129
4.58.	The GALE STAPLES in St. Marys River, 1917	130
4.59.	Unusual framing of the GALE STAPLES wreck	130
4.60.	Broken propeller wheel on Au Sable Reef	131
4.61.	One of two boilers from the GALE STAPLES	131
4.62.	View of the UNION, circa 1870	137
4.63.	UNION hull form	137
4.64.	Steamer SOUTH SHORE	142
4.65.	Coupling from dredging discharge-pipe	142
4.66.	The barges GALATEA and NIRVANA	144
4.67.	The GALATEA on Grand Marais beach	144
4.68.	The H.E. RUNNELS	148
4.69.	The RUNNELS after rebuilding	148
4.70.	The SAVELAND with original rig	151
4.71.	The SAVELAND fetched up in shallow water	151
4.72.	The SAVELAND beached at Grand Marais	152
4.73.	Navigation chart, Grand Marais, 1905	152
4.74.	Screw steamer, circa 1860	157
4.75.	The MANHATTAN's 1852 cargo manifest	157
4.76.	The HUNTER, circa 1888	159
4.77.	The steel steamer WESTERN RESERVE	166
4.78.	The passenger steamer EMPIRE STATE	166
4.79.	The barge ALTA piled up near Trout Bay, 1905	170
4.80.	The TURRET CROWN stranded at Grand Marais, 1906	170
5.1.	Grand Marais' Life Saving Station, 1899	182
5.2.	The modern Coast Guard Station at Grand Marais	182
5.3.	Au Sable Lighthouse, built in 1873	183
5.4.	Munising's Coast Guard Station, built in 1931	183
5.5.	Old Schoolcraft Furnace Company dock, Munising	191

APPENDIX:

A-1.	Typical Great Lakes Schooner	227
A-2.	Typical Great Lakes wooden bulk freighter	229
A-3.	Cross sectional details of bulk freighter	231

FOREWORD

We are pleased to add this volume on the underwater archeology of Pictured Rocks National Lakeshore by Patrick Labadie to the National Park Service report series on submerged cultural resources.

Although the focus of this document is intentionally confined to one portion of Lake Superior, it reflects the author's lifelong fascination with the whole spectrum of Great Lakes Maritime traditions and thus should interest any scholar of the "Inland Seas."

Marine Park managers should find the conclusions and recommendations section particularly interesting. Labadie's observations stem from the perspective of one who has been on the receiving end of management practices in many Great Lakes parks and who has worked in close association with park stewards for many years. He also brings to bear a career experience as a museum director and maritime historian offering a fresh outlook on some longstanding preservation issues.

If I am not mistaken, reader interest in this document will not be limited to the managerial and professional audience we are targeting, and we will be seeking avenues for additional printings before long.

Daniel J. Lenihan
Chief, Submerged Cultural Resources Unit
National Park Service

ACKNOWLEDGEMENTS

Support for the Pictured Rocks Shipwreck Study came from a variety of public and private sources, reflecting a partnership that makes possible the preservation and concurrent recreational enjoyment of the nation's historic resources.

Funding came from the National Park Service (NPS) Midwest Regional Office in Omaha through the support of Regional Director Don H. Castleberry and Cultural Resources Management Chief Francis A. Ketterson.

In the U.S. Army Corps of Engineers Duluth Area Office, chiefs Courtland Mueller and Alvin Klein kindly authorized the author's released time for this project in support of NPS, and helped to rearrange priorities in his absence at the Canal Park Marine Museum. The arrangement was approved by Mark Grazioli, the Corps' Detroit district chief of Construction-Operations, without whose support the undertaking would not have been possible.

Guidance and inspiration for the study was provided by Daniel J. Lenihan, Chief of the NPS Submerged Cultural Resources Unit in Santa Fe. Dan shared the skills gained in years of field research to help organize the project and keep it on track. With enormous patience, he shepherded the resultant report through endless interruptions, bureaucratic hurdles and conflicting priorities. Submerged Cultural Resources Unit archeologist Toni Carrell shouldered the burden for documentation work during 1988 and 1989, and was principally responsible for developing the fine site plan for the complicated KIOWA wreck remains at Twelve Mile Beach. She was assisted by diver/technician Michael Eng, who contributed enormous energy and skill to complete a particularly challenging part of the project. Archeologist Jim Bradford also used his considerable ability to develop parts of the KIOWA drawing.

Superintendent Grant Peterson of Pictured Rocks National Lakeshore shared his infectuous enthusiasm and his expertise, and he opened the park's human and cultural resources to assist during the whole of the study. Park Interpretive Chief Gregg Bruff uncovered invaluable historical records and photographs and sought out all the pertinent management documents. Secretaries Sheri Tunteri and Brenda St. Martin provided liaison, support and duplication services throughout the year-long field work. Grand Marais Ranger Bob Lanane and Munising Ranger Fred Young volunteered information about local history that proved very valuable in locating and identifying shipwrecks at Sand Point and Grand Marais.

Pete Lindquist, proprietor of Grand Island Venture and master of charter-boat PHYLLIS ANNE, proved to be a generous and particularly valuable participant. His knowledge of local shipwreck sites was prodigious and his boating skills were matched only by his generosity. Peter and his sister-in-law, Bonnie Heckman Lindquist, contributed innumerable hours to prepare drawings of the SMITH MOORE wreck in 100 feet of water near Sand Point, and later to document the new ELMA and MICHAEL GROH sites. George and Betty Tomasi and Fred Marti also provided boat service and logistical support at various times.

Author Fred Stonehouse of Marquette shared his extensive research with the author, and his Munising Shipwrecks provided much of the framework on which this study was based. Fred's fine work simplified the present task enormously. Dr. Julius F. Wolff Jr. of Duluth also contributed much through his book Shipwrecks of Lake Superior, through several long interviews, and through the use of his wreck photographs taken over a period of nearly 30 years. Jim Becker of Rochester Hills, Michigan and Walter Parker of Duluth also offered invaluable information in telephone interviews.

Valuable diving assistance and site documentation was contributed during 1988 by Michigan Sea Grant Extension agents John Schwartz and Ken Vrana, who gathered site data on several wrecks and shared their hopes for the future of the Alger Underwater Preserve.

Historical data on the various craft in the Pictured Rocks shipwreck population was gleaned from sources all over the country. John Vandereedt and Gloratene Robinson of the National Archives' Civil Reference Branch retrieved and reproduced the enrollments for each of the ships lost in the lakeshore. Suzette Lopez dug through the Milwaukee Public Library's marine collections and sent copies of extensive material related to the ships. Jay Martin, assistant archivist, researched many of the shipwreck incidents and provided copies from contemporary newspapers in the Institute for Great Lakes Research in Perrysburg, Ohio. Dr. Walter Hirthe of Milwaukee also shared information on several of the schooners in the Pictured Rocks shipwreck population, and underwater archeologist David Cooper of the State Historical Society of Wisconsin made available his field notes regarding wrecks on Lake Michigan that helped solve some of the mysteries regarding Au Sable Point wrecks.

Bonnie Lindquist of Munising served as divemaster on several occasions during the 1989 field work and assisted with logistical support. Jim Labadie of Detroit provided field assistance during the investigation of shoreline wrecks at Au Sable. Allan Apter of Duluth volunteered several days during the KIOWA documentation; he demonstrated his skills as a diver-photographer and quickly developed documentation capability besides. Pete Lindquist never passed up an opportunity to get into the water to sketch and measure, and it is clear that his newly developed skills will serve the Alger Underwater Preserve for years to come.

Finally, a number of people have molded, corrected and prepared this report to make it readable, accurate and attractive. NPS scientific illustrator Jerry Livingston has clarified and improved most of the illustrations for publication, along with Ernesto Martinez and Toni Carrell. Joy Waldron Murphy did all of the editing, and suggested innumerable improvements to the text. Fran Day took the responsibility for the word-processing that resulted in an attractive and readable format. Each deserves the gratitude of the author for long and careful work. The manuscript has gained much from their care and patience.

CHAPTER I: INTRODUCTION

General

The shipwrecks of Pictured Rocks National Lakeshore are nearly as well known as the rock formations that give the area its name. Rock cliffs form the lake shore, and the geology dominates everything else about the environment. But the shoreline marks the boundary between two very different environments, the land and the underwater world.

In this region the lake bottom is dramatically sculpted with ridges, banks and pinnacles, but blends into the larger body of Lake Superior. At Pictured Rocks the lake is the underwater component of part of the Lake Superior mining district. The underwater cultural resources of Pictured Rocks National Lakeshore are valuable, not because they are distinct from the shipwrecks around them but because they are so representative. The shipwrecks of the Lakeshore are also relatively well-preserved because they have been spared the human cultural pressures of population and industry. It is the undisturbed quality of the Pictured Rocks shipwrecks that has focused the attention of historians and sports divers there, and ultimately has resulted in organization of the Alger Underwater Preserve by the state of Michigan to ensure their further preservation and enjoyment.

Despite the strong focus on the shipwrecks of the area, much confusion persists about the identities and locations of many of them. The "Murray Bay wreck," for instance, which is probably the earliest-known and most dived wreck in the area, has been known by at least three different names, none of them correct. Three large wrecks on Au Sable Point have been confused for years. The stern of the steel steamer KIOWA was long presumed to be the bow. Numerous artifacts and shipwreck fragments discussed in Park Service narrated beach walks could not be positively identified. The need for a systematic and comprehensive study of the wreck sites is thus easily demonstrated.

Project Rationale

In the Pictured Rocks vicinity, all cultural and natural resources on the bottom of Lake Superior, including the shipwrecks, are the property of the state of Michigan. Title to submerged lands was transferred from the federal government when Michigan was admitted as a state in 1837 (letter from NPS Solicitor Curtis Menefree, December 20, 1979). The Park Service has concurrent jurisdiction with the U.S. Coast Guard and the U.S. Army Corps of Engineers over the surface waters of Lake Superior within the Lakeshore boundaries (Deed and Cession No. 99169 under Act 168, P.S. 1967, July 23, 1971).

Public Law 89-668, which authorized the Pictured Rocks National Lakeshore in 1966, requires:

. . . a land and water use management plan, which shall include specific provision for . . . development of facilities to provide the benefits of public recreation (and) protection of scenic, scientific and historic features contributing to public enjoyment . . .

The Park's Statement for Management specifies that the lakeshore:

. . . is managed for the perpetuation and protection of the natural environment and the preservation of cultural features while making them available for appropriate public use.

While the Park Service has a clear mandate to preserve, manage and interpret the cultural resources within its properties, the communities in the vicinity of the Lakeshore also recognized the value of the shipwrecks as historical and recreational resources. When Public Act 184 was passed by the Michigan Legislature in 1980, authorizing the establishment of underwater preserves, a citizens committee was formed in Alger County to promote designation of the Alger Underwater Preserve. The preserve was established by the Michigan legislature on June 24, 1981, encompassing an area from Au Train Point in the west to Au Sable Point in the east, including all of Grand Island and extending out to the 150-foot-deep contour line. Most of the Lakeshore lies within those limits. Public Act 184 of 1980 and subsequent Public Act 452 of 1988 provide special protection for shipwrecks ("abandoned property of historical or recreational value") within Michigan bottomland preserves. A penalty of "imprisonment for not more than 2 years, or . . . a fine of not more than \$5,000, or both" may be imposed if a person is found guilty of removal or destruction of abandoned property without a permit jointly issued by the Michigan Department of State and the Department of Natural Resources (DNR); enforcement is the responsibility of the DNR, assisted by local counties.

The Alger Underwater Preserve would clearly benefit from a study of the shipwreck resources within its boundaries, but the Michigan preserves are not funded, and the local preserve committees use most of their meager financial resources for promotional purposes. On the other hand, NPS has both the incentives and the authority to undertake such a study. It should result in a bank of authoritative information for management and interpretive purposes, clarify various management issues related to sports diving, identify potential safety hazards for divers, and enhance the enjoyment of visitors to the Lakeshore, including both divers and nondivers. It will also strengthen the working relationship between NPS and the Alger Underwater Preserve.

Pictured Rocks National Lakeshore's 1981 General Management Plan (p. 32) states that:

The Park Service will work with the state to protect and preserve the shipwrecks and to evaluate them for National Register eligibility. The Park Service will also work with the State to identify and protect newly discovered archeological sites.

Management objectives described in the same source (p. 71) suggest that the Park Service:

. . . encourage research by qualified persons into the geology, ecology and other important aspects of the Lakeshore to aid both the resource management and interpretative programs.

This study was funded out of the National Park Service Midwest Regional Cultural Resources budget.

Previous Research

Most of the existing information about shipwrecks in the Pictured Rocks area is the result of work by Dr. Julius F. Wolff Jr. of Duluth, Minnesota and Frederick Stonehouse of Marquette, Michigan. It comprises a formidable body of research. Wolff was asked by Superintendent Robert Burns to prepare a list of Pictured Rocks shipwrecks in 1975.

A lengthy inventory of incidents resulted, gleaned largely from contemporary numbers of the Marquette Mining Journal, the Duluth News-Tribune and the Annual Reports of the U.S. Life Saving Service. Wolff also provided descriptions of many incidents drawn from other sources, and those were complemented by further research by Park Service personnel under Burns' guidance. Wolff's comprehensive Shipwrecks of Lake Superior, published in 1979, added much more to the available literature of regional shipwrecks. Diver-historian Stonehouse was contracted to write the Historic Resources Study of Pictured Rocks National Lakeshore in 1981 by the Park Service. The study summarized the whole history of the area, and it included a chapter on shipping and shipwrecks. Stonehouse used a broad range of source material, including obscure government documents and reports. In 1983 Stonehouse published Munising Shipwrecks, expanding on his 1981 study. The book provides a good survey of the numerous accidents and losses in the area, and is supplemented with an excellent bibliography that proved especially valuable in the preparation of the present study. Stonehouse also worked with the Alger Underwater Preserve Committee to locate and identify many of the wrecks in the Lakeshore.

Project Goals

As a result of the work of Wolff and Stonehouse, there is a fine body of literature on the subject of local wrecks, but there is a total lack of site data and a clear need to address some of the confusion regarding wreck identities. In a more general sense, there is also a real shortage of information about the methods of building and equipping wooden ships on the Great Lakes, since drawn plans were not used much before 1890, and there are few other sources for that information. Thus the principal goals of this study are to establish the location and extent of shipwreck sites within and adjacent to the Pictured Rocks National Lakeshore, to document the appearance and condition of the wrecks, the extent and nature of associated scatter and, if possible, to substantiate the identity of each. Valuable information will be gathered about wooden shipbuilding technology. Another aim is to assess the human and environmental threats to the preservation of the sites and to prepare management recommendations. It is also the hope of the author to summarize the histories of each of the vessels lost in the Lakeshore, and to set their stories against the backdrop of the broader regional history to which they contributed individually and collectively.

Research Methodology

Research methodology chosen for this study is simple and direct. It was meant to be brief (complete in one field season), and low-tech because of budgetary constraints. The field work is necessarily nondestructive because of the driving philosophy of resource preservation.

A literature search was employed to clarify numerous details of ships' histories and circumstances surrounding the loss incidents, building largely on the previous work done by Wolff and Stonehouse. Other sources were also sought out to substantiate or supplement existing data. Salvage conducted subsequent to vessel losses was poorly documented, and a great deal of effort was put into clarifying its extent, frequently with little satisfaction. Contemporary descriptive data was also researched to help the reader to recognize and understand structural details of whatever remains have survived. Interviews were used to gather information about salvage, sport diving activity, wreck locations, changes to various sites, and local traditions regarding the wreck incidents. No survivors were found who had personal knowledge of the incidents, although it is plausible that some are still living who were associated with wrecks after 1920 such as the RUNNELS, the HETTLER, the KIOWA or the SPARTA.

Site documentation took several forms. Most of the wreck sites were measured in the field and drawn out carefully with measured plans in planimetric views. All sites examined during the 1988 field season were documented in this way. The SMITH MOORE wreck was not examined by the author, but measurements were provided by volunteers Pete and Bonnie Lindquist, from which a measured deck plan was prepared. A perspective drawing of the SMITH MOORE was also done because of the intact nature of the wreck, but it was not published because there was insufficient information to make it acceptably accurate. The KIOWA site plan was done with the greatest sophistication and accuracy because it is the most complicated of the Lakeshore's sites and one of the most poorly understood. In addition, the KIOWA's remains contain numerous removable artifacts for which a good record is required, so the site was thoroughly photographed and recorded on videotape. The wreck's features were carefully plotted on a large-scale site map, using trilateration and precise locations; most of the smaller details were drawn in freehand. Recording of the KIOWA site was considered a priority, but weather conditions prevented its documentation during 1988. It was surveyed during a 10-day period in June 1989.

Shoreline features were surveyed with special care because of their relevance to Park Service interpretive programming and their high visibility to the public. Much of the material buried in the sand at Au Sable Point was excavated for measurement and photography and then reburied for its protection. Scale drawings are reproduced in Chapter III.

Occasional details proved sufficiently significant that they were sketched out with considerable care, and some of the resultant drawings are also included with the report. All important details of the various sites were photographed to provide a permanent record of their appearance and condition. These will help Park Service and Preserve personnel to monitor changes to the sites. Along with the drawings, they will also provide valuable technological data on historical shipbuilding methods and materials.

Some sites were not seen or surveyed at all, like the stern portion of the SITKA wreck near Au Sable Reef, which could not be located during the 1988 field work, and the ELMA and MICHAEL GROH hulls, which were not found until after completion of the field work. As a result, only narrative descriptions of these sites are published in these pages, using information furnished by the Lindquists. It is hoped that Park Service and Preserve personnel will continue to add to the data bank long after completion of this study, to provide more information on the sites as bottom conditions change, and to document new sites that will undoubtedly be located.

CHAPTER II. MARITIME HISTORICAL CONTEXT

East of the Rocky Mountains, few regions of the United States waited longer for settlement than the Lake Superior basin. Before Lake Superior's cities began, Michigan, Wisconsin, Illinois and Southern Ontario were all fairly well populated by Europeans. Only the old French missions at Sault Ste. Marie, La Pointe and L'Anse predate 1700, and those were Ojibwe villages with a handful of whites. The fur trade came to Lake Superior late in the 17th century, bringing with it hundreds of traders and voyageurs to Grand Island, Fond du Lac and Grand Portage. Only a handful were permanent residents, the rest of the newcomers making seasonal visits on their way westward to the hunting grounds. In spite of the white man's visits over 200 years, the Indians were the only permanent residents of the vast region. Several thousand Ojibwe and Sioux lived at Sault Ste. Marie, L'Anse, Chequamegon and Fond du Lac.

In the 18th and 19th centuries, communication was almost exclusively by water. The mile-long rapids at Sault Ste. Marie kept commercial shipping largely away from the "Father of Waters," although fabulously rich natural resources there beckoned speculators and investors from the Eastern Seaboard and even from Europe. A handful of small sailing ships were constructed in the wilderness on Lake Superior between 1735 and 1820 to serve the fur trade (Nute 1944:117-121; Cuthbertson 1931:120ff). Most of them were schooners built between 1786 and 1803 at Point aux Pins above the Sault rapids. Between 1809 and 1821, the North West Co. built four schooners at its Fort William post, and in 1817 it portaged the small schooner EXMOUTH around the Sault Rapids to use on Lake Superior (National Heritage Ltd. 1972(1):19).

The American Fur Co. was organized in 1808. With the failure of the fur trade, the company began to pursue commercial fishing on Lake Superior in 1834. The next year American Fur built the 112-ton schooner JOHN JACOB ASTOR on the American side of the Sault to carry fish and furs from company stations along Superior's south shore. The rival Hudson Bay Co., in turn, built the 40-ton WHITEFISH at Point aux Pins, and in the next few years followed with three more vessels (Nute 1944:120).

During the 1840s, entrepreneurs from Cleveland, Detroit and Mackinac brought several schooners to Sault Ste. Marie and hauled them laboriously around the portage for the fishing trade on the Big Lake. The 60-foot ALGONQUIN was the first large vessel to cross the portage. Journalists all over the Midwest watched the enterprise:

. . . Several of our citizens [have associated] under the style of the "Cleveland North Western Lake Co." for the purpose of establishing fishing stations on Lake Superior and of embarking on the Northwestern trade generally . . . The ALGONQUIN, a new schooner of 60 tons, fitted up expressly for the expedition, sailed from [Cleveland] for the Sault Ste. Marie [sic] last week. The company intend to take their vessel over land on the Canada side of the Sault this Fall, launch it into the River above, and be ready for operations on Lake Superior with the opening of navigation next Spring. They will have to raise the schooner from the water below the Sault [and] slide it on ways something more than half a mile before launching. Considering the climate, the difficulty of obtaining machinery or help, the elevation, and other obstacles to be surmounted,

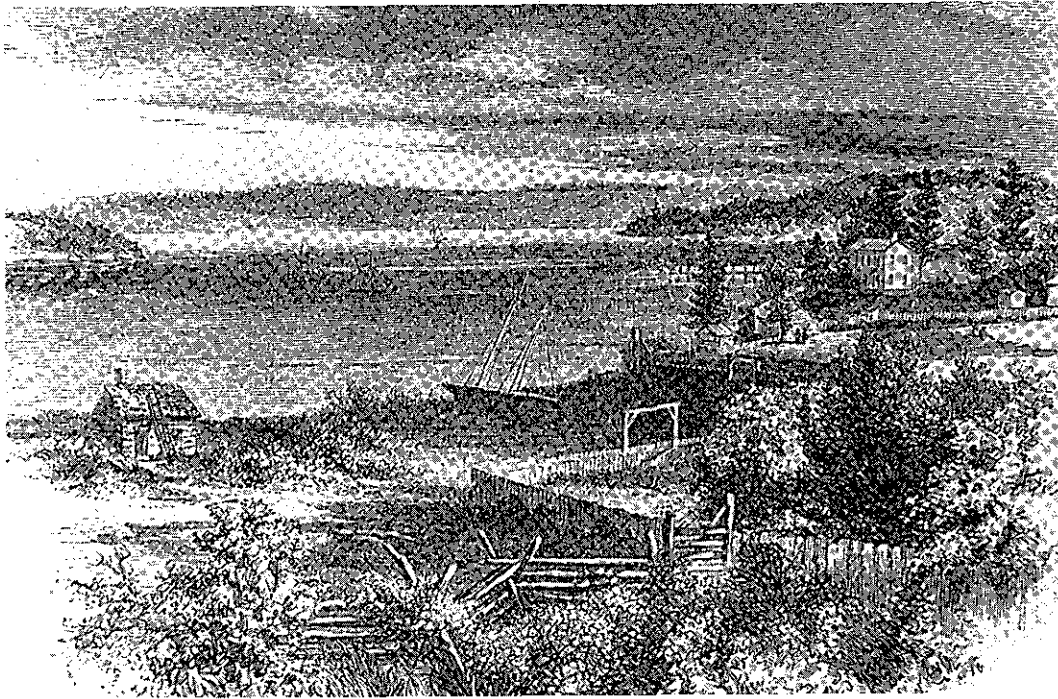


Fig. 2.1. In the old days, Grand Island Harbor was a refuge and a popular "wooding-up" spot. Harper's New Monthly Magazine, May 1867.

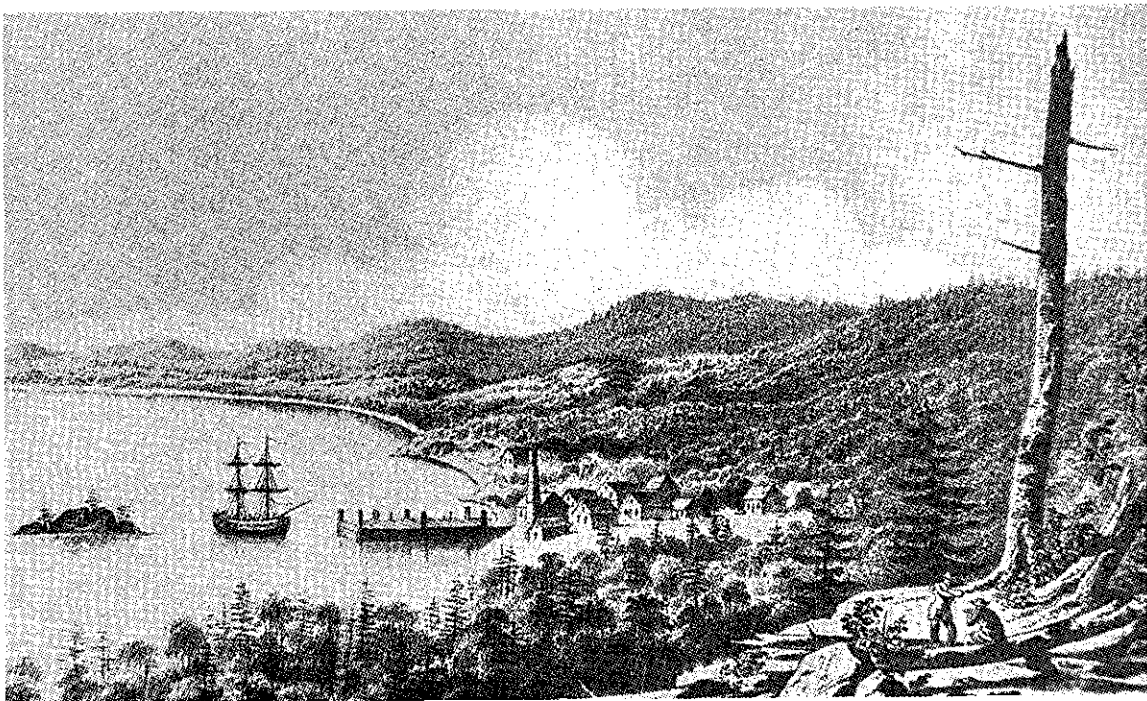


Fig. 2.2. Until the first gravity docks were built in Marquette in 1859, ore was loaded from wheelbarrows. Marquette County Historical Society Collection.

the undertaking would seem to be Herculean to others and impractical to many (Detroit Daily Advertiser, November 12, 1839).

The experiment was successful despite obstacles and skeptics. The ALGONQUIN became the only vessel operating on Lake Superior several years later when earlier craft disappeared one by one due to storms or old age.

In the decade of the 1840s other craft joined the ALGONQUIN, all coming by way of the portage and borne overland on crude wooden rollers. These craft included the schooners CHIPPEWA, NAPOLEON, SWALLOW, FLORENCE, UNCLE TOM, FUR TRADER, OCEAN and MERCHANT, and the "propeller" INDEPENDENCE.

The first steamer ever to sail the waters of Lake Superior was the propeller INDEPENDENCE of about 280 tons burden, which was put over the portage in 1845. Capt. J. Averill was her master and part owner . . . She was schooner-rigged, [with] foresail, mainsail, and jibs, with two rotary engines to propel her, which in dead calm would drive her at about four miles an hour. Her career was full of vicissitudes . . . (Williams 1905:101).

Other steamers were brought to Lake Superior in the same manner. The sidewheeler JULIA PALMER was brought in 1846 and in 1848 NAPOLEON, already on the Lake, was converted from a schooner to a screw steamer. The propeller MANHATTAN was taken across the portage in 1850, the MONTICELLO in 1851, and then the BALTIMORE, the PENINSULA and the SAMUEL WARD in 1852 and 1853 (Williams 1905:103; Mansfield 1899(1):199).

Vessels rushed in to Lake Superior in the later 1840s to exploit minerals, and their influx opened the region to the outside. Geologists and miners had already discovered extensive copper and iron deposits along the Lake Superior South Shore. When Michigan politicians wrestled the mineral rights from the Indians in the Treaty of La Pointe in 1843, unbridled speculation and land-grabbing began. Investors scrambled for the rich copper deposits on the Keweenaw Peninsula and iron ore in Marquette County, Michigan (Moore 1915(l):441, 463). Copper mines at Copper Harbor, Eagle River and Ontonagon, Michigan, began producing within two years of their discovery in 1844, and other mines soon opened in nearby locations and at Isle Royale (Nute 1944:165).

The few ships on the Lake were kept busy carrying miners and supplies in one direction, fish and copper in the other. Scores of mining operations started up, but only a handful were successful. Collectively they shipped several thousand tons of copper stampings and masses each year, usually as deckloads on the propellers, which carried 200 or 300 tons at a time. From 1850 until the mid-1870s, Lake Superior mines produced between three-fourths and four-fifths of all the country's copper, most of it from the Keweenaw Peninsula. Refined copper was shipped from the region until after the turn of the century, but Montana became the nation's principal source of copper after 1885.

An 1847 advertisement illustrated a typical itinerary for the Lake Superior steamers of that period, with the steamboat JULIA PALMER making departures every seven days for "Copper Harbor, Eagle Harbor, and other ports as occasion may require, viz. Grand Island, Dead River, L'Anse, Bete Grise Bay, Lac La Belle and also Portage, Elm River, Ontonagon, Iron River, La Pointe and Isle Royale" (Lake Superior Mining Journal, May 12, 1847).

The "staunch, low-pressure ship-built steam packet JULIA PALMER" was actually nothing more than a 108-foot paddlewheeler that was abandoned and turned into a cordwood dock after a year on the Lake. So inefficient had the ship proved, it had once taken 16

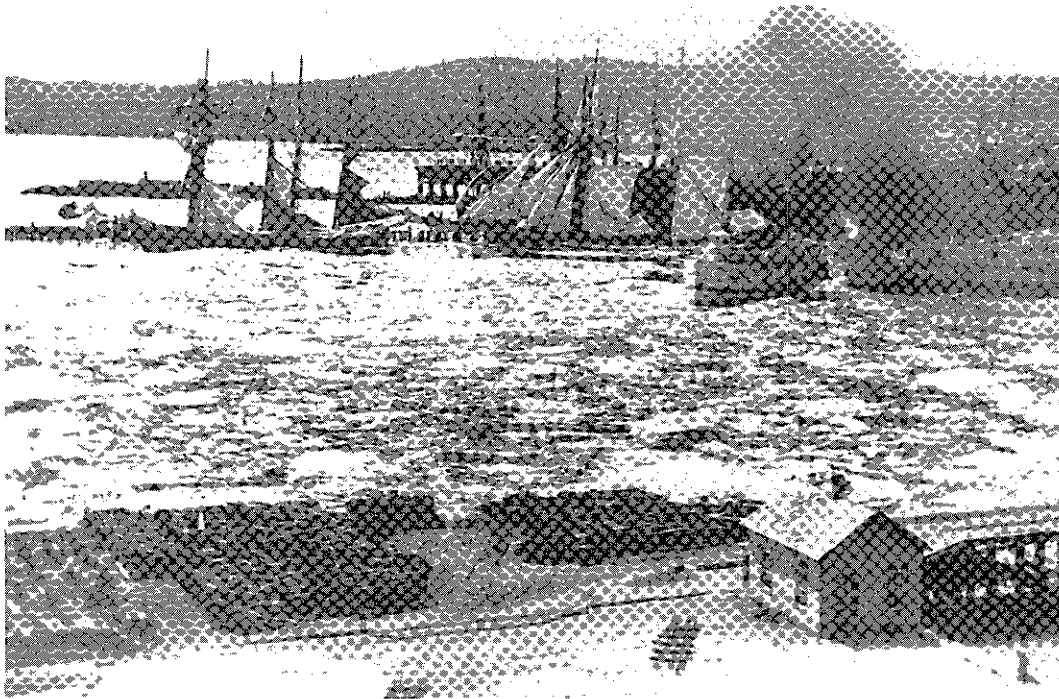


Fig. 2.3. Before the advent of modern bulk freighters, iron ore was carried in schooners and passenger steamers. Marquette County Historical Society Collection.



Fig. 2.4. Munising in the 1870s showing old Schoolcraft Furnace Company dock and the steamer CITY OF TRAVERSE. National Park Service Collection.

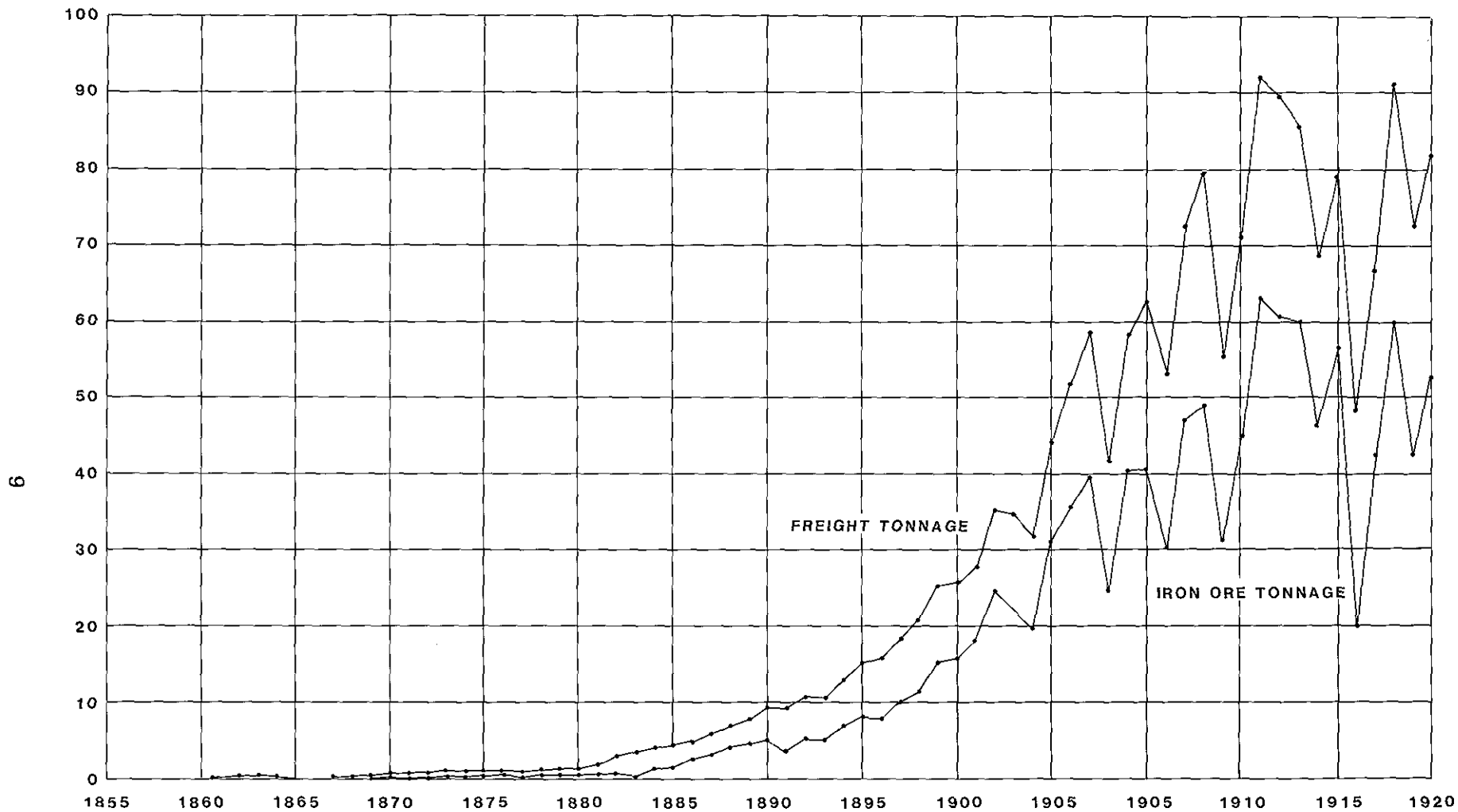


Fig. 2.5. Comparison of iron ore to total freight shipped through the Soo Locks, 1855-1925, in millions of tons. From *Transportation on the Great Lakes*, U.S. Engineers Department, 1930.

days to make the 200-mile trip from Sault Ste. Marie to Copper Harbor. On that ill-fated journey, the crew burned not only the furniture and combustible provisions but even the grain, in order to keep a head of steam in the boiler and make port (Buffalo Morning Express, November 20, 1847). Lake Superior was still wilderness, and the little fleet of merchant ships was very primitive.

The nature of the routes in those days and the dependence on cordwood for fuel required the steamers to "coast" along the South Shore. They were forced to stop every eight or 10 hours to take on wood for their boilers, but they also stopped at most way ports, keeping the traffic close to the shorelines. It was simply impractical to head down the center of the Lake. The pattern of hugging the shores meant that ship traffic concentrated close to Grand Island and Pictured Rocks. This would continue to be the case until nearly 1900.

Grand Island had a significant Indian population when it was first described by white men, although many of the Indians alternated seasonally between there and Sault Ste. Marie, while others lived on the mainland nearby. Fur trading existed on the Island. The North West Co. and the American Fur Co. were both reported to have had posts on the island before 1835 (Carter 1987:21, 23).

Abraham Williams came from Decatur, Illinois in 1840 to settle Grand Island with his family and raise 12 children there. Williams Landing was at the south end of the island, west of Murray Bay and opposite Powell's Point on the mainland. Williams traded and fished commercially, and conducted a lively business providing cordwood for passing steamboats. He was probably the only source of fuel between Whitefish Point and Carp River (Marquette). Several other settlers established homes on Grand Island in the 1850s, and one or two families lived on the mainland close to present-day Munising.

The discovery of iron ore at Negaunee, Michigan in 1844 led to a forge at Carp River built in 1847 to smelter it. A second forge was built at Worcester (downtown Marquette) in 1849, and several others went up in the vicinity in the next few years. Few of the forges were even modestly successful. On July 7, 1852 the steamer BALTIMORE loaded the first Marquette iron ore to be hauled down the Lakes, and the following year the Cleveland Iron Co. contracted to ship quantities of it to the Sharon Iron Co. in Sharon, Pennsylvania, ". . . the beginning of the great traffic which resulted from the new plan of sending ore to be treated near the Pennsylvania coal field" (Moore 1915(1):468). Iron ore in lots of 200 and 300 tons became common cargo on downbound ships in the early 1850s. Tonnage mushroomed when the railroads linked mines with shipping docks in 1857. Two years later the city of Marquette welcomed the building of elevated, "gravity-style" loading docks, patterned after coal-loading docks on the Hudson River. The new docks revolutionized the handling of bulk ore by speeding up the process and minimizing the labor. By the mid-1860s hundreds of ships loaded ore at Marquette each year. The shipments reached 114,401 tons in 1860 and surpassed a million tons by 1873 (Reed 1975:2).

Smelters were built at various locations around Marquette in the 1850s and 1860s, and two were erected in the vicinity of present-day Munising. The Munising Furnace, built by the Schoolcraft Iron Co. on the east shore of South Bay in 1867, began making iron in the summer of 1868. After 1873 it was operated by the Munising Iron Co. until 1877. It reportedly produced 15 to 20 tons of blooms or "pigs" a day. The Bay Furnace was built at Onota near present-day Christmas, Michigan, in 1869. A 1,400-foot dock was built into deep water for loading and unloading ships there, and the furnace boasted 12 kilns. Like the nearby Munising Furnace, the Bay operation was also suspended in 1877.

By that time some 30 houses, a blacksmith shop, sawmill and government lighthouses marked the townsite (Carter 1987:63ff).

When Marquette ore was discovered, the great Industrial Revolution was still almost 20 years in the future, but industrialists quickly saw the need to simplify transportation of the vital resource. As a result, they threw their economic and political weight behind the scheme to build a ship canal around the Sault rapids. The idea was not new. The North West Co. had built a very small canal around the Canadian rapids in 1797, and the portage railway had been a going concern on the American side since the mid-1840s. The need was obvious. When Michigan was made a state in 1837, its first governor advocated building a canal in his very first message to the legislature, who appropriated \$25,000 to undertake a survey for the work. The federal government blocked the project because it would have crossed a U.S. military reservation (Fort Brady). Subsequent efforts were made at state and federal levels in 1843, 1844, 1848 and 1849, each time falling on deaf ears in Washington.

With the dawning of the copper and iron mining industries on Lake Superior, Washington finally became more responsive:

. . . a better understanding of the commercial requirements and the probable cost, together with the clamor of the mining interests, which now had grown insistent, caused Congress to pass, on Aug. 21, 1852, an Act granting 750,000 acres of land to the state of Michigan to aid in building the canal. Congress required that the canal should be at least 100 feet wide and 12 feet deep, with locks at least 250 feet long and 60 feet wide. Congress allowed three years for beginning the work and ten years for its completion (Williams 1905:107).

The Michigan Legislature authorized the canal with locks 350 feet long and 70 feet wide, considerably larger than the Congressional requirement. Charles T. Harvey was made superintendent of construction, and he broke ground on June 4, 1853:

In twenty-one months Mr. Harvey built the canal at a cost of \$875,000, being within the estimates both as to time and expense; and the work was done much more substantially than the contract called for. At the time of their completion, the locks were the largest in the world (Moore 1915(1):470).

Completion of the canal was greeted with enormous enthusiasm:

On April 19, 1855 Harvey opened the sluice gate to the outer cofferdam on the Lake Superior level and let its waters flow into the finished canal . . . The canal was 5,700 feet long, 64 feet wide at the bottom, and 100 feet at the water's surface, and 13 feet deep. The locks, two in number, were each 70 feet wide and 11 1/2 feet deep, with a lift of about 9 feet each . . . On June 18 following, the steamer ILLINOIS passed up and the steamer BALTIMORE passed down, and these were the first vessels to use the canal that opened to mankind the greatest mineral domain in the world, and which has conferred a vast blessing upon the country (Williams 1905:116).

The expansive rhetoric was no overstatement. The ship canal at the Soo had a tremendous impact on the Lake Superior region, bringing speculators, land-lookers, geologists and capitalists even before its completion, and tens of thousands of settlers in the next two or three decades. The canal's completion became the most important event in the region's history.

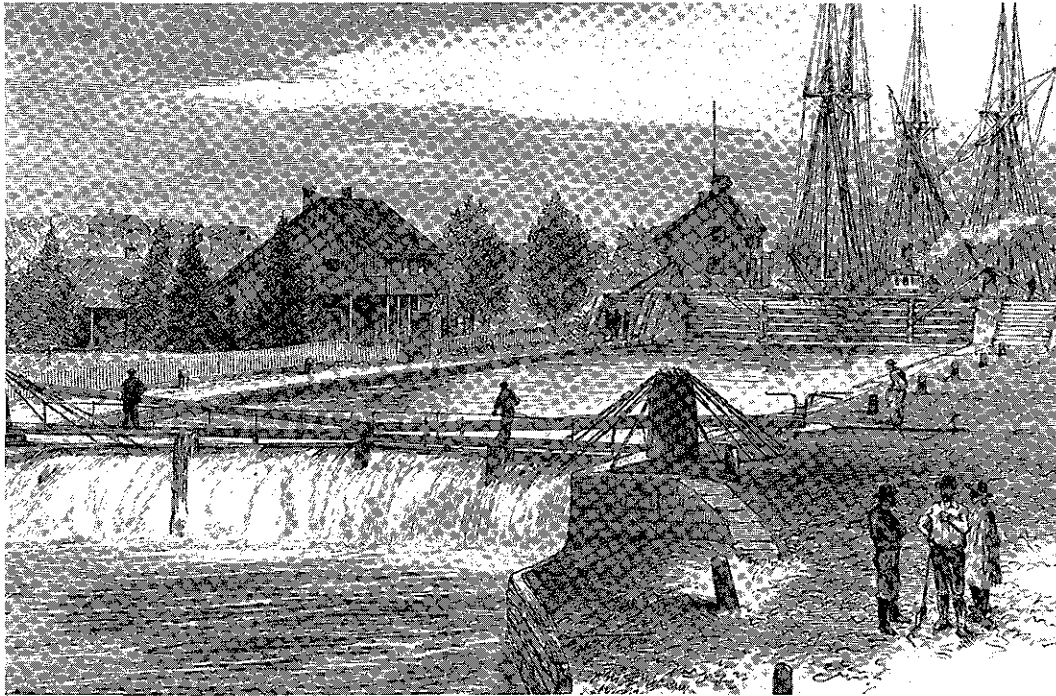


Fig. 2.6. Engraving showing the old State Locks at Sault Ste Marie in Civil War era. Dossin Great Lakes Museum Collection.



Fig. 2.7. Engraving illustrating Indians fishing in the rapids at Sault Ste Marie. Canal Park Museum Collection.

The most immediate effect of the Soo Locks was felt at Marquette, where vessel arrivals and departures grew from one or two a week to one or two a day as soon as the canal opened. In the fiscal year ending June 30, 1872, 390 vessel arrived; 20 years later the number was 1,032 (Mansfield 1899(1):355). Boom towns in the copper country were effected almost as dramatically. New ports sprang up as a result of the improved opportunities. Speculators settled Superior City in 1853 and 1854, certain that the ship canal would bring a great metropolis to the "Head of the Lakes." They were only 20 years premature. Houghton, surrounded by paying copper mines, was more spontaneous in its success.

The Sault's famous "miracle mile" brought the nation's commerce to Lake Superior's shores. Overnight the new canal cut deeply into freight rates for downbound (eastbound) cargoes of iron ore and copper. It opened new markets for fish, and brought to the settlers in the wilderness dependable deliveries of manufactured goods, foodstuffs, mails, lumber and livestock -- all upbound cargoes. It also made passenger travel practical and immigration easy. It resulted in a tremendous increase in the flow of ships passing the South Shore.

In the first years after the opening of the Sault Canal, the trade was, predictably, in copper, iron ore, mining supplies and provisions. Soon after, the growth of several Lake Superior towns resulted in broadening the range of cargoes and spreading out the shipping routes. Most of the ships abandoned the old practice of coasting, and ran to single destinations for unmixed bulk cargoes. Double-decked "package freighters" began calling at the larger ports. In the 1860s several lines of passenger and freight steamers initiated regular schedules of arrivals and departures. Some of the most elegant passenger ships on the Lakes were put on the Lake Superior route, many of them big 200-foot "palace steamers" with truly luxurious accommodations.

In the mid-1870s a whole fleet of modern ships served the Lake Superior passenger trade alone, including six in Ward's Lake Superior Steamboat Line from Cleveland and Detroit; four in the Union Steamboat Co.'s Buffalo and Lake Superior Line; four in the Atlantic, Duluth and Pacific Line from Buffalo; five in the Erie and Western Transportation Co.'s "Anchor Line" from Buffalo and Erie; two in the Hanna Line from Cleveland; two in Spencer's Lake Superior Line from Chicago; and three more in Leopold and Austrian's Lake Superior People's Line, also from Chicago. In 1873 there were 2,517 passages through the Sault Locks, including 968 steamers, 1,544 sailing vessels and five rafts of logs; the ships carried 30,966 passengers and 1,204,455 tons of freight (Annual Report of the Superintendent of the St. Mary's Falls Ship Canal for the Year 1873, 1874:5). By the mid-1880s the passenger traffic had increased to more than 50,000 annually, although the average was more like 30,000 (Mansfield 1899(1):194); the number of passages by Lake craft climbed to more than 12,000 at the turn of the century, with more than 45,000 passengers per year.

After the Civil War much of American expansion shifted to the West. Agriculture spread to Minnesota, Iowa and the Dakotas, and the fruits of the prairie states were shipped to Eastern markets. Duluth became an important trans-shipment point in the eastward flow of grain and flour. From 1870 until the present time, thousands and then millions of tons of grain products were brought each year across the Lakes from Duluth's docks. For many years in the 19th century, Chicago and Milwaukee were the nation's greatest grain-shipment ports, but Duluth took that honor away from them in about 1885 when the new lock at Sault Ste. Marie enabled Lake Superior ships to load deeper, and therefore more economical, cargoes. Port Arthur and Fort William, Ontario took the lead from Duluth and Superior in the 1920s, and have outstripped all other Lakes ports for grain shipments ever since. In 1980 the port of Thunder Bay (formerly Fort William and

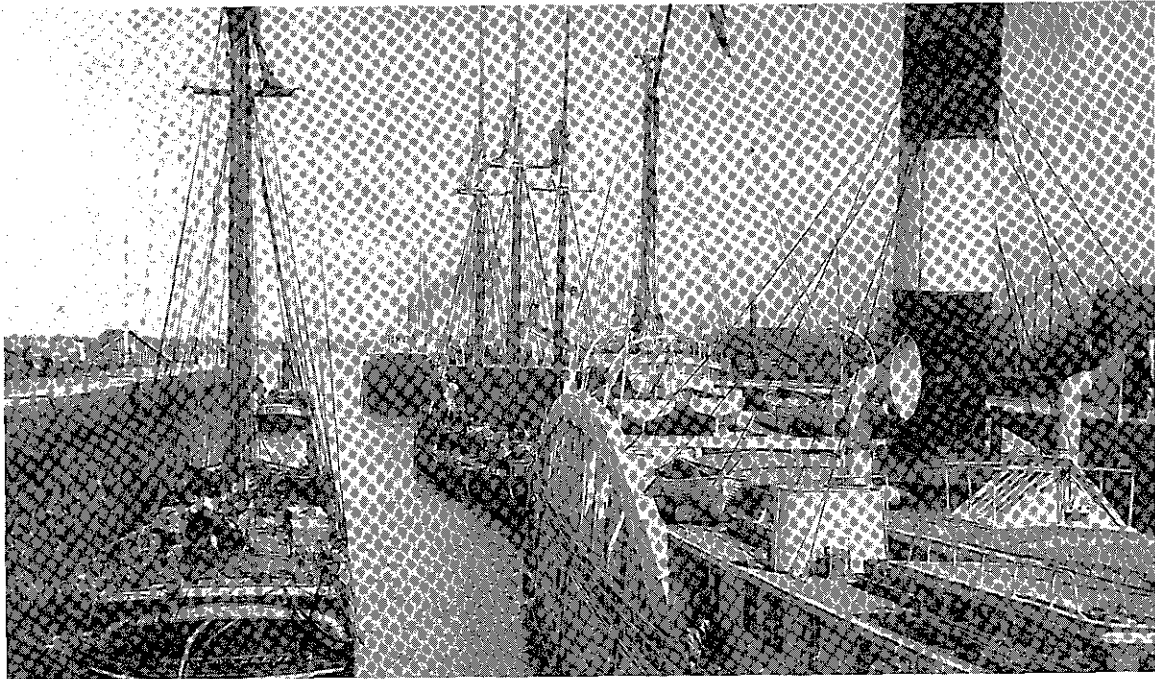


Fig. 2.8. All manner of vessels used the Soo locks in the 1870s and 1880s, including fleets of passenger craft and graceful schooners. University of Detroit Museum Collection.

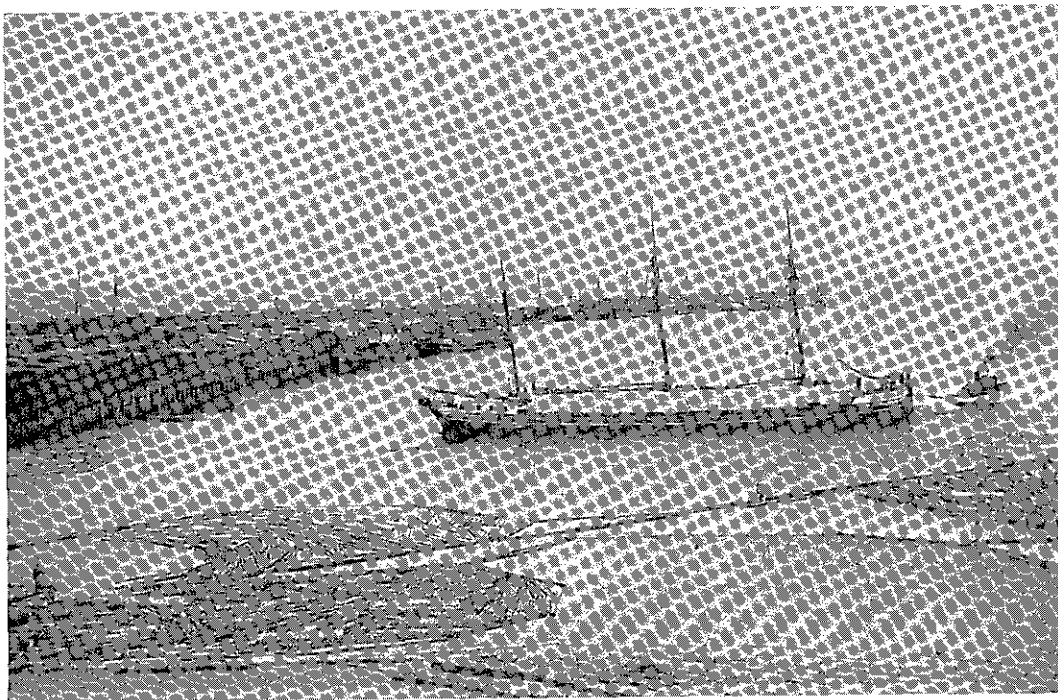


Fig. 2.9. Hundreds of lumber steamers and barges loaded at Grand Marais docks at turn of the century. U.S. Army Corps of Engineers Canal Park Museum Collection.

Port Arthur) handled 14 million metric tons of grain, while the Twin Ports of Duluth and Superior generated about 8 million tons (Thompson 1982:15, 17). The ascendancy of the Lakehead ports in iron ore and grain increased shipping along the North Shore and changed the predominant routes. As a result, intense vessel activity along the South Shore began dwindling around the turn of the century. Most of today's vessel traffic follows the middle of the Lake, where it is far removed from the Pictured Rocks area.

In the 1880s the lumber business in lower Michigan began to suffer because so much of the forest there had been harvested. It became expensive to transport log rafts from distant forests to the lower peninsula mills. Many of the larger companies shifted their attention to Lake Superior's forests, and some moved to Marquette, Grand Marais, Munising and towns near the Keweenaw. In the 1890s they moved farther west in search of pine. The first mill was built at Grand Marais in 1879, and by 1890 that place became an important center of the industry, with five big mills on the Bay, about 400 vessel arrivals annually, and nearly 150,000 tons of lumber shipments per year (Carter 1967:30). A few years later the torch passed to Ashland and, at the turn of the century, to Duluth. For a few years Duluth shipped more lumber than any other port in the world (Hall 1976:62). In 1899 940,000 tons of logs, lumber, shingles and other wood products left Duluth and Superior docks by ship. Ten years later there was no wood left to cut in the vicinity, and the timber industry had been transplanted to the Pacific coast. Between 1880 and 1910, though, tens of thousands of lumber-laden "hookers" and their schooner-barges wallowed down Lake Superior. Decks piled high, they were easy prey for the Lake's frequent storms. The lumbering era was one of the most colorful and exciting periods of the region's history, although it lasted a relatively brief time.

The Gogebic Iron Range in Michigan was opened in 1882. The port of Ashland, Wisconsin grew to handle a portion of its production. In 1884 the Vermillion Range was opened in Minnesota, and Two Harbors was laid out with modern railroads and loading docks to market its resources. The great Misabe Range was tapped in Minnesota in 1892, when ore docks were erected in Superior and Duluth to handle its soft, rich ore. With the opening of each of these new ranges, the center of the iron ore trade shifted steadily westward, away from Marquette. Early in the present century, Marquette's ore production fell behind that of Ashland, Duluth, Superior and Two Harbors, and stayed at about 3.5 million tons right into the 1980s. Ashland's shipments rose to above 7 million tons in the 1920s, but then averaged 5 million to 6 million until the 1950s, when it petered out entirely. Two Harbors averaged about 6 million tons until World War II, when it rose to more than 18 million tons annually; an all-time peak was reached with 21 million tons in 1953 (Lake Superior Iron Ore Association 1952:278ff). In the 1970s and 1980s, production has averaged less than 10 million tons. Duluth-Superior production rose from 5 million tons in 1900 to 30 million in 1920, 45 million in World War II, and 60 million in 1953. Recently it has averaged 20-25 million tons. In the 1960s when vessel size averaged 620 feet or 16,000 tons capacity, that tonnage would require 1,600 ships per year. In the 1980s, with 65,000-ton supercarriers, the same tonnage requires fewer than 400 ships a year. Today Marquette's downtown ore docks have been long since abandoned, and Marquette's production is shipped out of nearby Presque Isle docks. About 95 percent of Lake Superior's production, however, comes from Minnesota mines (Great Lakes Basin Commission 1975:50). This pattern has drastically reduced commercial shipping in the Pictured Rocks vicinity in the past several decades.

With the enormous growth in the Lake Superior shipments, the original Soo Locks proved inadequate only 15 years after construction. The state of Michigan turned to the federal government to provide a second, larger lock:

The Weitzel Lock was constructed and the Canal deepened between the years 1870 and 1881. The new lock lay to the south of the original State Locks, and was named in honor of one of the engineers in charge, General Godfrey Weitzel. Now it became apparent that one state could not go on taking charge of a public work like a great ship canal on an international boundary which served the people of many states and countries. So in 1881, just before the completion of the new lock, the state legislature passed a bill that authorized the transfer of the canal to the United States (Nute 1944:236).

Even larger locks were built in later years to accommodate more traffic and larger ships. The Weitzel Lock was completed in 1881, the Poe in 1905, Sabin and Davis twins in 1916, McArthur in 1943, and finally the second Poe of 1,300 feet in 1978. The Soo Locks will always be a critical link in the transportation systems of the United States and Canada.

The commercial shipping traffic of Lake Superior focused principally between Sault Ste. Marie and Chequamegon during the fur trade. With the advent of the copper trade in the 1840s, a triangular route was adopted between Sault Ste. Marie, Marquette and the Keweenaw Peninsula. Marquette's entry into the iron-ore business resulted in a more diversified pattern of routes and schedules between 1860 and the 1880s. Then as other mineral ranges opened up, the diversification broadened. The entry of Duluth, Superior and the Canadian Lakehead ports into the grain trade diverted more of the traffic along the North Shore. Finally, with the decline of ore production in Michigan and Wisconsin, ships began using a single track from Sault Ste. Marie to the head of the Lakes, whether the destination was American or Canadian.

The little harbor at Grand Island provided shelter and "wooding up" in the 1840s, 1850s and 1860s, but more recently it served only as a refuge from Lake storms. The port of Munising attracted some trade in ore between 1870 and 1880 to feed the Bay furnaces, and some lumber in the 1880s and 1890s, but never became a major port. Grand Marais flourished in lumber and commercial fishing activity, principally between 1880 and 1910, but now serves only a few fishermen and resorters. Along that whole section of lakeshore, only Marquette still has active commercial docks, servicing about 100 ships each year loading there, and a flotilla of pleasure boats. The big ships have come, and for the most part they have gone.

CHAPTER III. THE DEVELOPMENT OF COMMERCIAL SHIPS ON LAKE SUPERIOR

Lake Superior was long separated from its sister Lakes, and it is still set apart from the others by its pure, primitive quality. Yet despite the elements that make Lake Superior different from all the others, it is in every sense one of the Great Lakes. The Ojibwe people call it the "Father of Waters" because the other four Great Lakes are born in its cold depths and nourished by Superior's endless overflow.

So it is that Lake Superior's ships are the ships of the Great Lakes. Nothing distinguishes this evolution from the ships of the other upper Lakes (Huron, Michigan and Erie), although there are distinctive features that were adopted by the Canadian vessels of Lake Ontario and the St. Lawrence River country.

Because of the Lakes' unique character, the ships that evolved there have been unlike those of any other place. They have taken the best of contemporary French, British and Yankee shipbuilding traditions and adapted them to the needs of the Lakes' environment, within the limitations imposed by local availability of raw materials. The environmental conditions of the Lakes have shaped the characteristics of ships' hulls through more than 200 years of evolution, so that today's steel supercarriers are just as distinctly Lakes-born as their tiny wooden counterparts so many generations before, but fine-tuned and rendered infinitely more efficient by as many generations of craftsmen and engineers.

The great rapids in the St. Lawrence and Niagara rivers kept the first European explorers from bringing in their own ships from the Atlantic, so it was necessary for them to build new ones above the rapids and falls to pursue their explorations westward. While they used transplanted European ship designs, they did not pattern the new ships after the deep-draft vessels that had carried them across the Atlantic. Instead they chose designs that had proven themselves in the North Sea, where the waters were unprotected but shallow, like the Lakes.

LaSalle's exploratory ship GRIFFIN was the first vessel built on the upper Lakes. It was designed in France and built on the Niagara River in 1679. At that time there were already several other vessels on Lake Ontario, and all were French (Cuthbertson 1931:40).

The French and Indian War occupied the British and French in the region between 1756 and 1763. All shipbuilding during the period involved brigs, "snows" and schooners of British and French Admiralty design. The fore-and-aft rig was adopted at this time for many of the fighting ships, as sloops and schooners had proved their desirability over square-rigged ships, which were more commonly used on the oceans. When the French surrendered Canada in 1763, the British built two small schooners at Navy Island on the Niagara River, the first British craft on the Upper Lakes. These were the 80-ton HURON and MICHEGON. They built two others in 1766 (Cuthbertson 1931:227). From 1763 until 1785, all Lakes navigation was restricted to British naval craft, and private enterprise was officially throttled by the Crown. Merchants and traders were required to ship all cargoes on government ships making up the "Provincial Marine." In 1780 there were 16

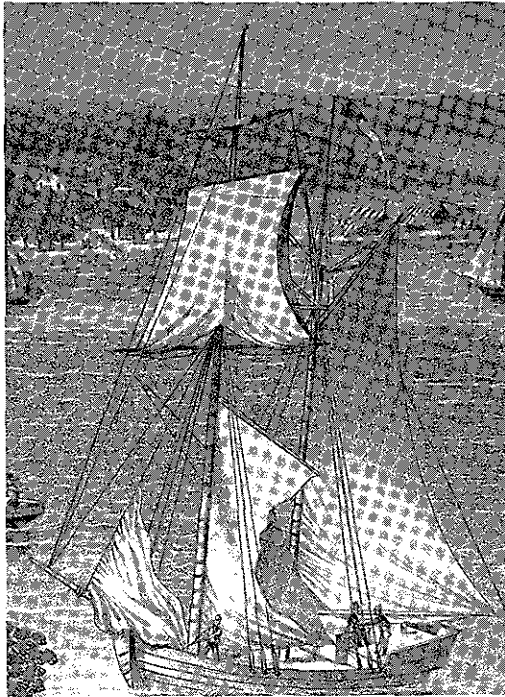


Fig. 3.1. This 1837 lithograph illustrates the appearance of merchant schooners in that era. Most were little more than 60 feet long. Dossin Great Lakes Marine Collection.

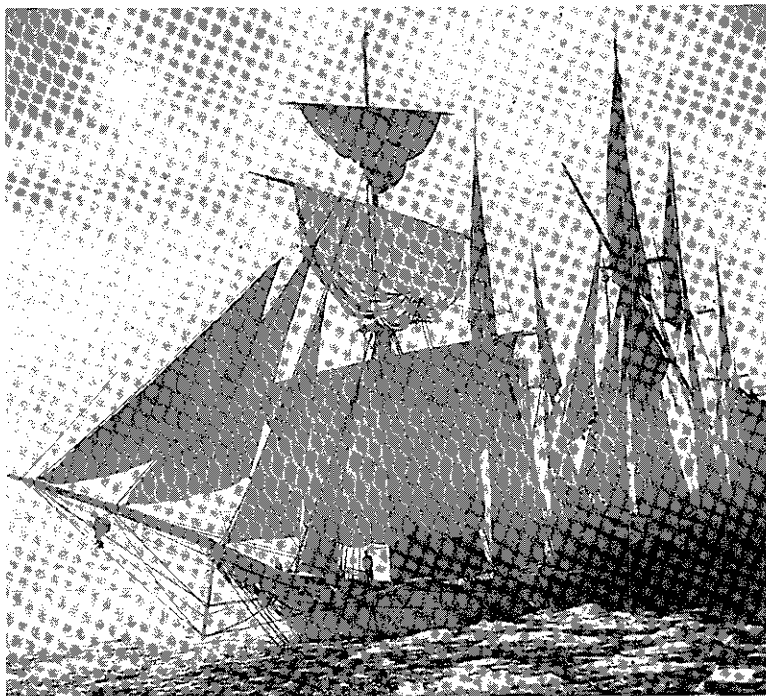


Fig. 3.2. In the 1870s, the Lakes fleet included nearly 2,000 schooners. Superior View Company, Marquette.

ships on the Great Lakes: five on Lake Ontario, nine on Lake Erie, and two very small ones on Lake Superior that had been built for an English copper-mining syndicate.

In 1785 the Governor General of Canada lifted the ban on private shipping, and several ships were begun at once, principally for the various fur companies doing business in the far west. The 35-foot sloop BEAVER was the first commercial ship built after the prohibition was lifted; it was built at Detroit. The slightly larger OTTER was built the same year at Point aux Pins on Lake Superior for the North West Co. Along with the mining company's schooners of 1770, it was the first commercial ship on the largest of the Lakes. A handful of other privately owned merchantmen were also built at this time at various ports. All were designed and built independently of the Navy, although many of the shipwrights came out of the naval services, principally British, and their influence was felt for many decades.

Canada passed the Inland Navigation Act in 1788, fully opening the commerce of the Lakes for the first time. The Act coincided with the start of mass immigration into the Great Lakes, and it had a profound effect on the development of the region. Between this time and the War of 1812, dozens of trading vessels were built all around the Lakes, although most of the shipping centered on Lake Ontario. Trade there exceeded that of all the other Great Lakes combined (Murphy 1987:44).

The Jay Treaty gave the United States possession of what are now the Great Lakes states in 1795. Soon afterward Americans began to build warships to protect their hard-won territory. The British responded by beefing up their naval forces on the Lakes. Worsening conflict between the two nations prompted a vigorous shipbuilding program on both sides of the border (Barry 1973:33). The principal fighting ships on both sides were square-riggers, although many captured or commandeered merchant schooners were also used. The main reason for the military preference for square rig over fore-and-aft was that square rig was simply more difficult to put out of commission during sea battles. The more numerous square sails offered smaller targets, while fore-and-aft sails offered large, vulnerable targets. However, square-rigged vessels required large crews to handle the many sails, a serious concern to merchants seeking the lowest operating costs when transporting cargoes, so they were not as efficient in the merchant services, except for long sea voyages.

Some characteristics of square rig were desirable even in merchant transport. Square-rigged vessels sail fast before the wind, and the prevailing westerly winds on the Lakes made for quick downbound passages. The rivers and channels of the Lakes, however, make the more maneuverable schooners more practical. It was probably demonstrated early that rigs combining some features of both square and fore-and-aft sails were the most desirable of all for use on waters like the Lakes because they embodied the advantages of each. As a result, barkantines and brigantines became popular on the Lakes in the years following the War of 1812, deriving some of the benefits of both rigs. Often these vessels were referred to as "barks" and "brigs" in the parlance of Great Lakes sailors, but there were very few true barks and brigs (totally square-rigged) employed on the Lakes. Barkantines and brigantines had square sails on the foremast and fore-and-aft sails on the other masts, the former being three-masters and the latter two-masters.

Merchants and sailors were quick to establish the most practical and profitable rigs for navigation. Although some barkantines and brigantines were built well into the 1850s, the topsail schooner was the hybrid most widely adopted after about 1830. It was designed for the fastest possible trips with heavy payloads (characteristics of square rig)

and maneuverability with limited crew, plus the ability to sail close to the wind (characteristics of fore-and-aft rig).

Schooner development appears to date to the 15th century, when some European nations began adopting more and more fore-and-aft sails in their square-riggers until the principal sails were schooner-like gaff-rigged main courses; other similar craft evolved from two-masted lateen or spritsail forebears. Schooners began to appear in colonial America in the early 1700s, and the name was first applied about 1717 (Chapelle 1935:11). The first schooners are thought to have appeared on the Lakes during the French and Indian War, when both the French and English began using fore-and-aft rig, but even LaSalle's pinnaces of 1678 on Lake Ontario were a related type. Merchant schooners appeared in considerable numbers after 1800. They were the backbone of the merchant fleets for the next hundred years.

At 132 tons, the schooner MICHIGAN was the largest American merchant ship on the Lakes in 1817. It was built by a shipwright from the East Coast, and exemplified the strong influence of European and coastal builders on Lakes schooner development. Eastern builders had brought their traditions and designs to the Lakes since the wartime years. Their influence led to the sharp-model schooners on the Lakes and to the later "clipper" tradition. Shipmasters and sailors on the Lakes before 1830 were also transplanted from the seaboard.

Like the clippers, coastal packets lent some of their most useful traits to Lakes craft. Sturdy ships were developed with full hull forms and flat bottoms to maximize cargo capacity. The "canallers" that dominated the Lakes trades for many decades bore distinct resemblance to earlier coastal packets, and they served to become the models for nineteenth- and twentieth-century Lake steam bulk freighters.

Flat-bottomed schooners and sloops were built to answer to the needs of navigating the Lakes' shallow and twisting channels, but they were often poor sailors due to their shallow-draft hulls. The tendency of a vessel to drift sideways is directly proportional to the shallowness of its hull, so it was difficult to design shallow-draft hulls, especially schooner-rigged ones, which could sail efficiently before the introduction of centerboards. Slip-keels and sliding keels were tried on the Lakes before centerboards, just as they were on the coast. Centerboards became common after about 1825 (Chapelle 1967:264). They were eventually used in almost all Lakes sail craft, and even in some steamers to control "windage" (drift) when they were without cargo.

Between 1812 and 1820 the Great Lakes fleets grew in number, but there was little growth in vessel size because of the limited depths of water in unimproved channels, and because of the relatively limited trade. The average schooner measured 45 or 50 tons (Mansfield 1899(1):129). Hull draft in the 1820s rarely exceeded 5 feet because of the water depth at the St. Clair Flats, a well-known obstruction in the connecting channels above Detroit. These small vessels were only superseded in size when economic conditions in the 1840s forced channel improvements.

The first decades of the nineteenth century brought several technological improvements to sailing ships. Loom-woven cotton duck canvas was introduced in the early 1820s. Chain anchor-cables were first employed in 1823. Iron rods were developed for standing rigging in the 1820s and 1830s. Geared capstans, windlasses and steering mechanisms, iron-stropped tackle blocks, and new ironwork for rigging were all developed between 1820 and 1840 (Walker 1902:203, Chapelle 1967:279).

The numerous canals tributary to the Lakes have had a profound effect on regional trade since the 1820s, when the Erie Canal opened. The canal brought goods from the Great Lakes to East Coast markets, but it also expedited the settlement of the West by funnelling hundreds of thousands of immigrants to Michigan, Illinois, Indiana and Southern Ontario. The canals that most influenced ship design were not those tributary to the Great Lakes, however, but the interconnecting waterways between the Lakes, such as the Welland, St. Lawrence and Sault canals. These canals fixed the limits of vessel dimensions for a very large part of the Lakes fleet. The Welland Canal, connecting Lakes Erie and Ontario, had the greatest effect.

The Welland Ship Canal was completed in 1829 to bypass Niagara Falls, most insurmountable of the natural barriers to the east-west navigation. Its 35 locks measured 100 feet long, 22 feet wide and 6 feet deep (Mansfield 1899(1):233). It connected the upper Lakes with Lake Ontario and eventually with the Atlantic, so its dimensions controlled the size of any ship that hoped to operate competitively in the Lakes trades, excepting those that were limited to Lake Michigan or Lake Superior shuttles.

The ships built for the commerce to Lake Ontario or the St. Lawrence were known as "canallers," and they were characterized by their dimensions, which very nearly approximated those of the locks themselves. The ships that first used the canal were varied in their size and model, but they became more standardized after about 1840. The Canal was enlarged a few years later, and predictably, a whole new class of larger canallers appeared. The "Second Welland" was completed in 1845, and it allowed vessels 145 feet in length, 26 feet beam and 10 feet deep. Canallers built for the second Welland were probably the first distinctly "Lakes" vessel type. They were easily recognized for their plumb bows, relatively narrow beams and flat sides, which were carried just as far forward and aft as possible to maximize cargo capacity (Barry 1973:124). In 1862 there were reportedly 755 canal schooners on the Lakes.

The 1840s marked the beginning of a dramatic expansion of the Lakes fleets, when shipyards all over the region were kept busy turning out all manner of new hulls, principally sailing craft. The number of schooners on the Lakes went from 384 in 1848 to 974 in 1860, and to 1,255 in 1868, probably the peak year for the schooners (Toledo Blade, May 26, 1869). After that time, steamers and barges gained the ascendancy. The earlier classes of barkantines and brigantines, popular in the 1840s and 1850s, disappeared. Schooners began a slow decrease in numbers after 1870.

In their heyday, the schooners of the Lakes distinguished themselves with many fine records for quick passages and consistent profits. From the 1860s through the 1880s, marine columns were full of stories about fast trips between Chicago and Buffalo, some in the remarkably short time of four days and a few hours; seven days was good time and 10 days about average.

Ironically, it was after the steam freighters began to take the trades away from the sailing craft that the Lakes schooners really achieved the zenith of their development. At their peak they numbered nearly 2,000. They made fortunes for many owners and operators, and they inspired poets and historians alike. When the infamous shoals were dredged at the St. Clair Flats below Lake Huron in 1871, a whole fleet of large schooners was built for the Lake Michigan and Lake Superior ore and grain trades, including perhaps 200 big three-masters and a few four-masters. All the new schooners were built between 1871 and 1874 with 12-foot draft and hull lengths of about 200 feet. This was the last great thrust of the schooner era, when their large capacity enabled the new vessels to compete effectively for a while longer with the growing numbers of efficient

steambarges and bulk freighters. There was a concurrent shortage of vessel tonnage, so that almost anything that floated could have made money at the time, but that wasn't to last long.

The advent of the "consort system" a few years before had made it economical to tow sailing vessels, several at a time, down the Lakes. The new "steambarges" would move two, three or more schooners or barges all the way from Chicago or Marquette to Buffalo at a steady 6 to 8 miles an hour, regardless of weather. The larger ships and the consort system resulted in plummeting freight rates and increased competition, and ultimately in vastly reduced profits. Most of the Lakes sailing craft were reduced to barges during this time, and by the middle of the 1880s the decline of schooners was precipitous.

The practice of towing barges began about 1862, and increasing numbers of sailing vessels were relegated to that role every season until the turn of the century. Conversion to barge meant removal of rigging and topmasts. The last fully rigged schooner was built in 1889. Some schooners lasted into the twentieth century, but they were curiosities, the only survivors of nearly 20,000 of their type. In the 1930s only three were left.

Steam navigation came to the Lakes when the sidewheel steamboats ONTARIO and FRONTENAC were constructed on Lake Ontario in 1817. The WALK IN THE WATER was built at Black Rock (Tonawanda), New York in 1818, becoming the upper Lakes' first steamer. Steamboats were slow to favorably impress vessel owners, simply because there was not much incentive for the large investment required for the machinery. After completion of the Erie Canal in 1825, however, the commerce of the Lakes grew rapidly, and the burgeoning passenger trade offered returns high enough to justify the more costly steamboats. In the 13 years before the Erie Canal only 25 steamers had been built, in the next four years some 60 were completed, and by 1840 more than 100 sidewheelers were in service. About 40 of the latter craft were used as ferries, while the remainder, principally the large boats, ran from Buffalo to upper Lakes ports or from Niagara and Toronto to lower Lakes or St. Lawrence River destinations (Labadie 1985).

By the 1840s the Erie Canal was bringing to Buffalo each year tens of thousands of settlers seeking passage to the West. The population of cities bordering the upper Lakes is said to have quadrupled in the eight years previous to 1840 as a result of that tremendous influx, so passenger business was booming.

Steamboat technology developed rapidly in the 1840s. Some sidewheelers had square, or crosshead, engines easily identified by towering galleys that stood high over the superstructure, with a crosshead moving up and down in a slide. Others had horizontal engines, Western-rivers style, with the machinery entirely contained below deck. The most common arrangement on the Lakes was the vertical, or "walking-beam," engine that had a tall A-frame with a crosshead fixed on top that rocked back and forth, attached to connecting rods at either end for the crankshaft and the cylinder. There were other styles, too, but none so common as the three described. The steamers all burned cordwood for fuel until coal and eventually oil were adopted after the Civil War. The first 1,000-ton steamboat was built on the Lakes in 1844, ushering in the era of the palace steamers, which lasted for the next 13 years. The introduction of those 300-foot ships was made possible by the adoption of new methods of strengthening wooden hulls, such as iron truss-rods, hogging frames and bridge-like wooden arches. The various methods were pioneered in Scotland, England and on the Hudson River (Murphy 1987:49). These systems were designed to distribute stress evenly within oversized wooden hulls, so that the enormous weight of the machinery would not be concentrated

amidships. Another very significant development of the 1840s was the introduction of the screw propeller.

The palace steamers of the late 1840s and early 1850s were the most beautifully appointed craft ever built on the Lakes. In all there were 25 such steamers, most measuring between 1,000 and 1,600 tons. The CITY OF BUFFALO, built in 1857, was the last and largest, at 350 feet long and 2,026 tons. A financial panic in 1857 ruined the passenger business, and the entire fleet of palace steamers was withdrawn from service. Most never ran again, although some were only a year or two old. By the time the country began its slow economic recovery in the early 1860s, the ships were no longer worth repairing, and most were dismantled. Some were made into barges. The steamers built for the passenger business after the Civil War were far more modest in size and furnishings.

The bottleneck effect created by the small locks of the Welland Canal tended to keep steamboats from trade with the lower Lakes in spite of strong economic incentives. The beamy sidewheelers simply couldn't fit through the locks. It was in this setting that several Lake Ontario vessel owners began to experiment in 1840 and 1841 with new propeller technology. They built the first "steam schooners" with screw propellers, adopting new machinery recently developed by Swedish inventor John Ericsson. The first screw-propelled commercial craft in America was the 63-foot towboat ROBERT F. STOCKTON, built in England in 1838 and sailed across the Atlantic in 1839 to serve on the Delaware & Raritan Canal (Baker 1965:42). The 126-ton screw steamer ERICSON was built at Brockville on the St. Lawrence River in 1840, and two others appeared at Brockville and Niagara, Ontario in 1841. The 138-ton VANDALIA, built at Oswego, New York in the same year, was the first to see service on the upper Lakes. The VANDALIA was built to trade through the Welland Canal and to divert some of the lucrative Lake Michigan trade from Buffalo to Lake Ontario ports. It demonstrated that "propellers" could pass easily through the narrow locks, while sidewheelers could not. Thus the advent of the propeller steamers was a turning point in the economic history of Lake Ontario and the St. Lawrence River ports. When the St. Lawrence canals were completed all the way to tidewater in 1846 and 1847, the propellers could navigate all the way from Chicago to Montreal. Schooners could navigate the same route, of course, but they had to be towed upstream at great expense.

When the first propellers were built, the maritime industry was guardedly optimistic. The propellers performed admirably, and the industry was quick to acknowledge their advantages over both sailing craft and sidewheel steamers. Propeller ships proved to be very economical. They were far cheaper to build and outfit than sidewheelers, and they were cheaper to run as well. They burned one-fourth the fuel of steamboats and required about half the crew (Mills 1910:130). Most important, propellers could carry far more freight than sidewheelers of comparable tonnage because their machinery was so much more compact; the engines and boilers of a sidewheeler occupied a major portion of the hull. All these factors made it possible for propellers to offer freight rates somewhere between those of sailing craft and sidewheelers. Not long after their introduction, propellers began to gather contracts for larger and larger proportions of the flour, grain and provisions shipped down the Lakes.

The number of propellers on the Lakes grew rapidly. Between 1840 and 1849, 81 propellers were built at Lakes shipyards. During the next 10 years, 133 more were added and during the 1860s, another 88 were built, not including screw tugs (Labadie 1981). The journalists of 1841 and 1842 had correctly predicted that propellers would revolutionize the carrying trades.

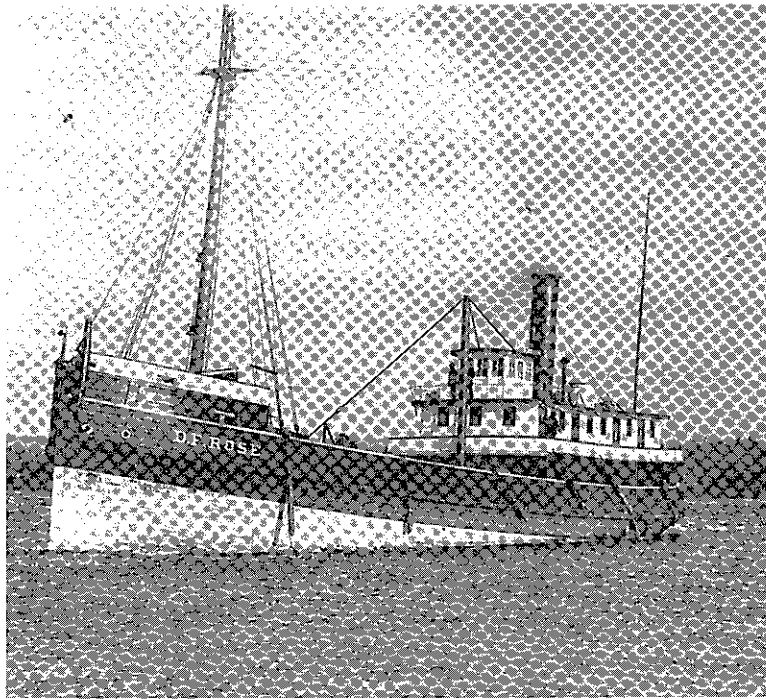


Fig. 3.3. The earliest steambarges had their houses at the after end, usually with a single, tall spar forward. Canal Park Museum Collection.

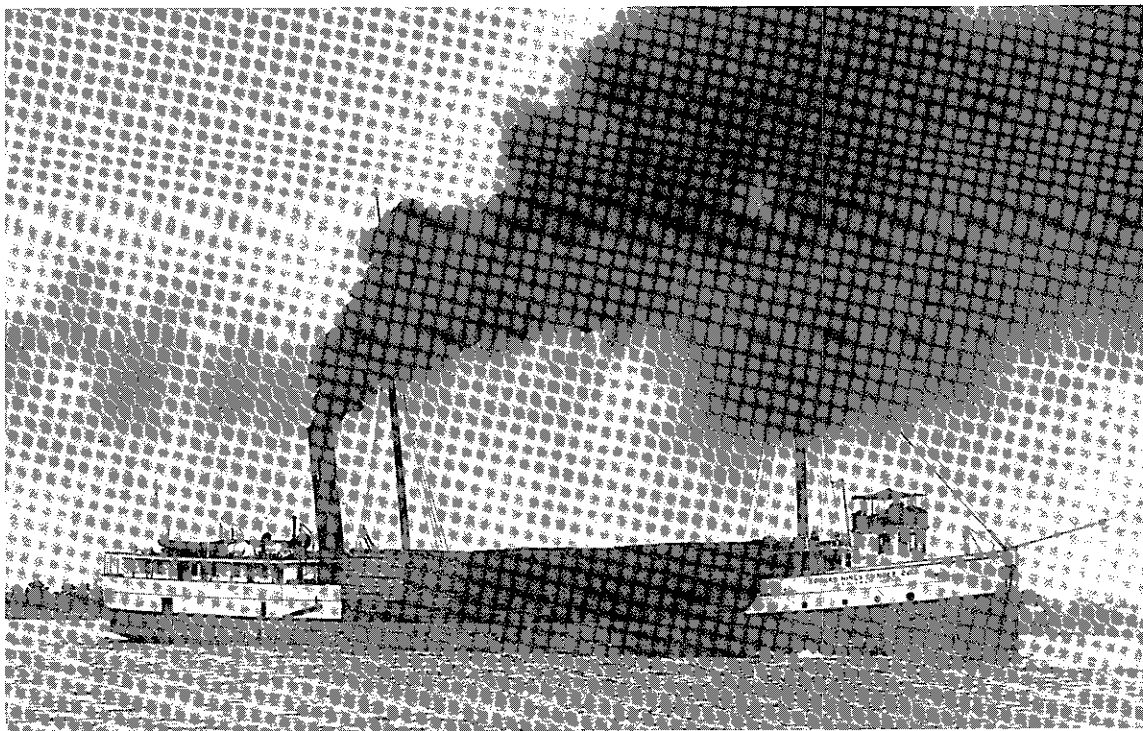


Fig. 3.4. Steambarges or "lumber hookers" built after 1880 grew to 160 or 180 feet and had their pilothouses on a raised "forecastle." Canal Park Museum Collection.

Screw towboats or "tugs" appeared on the Lakes shortly after the first propellers. In fact, the first screw steamer in the nation was built for towing and not for cargo at all, so it is not surprising that the type was readily adopted on the Island Seas, too. The 111-ton CLIFTON, built at Dexter, New York in 1847, is the first Lakes craft known to have been built specifically for towing, although several Canadian craft built on the St. Lawrence River in 1843 and 1844 are suspected to have been tugs. Indeed, it appears that there were several screw tugs built before 1850, more than 100 during the 1850s, and nearly 400 in the 1860s.

Not long after the first propellers were introduced, the first all-freight screw steamer was built: the 250-ton SAMPSON, built in 1843. It carried package freight and livestock, and was the forerunner of what became known as "package freighters." Package freighters were double-decked screw steamers with gangways in the sides for loading cargo. Passenger propellers were much the same, except that they had a cabin built on the upper deck, while package freighters did not. Because there was so little difference between the two types, many ships were changed from package boats to passenger propellers or vice versa by the addition or removal of cabins at relatively modest cost.

As the tide of immigration slowed, the proportion of passenger-carrying propellers dwindled, and more of the propellers were simply built without cabins. During the 1840s there were 79 propellers built and only two package freighters. In the 1870s there were 56 propellers and 31 package freighters. After 1880 few passenger ships were built, although more package freighters were added each year until the turn of the century.

Like sailing craft, steamers tended to grow in size over the years. The largest ships would carry cargo at the cheapest rates but their size was limited by canal systems, the connecting channels, and by shipbuilding technology, all of which improved as time passed. The VANDALIA and its running mates were less than 100 feet long, having been built for the first Welland Canal. After 1845 virtually no propellers were built less than 140 feet long, because the Welland had been enlarged with 150-foot locks. Many of the propellers built after 1850 were not required to pass through the Welland at all, so they were frequently built longer than 150 feet. The average propeller size in 1862 was 182 feet (641 tons). In 1877 the average had increased to 220 feet (1,300 tons). Inasmuch as the Welland Canal was not enlarged again until the early 1880s, it may be inferred that most of the propellers and package freighters of the 1870s were upper Lakes vessels that operated above Lake Ontario, probably from Buffalo to Lake Michigan or Lake Superior ports. When the locks were enlarged in 1884, the typical 220-footers could navigate all the way through the St. Lawrence River to Montreal and the seaboard.

By the time of the Civil War, railroads had penetrated into the west, cutting into the profitable package freight business. There were still enormous quantities of foodstuffs and manufactured goods to be transported by ships, but more and more of it was bulk material such as salt, coal, grain, ore or lumber, all generating small profits for vessel operators. The need for increasing cargo capacities led to adoption of the consort system in 1861 or 1862. Several of the retired palace steamers were purchased for a fraction of their original value and made into huge barges to be towed down the Lakes with immense cargoes of lumber. The exercise in adaptive reuse revolutionized the carriage of bulk cargoes, and resulted in a practical means of making steady profits for ship owners. Between 1861 and 1870, dozens of old passenger craft were made into lumber barges, and other ships were built from the keel up as barges.

When the consort system caught on, a new type of steamer evolved. Steam barges were developed as the ideal towing steamer. These new hybrids were constructed with powerful engines in order to tow several barges in tandem, and they had the carrying

capacity for several hundred tons of lumber. They were single-deckers with schooner-built hulls and a small cabin at the after end. The pattern was said to have been introduced in 1848, but there was little demand for hauling lumber then, and the ship was not profitable. The PACIFIC was built at Racine, Wisconsin in 1853 along the same lines, but was a financial failure. Steambarges were introduced again in 1865 with the 115-foot TRADER at Marine City, Michigan, and this time the type became an immediate success, due to the insatiable demands for lumber and to the success of the consort system.

The typical steambarge measured 145 feet in length and carried about 350,000 feet of lumber, although ships of that class ranged all the way from 65 feet to fully 200, and some hauled more than a million board feet. All steambarges were single-decked like their schooner forebears. Most had raised poop-decks. The earliest steambarges had their pilothouses aft, but after 1880 most carried them on a raised forecastle with a well-deck between bow and stern, an arrangement that improved visibility for navigating and also helped to keep the bow down when the ship was light. Early steambarges had a tall mast near the bow where they usually spread a single gaff-rigged sail and a jib, but the large boats built after 1880 often had two or three masts. Because they carried working sails and because they rode very high when without cargo, most had centerboards, another link with their schooner cousins.

Steambarges were also called "lumber hookers" or "rabbits." They carried their lumber cargoes in the holds and stacked high on deck, and it was similarly stowed in the barges. The hookers and their consorts carried square timber, logs, posts and poles, shingles, railroad ties, and "deals" (cut lumber). They ran on all the Great Lakes but the busiest routes were from Saginaw Bay to Buffalo and Tonawanda, New York; from Muskegon and Manistee, Michigan to Chicago; or from Lake Superior ports to Chicago. Nearly 600 steambarges are estimated to have been built between 1870 and 1900. The lumber trade moved to the Pacific Coast around 1910, and the use of steambarges declined sharply after that. Few of the small ships survived past 1920 (Labadie 1982).

The practicality of the consort system was not limited to the lumber trade. Some of the first steambarges hauled occasional cargoes of coal, salt and iron ore, and what they lacked in capacity they made up in efficiency, particularly when they were paired with two or three heavily laden barges. The hatches in lumber steamers were not ideally suited for grain or ore, however, and they had limited capacity. The R.J. HACKETT was built in 1869 specifically for the iron-ore trade, taking the best features of steambarges and adapting them for ore instead of lumber. The ship was double-decked so that it carried all cargo below decks, and it was fitted with large regularly spaced hatches that were matched to the spacing of the spouts on Marquette's loading docks. The HACKETT was provided with a powerful engine so that it could tow one or two loaded barges its own size. The result was a 210-foot bulk freighter, the first of the breed (True 1956:3). The ship carried 1,200 tons of ore.

Bulk freighters were profitable because they carried large quantities of bulk commodities economically. For this reason, few bulk freighters measured less than 200 feet in length, even when the type was first introduced. The construction of these long, narrow, shoal-draft steamers is characterized by very heavy longitudinal framing. Huge oak keelsons, parallel to the centerline keel, were laid on top of the floor timbers, which were the lower portions of the transverse frames in the ship's bottom. These keelsons, called side- or floor-keelsons, usually measured from 12 to 18 inches square and ran the length of the ship's bottom, spaced at intervals of about 3 feet. No other Lakes vessel type used these long, heavy timbers. In addition to the powerful keelsons, wooden bulk freighters were reinforced with iron straps that criss-crossed the sides,

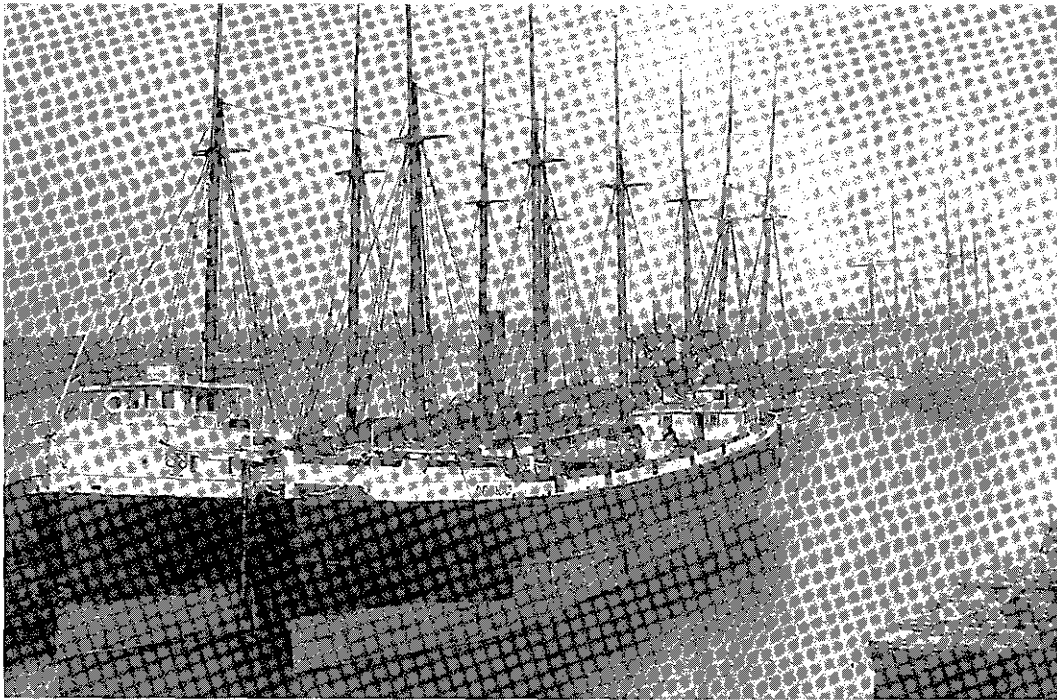


Fig. 3.5. Early bulk freighters averaged about 200 feet and almost invariably towed a "consort barge." Delta County Historical Museum.

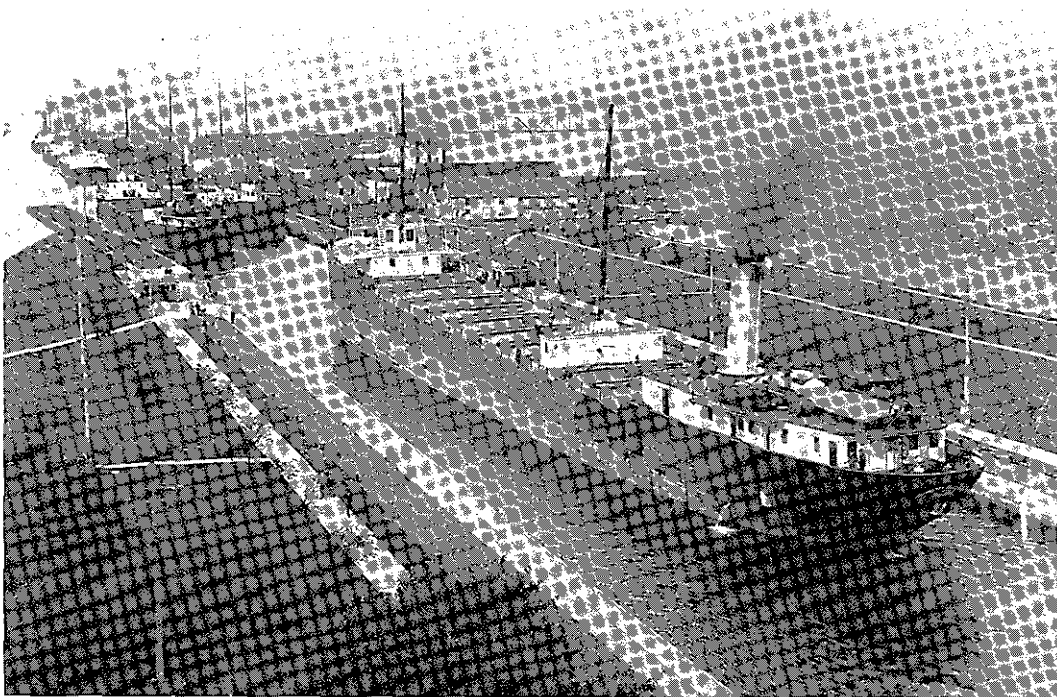


Fig. 3.6. A ship building boom at the turn of the century resulted in the construction of dozens of 500-foot steel bulk carriers. David T. Glick Collection.

running from stem to stern. The straps were fastened over the frames before the planking was put on, and they ran from the rail right down under the turn of the bilge. At top and bottom, they were usually attached to a wide band of 3/4-inch iron. Little of this strengthening would have been necessary in a deep ocean-going hull, but the shallow quality of Lakes vessels made their hulls weak by comparison.

From the time the R.J. HACKETT was christened in 1869 until shipbuilding was halted by the Panic in 1873, there were 47 bulk freighters built, averaging just over 1,000 tons gross. When shipbuilding resumed again in 1880, still larger bulk freighters were launched, 170 built during the 1880s alone. Most had consort barges built to run with them, usually of similar dimensions (Labadie 1984). The typical bulk freighter built in 1890 was 2,200 gross tons and averaged 260 feet long. The growth resulted not so much from improved shipbuilding technology but from deepening and improving the channels.

The next significant event in the development of bulk freighters was the introduction of iron and steel to shipbuilding. Iron ships had been built in Scotland and England before 1800 (Morrison 1905:2). Several iron steamers were built in Canada and the United States during the 1850s and 1860s, but the first bulk freighter of iron was the "monster steamer" ONOKO, a 287-foot giant, built at Cleveland in 1881. The ship was a sensation. It had double bottoms and water-ballast tanks, and was designed to carry 3,000 tons of ore on a 14-foot draft. For nearly 10 years the ONOKO carried the largest cargoes on the Great Lakes.

The principal advantage of using metal for shipbuilding is its very high ratio of strength to weight. A 200-foot wooden ship required an oaken hull more than 18 inches thick, while a similar craft of iron had shell-plating no more than a half-inch thick and roughly a tenth as heavy. Iron ships drew so little water that they had to carry water ballast to keep their propeller wheels below the surface when they were without cargo. Double bottoms were developed to satisfy that need and to provide for safety in case the outer shell was punctured. Iron and then steel ships had much greater longitudinal strength than their wooden counterparts, a factor that enabled ship architects to design larger hulls. Some wooden shipbuilders persisted until the turn of the century, but relatively few were constructed after 1890, and the largest barely exceeded 300 feet. Steel freighters grew to 400 feet in 1894, to 500 feet in 1900, and to 600 feet by 1906 (True 1956:27).

During the 1890s 92 steel bulk freighters were built for the Lakes ore and grain fleets, and in the first decade of the present century nearly 200 more joined their ranks. While bulk freighters became more numerous at the turn of the century, several other vessel types dwindled in number and eventually disappeared. Sailing craft were entirely displaced by steamers, except in the lumber trade, where they found a niche in later years as tow barges, with their rigging cut away and their graceful bowsprits cut short. The last schooner-barges were laid up and abandoned during the Great Depression.

Steambarges lasted only as long as the lumber trade on the Lakes. When the forests had been stripped clean in Michigan, Wisconsin, Minnesota and Ontario, and the supply of lumber was gone, the industry moved to the West Coast. Some of the lumber steamers also went there to serve the industry for which they were intended, but most were simply abandoned and dismantled. Their design was too specialized and their capacity too limited to make them suitable for any use but the lumber trade. By 1930 only a score of steambarges remained, carrying coal or sand and gravel, or converted for dredging. Virtually none survived the Depression years, except as moldering hulks in dozens of ship boneyards.

The heyday of sidewheelers was relatively short. They reached their zenith when the palace steamers were built, but all were victims of the 1853 panic. Although sidewheelers made something of a comeback following the Civil War, their numbers were never very great, and they never again attained the elegance of the Golden Era. A few paddlewheel giants were constructed on the Lakes after 1900, including the largest sidewheelers ever built. After 1950 none were in use.

Passenger propellers, like their package-freight cousins, were most successful when they were coupled with the railroad systems stretching from the Lakes to the coast. After 1880 relatively few large propellers were built, and those were principally for local routes rather than the system-wide Buffalo-to-Chicago or Buffalo-to-Duluth services typical in the 1860s and 1870s. Some of the new propellers constructed after 1890 were exclusively passenger craft, with no cargo space at all, and others were "day boats," excursion steamers with neither overnight accommodations nor cargo space. A dozen passenger propellers survived the opening of America's highway networks in the 1930s, but the last of them succumbed to economic pressures and government regulations in the mid-1960s. The Georgian Bay Line steamer SOUTH AMERICAN was the last active representative of its type, and retired at the end of the 1967 season.

Package freighters numbered 116 in 1890, which was probably their peak. Much package cargo was also carried in passenger propellers and sidewheelers, too. The tonnage of freight carried in Lakes ships diminished as the nation's railroads were extended, however, and the number of package freighters shrunk proportionately. In 1915 antitrust legislation forced the disposal of most of the package freighters by the railroads that were their operators, and many of the ships never again saw service on the Lakes. Those that were left were largely requisitioned for coastal service during World War II, so that virtually no American package freighters remained on the Lakes after 1940. A couple of Canadian fleets ran package boats until 1980 in specialty trades such as rolled newsprint or barrelled chemicals, but those were discontinued in 1982. It was the end of a colorful era.

At the time of this writing, only the bulk freighters have survived on the Lakes. Most of them are between 730 and 1,000 feet long, highly specialized and efficient craft carrying up to 80,000 tons of cargo. The only representatives of the Great Lakes 30,000 wooden steamers and sailing craft are the myriad shipwrecks beneath the Lakes' waters, and a few museum-ships enshrined where the love of the lakes is kept alive.

CHAPTER IV: SHIPWRECKS

Introduction

This chapter summarizes the results of a search of primary archival and secondary sources on the background history of the ship disasters along Pictured Rocks and on-site examination of the archeological remains of those disasters. A total of 24 vessel losses, strandings or accidents that have left a variety of physical remains on the lakeshore or lake bottom are discussed in this chapter. The contemporary accounts of actions before and after the various loss events provide a historical context that complements the archeological record. Basing on the historic documentation and archeological evidence, each site was examined for positive identification of ship names linked to the physical remains. On-site observation has also led to more questions about the sites. In each case, the archeological record is the hard evidence that confirms, controverts or augments the historical documentation.

The amount of text devoted to each ship varies greatly, partly because of the disparity in surviving archival documentation and partly due to the amount of time available to examine each site. Whenever possible, photographs and graphics were developed to augment the written site descriptions and analyses.

Most of the site locations are common knowledge, and many receive regular visitation by sport divers. The ship remains, both underwater and exposed along the shoreline, are an important part of Pictured Rocks National Lakeshore's cultural resources management and interpretation activities. The information provided here should be directly applicable to Park Service needs as well as providing technical information on ship construction to maritime historians and archeologists. The boundary of Pictured Rocks National Lakeshore does not reflect historically relevant regional or socioeconomic lines of demarkation. For that reason, sites outside the park's legislative boundary are included in this study. All the sites studied comprise a shipwreck assemblage that must be examined as a whole in order to understand the relative significance of each individual site.

Analysis of Shipwreck Sites in and Around the Pictured Rocks National Lakeshore

There is always an element of mystery about shipwrecks. It may result from their antiquity, from the circumstances surrounding their losses, or from the funereal quality of a functioning ship struck lifeless. It may have as much to do with the physical environment of the site . . . the fact that a ship is hidden in the depths, obscured by sediments, or faded from popular memory. Individual sites are full of enigmas, and they invariably generate as many questions as they do answers. But in their group context, shipwrecks are not so mysterious.

The occurrence of maritime accidents is not random. The incidents are the result of a complex interplay of human behavior, physical environment, socioeconomic factors, and technology. As such, they are patterned (Murphy, Lenihan and Carrell 1982:2), and they reflect the society that produced them. The resultant shipwrecks comprise the material

record of a historical progression that is as readily interpreted statistically as it is substantiated by historical research.

The Pictured Rocks region is not part of some mysterious "Lake Superior Triangle." The Lakeshore is a microcosm of a busy waterborne transportation system. The system has recognized and well-defined hazards, where clusters of accidents are predictable within the context of the region's historical development. As a result, there are few surprises in the Pictured Rocks shipwreck population.

Within the shipwrecks in the Pictured Rocks vicinity there are 25 sailing craft, 10 bulk freighters, eight tugs and fishing craft, five passenger vessels, four steam barges, and two general (package) cargo ships. About half of these wrecks lie within the actual boundaries of the park, and those reflect the same proportions as the larger number.

By extrapolation, the number and distribution of wrecks leads to the hypothesis that most of the commercial craft in the region, and certainly the most susceptible to accidents, were sailing ships. As a matter of fact, the typical cargo carriers before 1880 were two-masted schooners of about 250 gross tons. In later years, those were superseded by three-masters averaging 650 tons. At the turn of the century, the only surviving sailing craft in the Lake Superior trades were all being used as tow barges. The bulk freighters that appeared in the 1870s began to dominate the ore and grain trades 15 years later, and they literally drove the schooners off the Lakes. The "bulkers" ranged from 180 to 200 feet in length before 1880, and they grew to about 300 feet before they were supplanted by steel ships at the turn of the century. These broad trends are all reflected statistically in the region's shipwrecks.

Interestingly, the progression from wooden ships to steel ones is not obvious in the Pictured Rocks wrecks, but this apparent discrepancy is easily explained. Steel ships are safer than their wooden forebears. They are provided with more powerful engines, compartmented hulls, and more reliable navigational instruments than their predecessors. Several steel ships met with serious accidents in the Lakeshore region, and some barely escaped total loss; almost without exception, however, they were recovered, repaired and returned to service. When steel steamers became predominant, the principal routes shifted way offshore so that where there were vessel losses, they occurred in deep water, many miles from shore. Thus the general paucity of steel shipwrecks reflects the sharp decrease in vessel losses after 1900 rather than the disappearance of shipping activity.

An examination of the maritime accidents in the area leads to several interesting conclusions beyond the relative importance or the numerical preponderance of different vessel types. There are clear chronological patterns to the 116 incidents recorded in the vicinity. More than half of the known accidents occurred between 1880 and 1910; 52 percent of the accidents occurred during a period that comprises only 15 percent of recorded maritime history. Six accidents occurred in the fall of 1905 alone, helping to make that the worst single year for mishaps. For Lake Superior as a whole, that same year was the worst ever recorded. A particularly vicious November gale disabled or sank 18 ships at the western end of the Lake alone and claimed 78 lives (Wolff 1979:82). In the Pictured Rocks area, other gales accounted for multiple ships losses during 1870, 1895, 1901, 1929, 1932 and 1941. Accidents were few before 1870 because of the relatively meager traffic on the Lake, and after 1910 because of the improved safety aboard ships. November incidents account for no less than 27 percent of the total, and October incidents for 22 percent. Each of those months took almost twice the toll of any other months. The risks of late fall navigation are well known. They are reflected in marine insurance rates, which climb sharply as the fall season advances.

Ship accidents resulted from a variety of causes, but weather was clearly the dominant factor. Strandings accounted for 70 of the 116 incidents in the area, or 61 percent of the total. There were also 29 founderingings, 12 incidents of storm damage, three fires and two collisions. Forty-one of the 70 stranded vessels were recovered, while 29 (41 percent) became total losses. Of the 29 vessels that foundered from stress of weather, only three were recovered. Groundings and strandings were very common before about 1910, when channels and obstructions were poorly mapped and seldom marked. Most vessels that had been in service for a few years before the turn of the century were certain to have suffered from groundings in the twisting and shallow channels, and from more serious strandings (running ashore) as well. These incidents can be attributed not only to inadequate aids to navigation, but also to storms and fog. While the latter do not pose a serious threat to modern ships, they took a tremendous toll among the 19th-century craft that were underpowered, unballasted, and unaided by navigational technology.

The accidents in the Pictured Rocks area occurred geographically in several clusters. There were 22 accidents at Grand Island, seven in the West Channel, and 14 in the East Channel/Sand Point vicinity. There were 10 more at the west end of the Pictured Rocks, five at the east end, two at Twelve Mile Beach, and no fewer than 21 at Au Sable Point, including 14 partial and seven total losses. East of Au Sable, there were three accidents off the Sauble Banks, 17 at Grand Marais harbor and 13 offshore. Grand Island with 22 and Au Sable Point with 21 together accounted for 37 percent of the total. The two prominent geographical features were the most dangerous obstructions in the region. Both were recognized early and marked with lighthouses as a consequence. After those two locations, the next most dangerous spots were the Grand Marais harbor entry with its treacherous currents (17 incidents), and the Munising East Channel (14). Mariners have always dreaded Pictured Rocks, where there are neither safe beaches nor safe anchorages, but that stretch of rugged shore accounts for only 17 incidents or 15 percent of the 116 in the larger area between Grand Island and Grand Marais.

Among all of the vessels involved in accidents in the area, 31 were carrying iron ore cargoes, 15 package freight and/or passengers, 12 lumber, five coal, and three grain; 41 were without any cargo at all. It would be reasonable to assume that ships without cargoes were particularly vulnerable to weather-related accidents based on purely statistical analysis of the accident chronology, and that fact is borne out by various studies (Chappelle 1967:212, Chapman 1957:423). Sailing ships in particular were not nearly so manageable when they were "light" as when they were laden with cargo. Many deep-sea vessels carried ballast of stone or sand when they were without cargo, but the shallow-built Lakes sailing craft did not use ballast. This made Lakes schooners susceptible to windage or "leeway," causing them to be blown off course by beam (lateral) winds. Underpowered steam barges and early bulk freighters were similarly effected by beam winds, and they were little match for Lake Superior's fall gales as a result. Steamers with consort-barges in tow were doubly at risk, and it is no wonder that they ran for shelter when the weather was threatening. Steel steamers carry water-ballast in their double bottoms, and this makes them much more easily managed in unfavorable wind conditions.

Of the 116 incidents studied, 18 involved loss of life. Six of those occurred within the present boundaries of the Pictured Rocks National Lakeshore. The steamboat SUPERIOR, lost in 1856, took some 35 lives. It was the most serious tragedy on Lake Superior until it was superseded by sinkings in 1885 and 1918 which claimed still more victims. Other incidents involving loss of life within the Park were the sinkings of the barge ELMA in 1895 (1 man); a sailboat in 1908 (1); the tug ALICE L in 1929 (1); the steamer

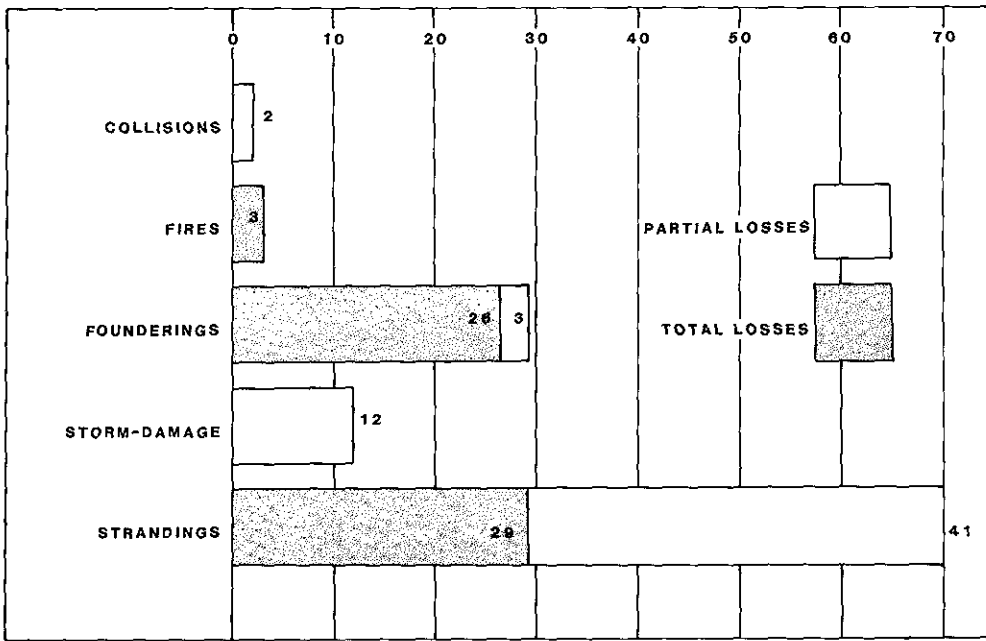


Fig. 4.1. Analysis of causes for shipping accidents in Pictured Rocks area, showing partial and total losses.

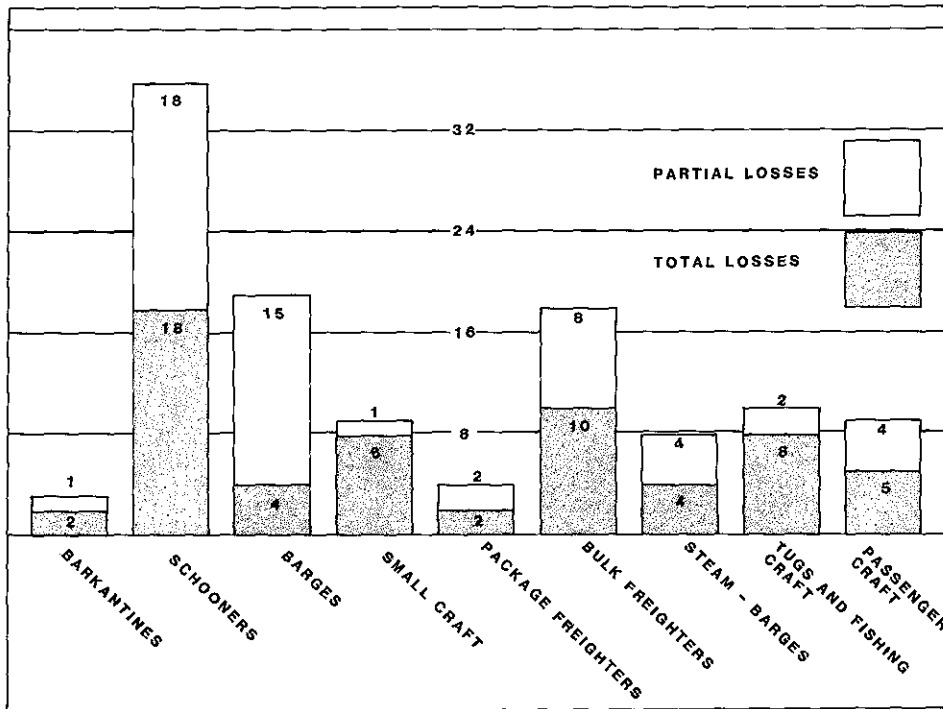


Fig. 4.2. Analysis of vessel-types involved in Pictured Rocks area accidents, illustrating partial and total losses.

KIOWA in 1929 (5); and the tug MINER's CASTLE in 1941 (4 lives). Total lives lost in the Lakeshore by shipwrecks is at least 47, but a totally accurate count cannot be established because the exact number of victims lost in the SUPERIOR is unknown.

Among the 116 known incidents, there were 61 total losses, 21 of which were inside the Lakeshore. Of the latter 21 craft, the tangible remains of only 13 are known to exist today. Each of those 13 wrecks is examined in some detail in the following pages, along with several other wrecks found just outside the Park that were judged to have strong relevance or significance to the Park Service interpretive program.

The order of presentation is geographic, starting from Munising Bay and working east toward Grand Marais.

Munising Bay

BERMUDA

History

The BERMUDA lies 300 feet northeast of Muskrat Point in Murray Bay, at position 46°27'88" North and 86°38'80" West. The deck is submerged in about 12 feet of water, and both ends of the ship are buoyed for convenient mooring.

Much has been written during the past 20 years about the schooner wreck in Murray Bay, variously known as the GRANADA, the DREADNAUGHT or the ARNOLD. The wreck is popular among sport divers, and is one of the most intact schooners to be found in any shallow-water site in the upper Lakes. This popularity has heightened the mystery about the ship's identity, so it is remarkable that no irrefutable proof has yet been found to lay to rest the speculation about its identity.

The most frequently quoted theory about the schooner asserts that it is the 320-gross-ton DREADNAUGHT, known to have wrecked on the beach at Grand Island on October 28, 1870 with a cargo of iron ore (Marquette Daily Mining Journal, November 5, 1870). The ship was reportedly abandoned at a site "near Grand Island Harbor," but it is clear that it was later recovered. The actual salvage was not described in local papers, but DREADNAUGHT was still in active service 12 years after the incident (Lake Hull Register, 1876 and 1879), leaving no doubt that the salvage was successful.

The ship has also been called the GRANADA by several historians (Stonehouse 1983:24). A schooner GRANADA was built at Buffalo, New York in 1856 and operated on the Lakes for many years. It had nearly the same dimensions as the Murray Bay wreck; that craft, however, was wrecked at Muskegon, Michigan in October 1880 with a load of lumber. It went to pieces with the loss of five lives in an accident that was widely publicized in Lake Michigan Papers (Chicago Inter Ocean, October 17, 1880 et passim) and is not known to have been involved in any accidents on Lake Superior.

The W.W. ARNOLD was also a similar schooner, wrecked on November 4, 1869, at the mouth of the Big Two Hearted River, 55 miles east of Grand Island. Speculation at the time of loss suggested that it may have been blown onto the island's rugged shores; (Woiff 1979:16).

The Murray Bay wreck appears to be the canal schooner BERMUDA, which was sunk in South Bay on October 15, 1870 and later brought to Murray Bay during a salvage attempt that was only partially successful.

The BERMUDA was one of a very large class of schooners built to trade through the old Welland Canals to Lake Ontario in the lucrative pre-Civil War grain trade. It was a two-master built at Oswego, New York by George Goble for Thomas S. Mott and launched on April 12, 1860 (Detroit Free Press, April 17, 1860). The ship measured 136 feet on the waterline, 143 feet overall, 26 feet 1 inch beam and 11 feet 9 inches depth. It was 394 and 67/95 tons according to the "old style of measure" in conformity with an Act of Congress passed February 18, 1793 (permanent enrollment No. 17 was issued at the Port of Oswego, April 5, 1860, from Record Group 41, U.S. National Archives). Its capacity was 400 tons, and it was valued at \$16,000 (Lake Vessel Register, 1860). The BERMUDA was awarded U.S. official No. 2160.

The ship was acquired by William Stewart of Detroit in the winter of 1863 and was issued permanent enrollment No. 4, at the port of Detroit February 12, 1864. The BERMUDA continued in the Lake Michigan and Lake Ontario grain business until the 1860s, when it began to trade at Marquette.

On November 19, 1869 the BERMUDA was wrecked in a howling gale at Shot Point, 6 miles east of Marquette, while carrying a load of supplies for the mines (Marquette Mining Journal, November 20, 1869). It lay exposed on the shore throughout the winter months, but the weather left it relatively undamaged. The wrecking tug MAGNET succeeded in getting it off the beach the following summer (Detroit Free Press, June 23, 1870; Detroit Advertiser & Tribune, June 25, 20, July 9 and 11, 1870) Floating free on July 5, it was brought down to the shipyards in Detroit for a thorough rebuilding.

The August 11, 1870, Detroit Free Press noted:

The BERMUDA has been painted. Her upper works are white with a green rail, and the waist belt and lower part of the hull green. She will shortly be sold by the insurance companies who own her.

Indeed, the schooner was back in service before the summer was out, owned by Peter J. Ralph of Detroit, who purchased the schooner from the companies who had raised it a few weeks before. According to enrollment No. 26 issued at the port of Detroit, September 21, 1870, Michael Tinney was the master.

The newly rebuilt BERMUDA was sent on September 21 with a load of supplies to Marquette, where the costly cargo was unloaded without incident. It took on 488 tons of ore at the local docks and was on its way down the Lake when it ran into a storm off Grand Marais on October 15 and sprang a leak. Captain Tinney ran for the only shelter in the vicinity, Grand Island. He succeeded in getting in behind the island before the ship filled. All the crew was safe (Detroit Post, October 17, 1870).

The Post of October 20, 1870 says:

After beaching the vessel close to the Anna River in South Bay, Capt. Tinney made her fast fore and aft to the trees and everything seemed secure, when at 8:00 p.m. she suddenly sank and lies with 20 feet of water over her deck. All hands were carried down with her, and but for the bursting of the cabin deck, none would have been saved. Steward Harry McWhey of Detroit and John Hunt and one other were lost.

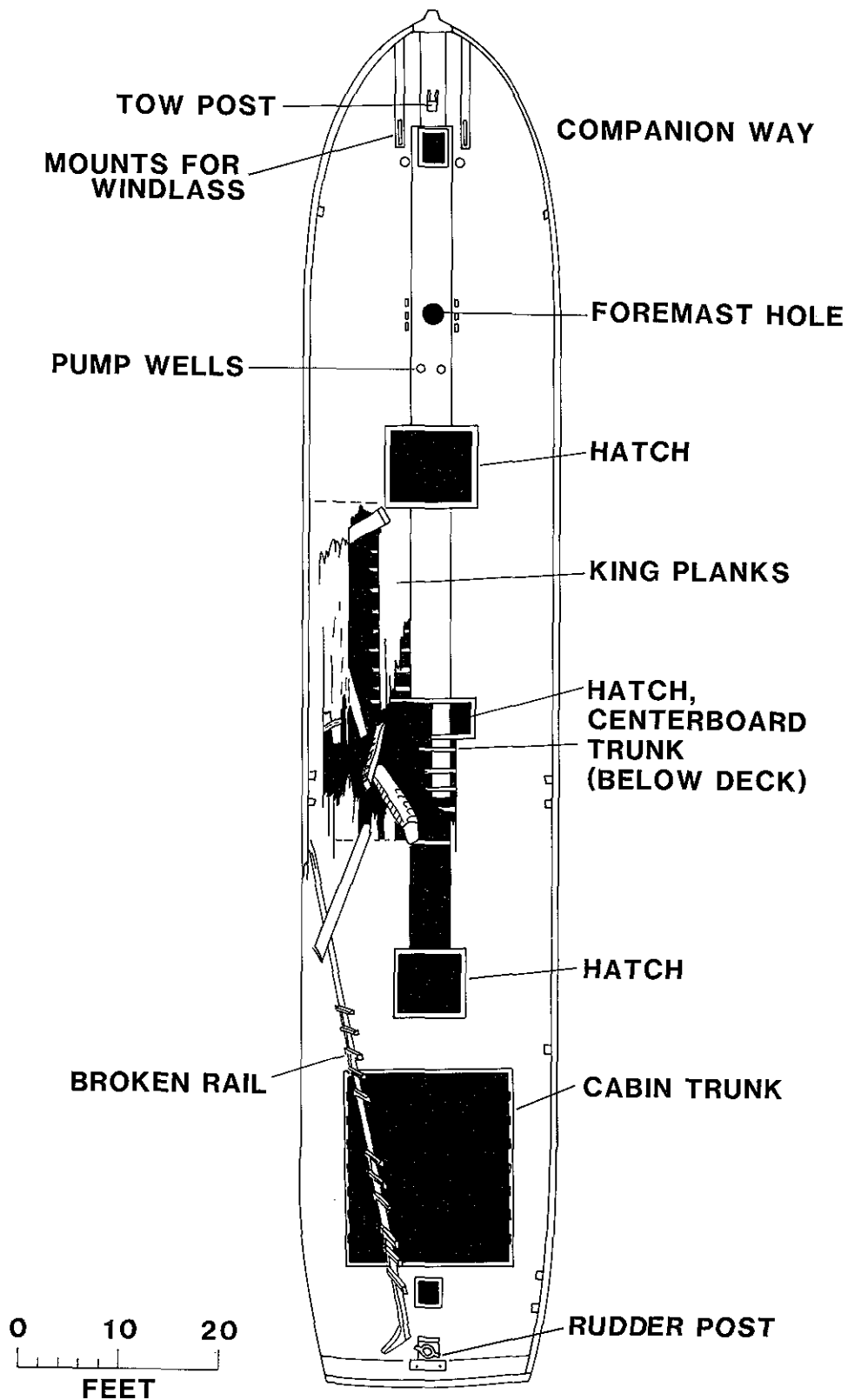


Fig. 4.3. The BERMUDA deck arrangement.

The Port Huron Weekly Times (October 28, 1870) said that the schooner was "made fast to the trees (and) suddenly sank owing to the sand bank giving away . . ." The Detroit Free Press (October 20, 1870) indicated that the ship lies "with 20 fathoms [sic] of water over her deck," but that figure seems doubtful if the ship was lying alongside the shore. It would also be foolish to moor a sinking ship in 120 feet of water.

None of the contemporary articles describe the condition of the wreck or the nature of damages, but the Marquette Mining Journal indicated on October 29 that "Captain Finney (sic), of the wrecked schooner BERMUDA, now sunk in Grand Island harbor, left here on Tuesday with a party of men to strip the vessel, she having been abandoned to the underwriters."

It is not clear whether the decision to give up the ship was due to its condition, depth or lateness of the season, although the ship was probably in good condition, being only 10 years old and freshly rebuilt.

Interestingly, the marine columns for the succeeding weeks in 1870 contain no further comments about the ship, nor about any plans to recover it. The first mention of salvage plans appeared nearly 13 years after the sinking! The Cleveland Herald of October 31, 1883 contained a short article under the headline "AN EFFORT TO RAISE THE BERMUDA":

Marquette, Oct 30 - The old schooner BERMUDA, which has been sunk near Grand Island for the last eleven [sic] years, was raised and towed into Murray Bay. The chains slipped and she sank again in four fathoms of water.

On November 8, 1883, the Chicago Inter Ocean reported from Marquette:

The tug KATE WILLIAMS arrived at this port today. She is at work wrecking the schooner BERMUDA, which has been sunk in Murray Bay, under Grand Island, since 1872. She has taken out about 100 tons of ore. The BERMUDA will be afloat in a few days.

The ship had not really lain in Murray Bay since 1872, and the article appears to have been premature in its optimism. The BERMUDA was not raised that fall at all. In August of the following year, almost 14 years after the ship's loss, another article said, "S.A. Murphy's wrecking schooner JOHNSON is attempting to raise the schooner BERMUDA, which is under forty feet of water at Grand Island" (Detroit Free Press, Aug. 21, 1884).

As nearly as we have been able to determine, the ship was never raised, although much of its rich cargo was salvaged during the 1883 work. The BERMUDA still lies in 40 feet of water in Murray Bay, exactly where the frustrated salvors left it so many years ago.

A 1901 newspaper article (Marquette Mining Journal, September 28, 1901) contained a reference to the wreck by a Capt. McLeod of Buffalo, who recalled the name of the schooner as GRANADA, saying that "she sank about fifteen years ago." This obviously led to much of the confusion about the ship's identity in subsequent years. It would have been easy to confuse the names of the two Caribbean Islands, Granada and Bermuda, and McLeod thus innocently started the controversy.

The GRANADA-DREADNAUGHT-ARNOLD-BERMUDA wreck appears to have been known to local residents through the years, and it is no surprise that it became a popular gathering place for scuba divers when that sport caught on in the 1950s. Deck equipment and tackle was removed from the shallow site for lawn ornaments and divers began a relentless effort to remove everything else that could be twisted, pried or

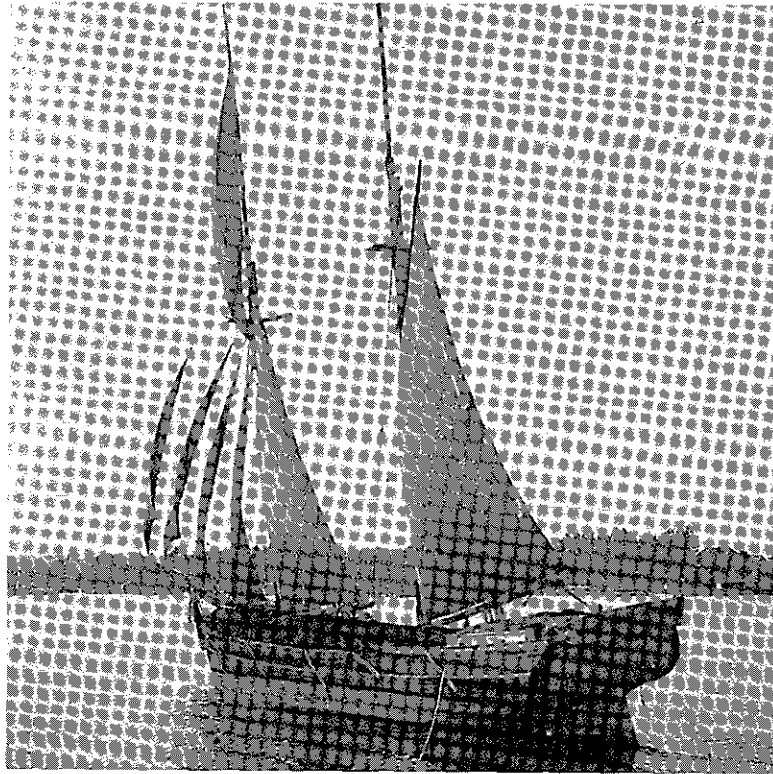


Fig. 4.4. The OLIVER MITCHELL was a canal-schooner much like the BERMUDA; there were literally hundreds on the Lakes. Manistee County Historical Museum Collection.

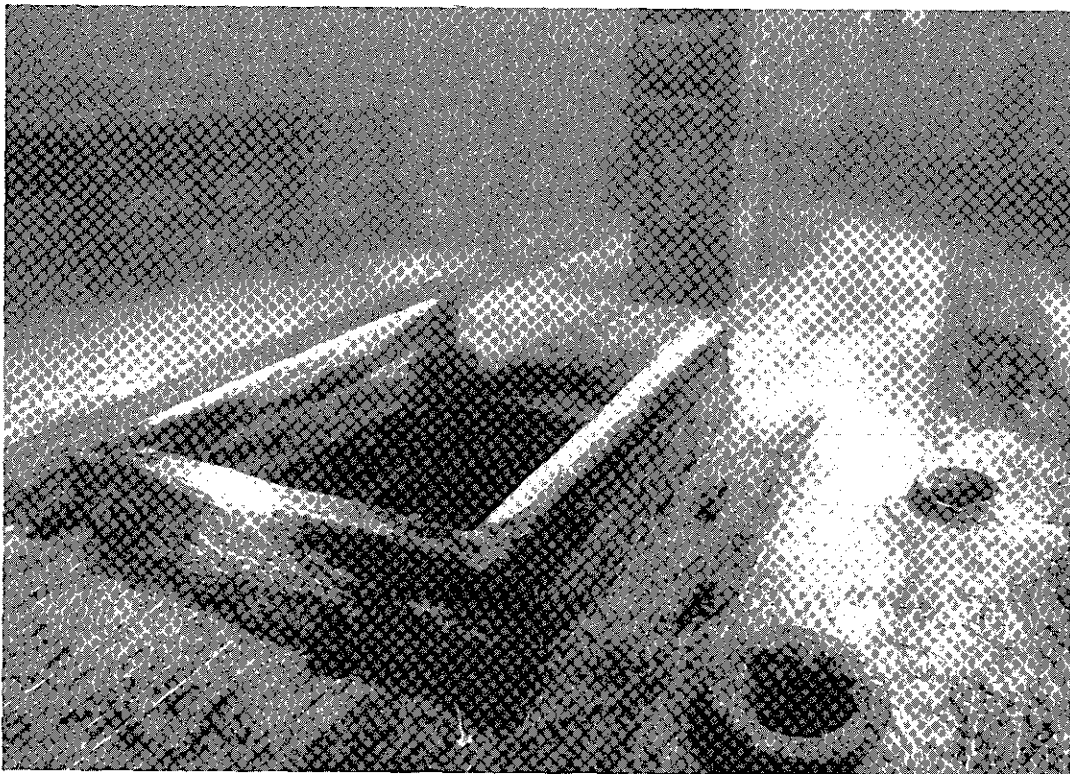


Fig. 4.5. Although the deck equipment has been removed, the hull of the canal schooner BERMUDA is in near-perfect condition. NPS photo by Patrick Labadie.

sawed off. In 1960 some of the more enterprising divers removed much of the remaining iron-ore cargo for souvenirs at a rock and mineral show (Marquette Mining Journal, June 11, 1960); only a small portion of the silvery, crystalline ore remains today.

Site Description and Analysis

An examination of the Murray Bay wreck reveals a wooden hull lying on an even keel on a relatively flat, sandy bottom in about 35 feet of water, just inside what is called Muskrat Point. The ship's masts, tackle and deck equipment have all been removed, and the deck is damaged, but the hull is otherwise intact and appears undamaged. The cabin structure is entirely gone, as are all the hatch covers, so that the cargo hold is exposed and easily accessible. The ship has two small companionways (one all the way forward and one right aft), three cargo hatches and a gaping cabin trunk. Several large timbers lie in a great hole in the ship's deck, including one that is round in cross-section and measures 16 inches in diameter and about 16 feet in length. This may have been one of the ship's spars, although the deck openings are considerably larger where the masts stood. The ship had two masts. Only one of the mast-holes is still intact, but the chain-plates may be seen on the sides to identify the location of the second mast. A portion of the deck has collapsed into the hold, and many of the deck beams are broken in the midships portion of the wreck. A 26-foot centerboard trunk is offset on the starboard side of the keel, somewhat forward of amidships.

There are no clear indications of the wrecking (salvage) activity on the ship, although some chafing marks were observed on both sides near the bow and stern that could be attributed to lifting chains described in historic accounts. The hull is marked with the graffiti of scores of modern divers who have left initials and dates behind, thus any archeological evidence is badly compromised. Little cargo remains in the ship's hold, but some may be seen lying on the deck on either side of the vessel from either the original (1883) or the modern (1960) removal. It is not clear whether the deck damage occurred during salvage. A piece of 1/4-inch plywood lies on the deck on the port side near the after hatch, an obvious relic of the more recent salvage work. Some 55 feet of the rail has been torn loose on the port side aft, and it lies upside down on the deck. According to divers, the rail was intact and in its proper place only eight or 10 years ago.

The wreck's measurements correspond handily with the BERMUDA's official registered dimensions. The length, from the fore side of the stem to the farthest point of the transom on the centerline, is 141 feet 4 inches, and the beam, measured over the waterways, is 26 feet even. The BERMUDA's 1860 Certificate of Enrollment lists the dimensions as 138 feet in length and 26 feet 1 inch beam, but it must be observed that the original measurement was made "from the fore part of the main stem to the after part of the stern post above the main deck," and would be several feet short of the overall figure recorded during the 1988 field work; breadth (beam) was measured "at the broadest part about the main wales" (Law of the United States Regarding Admeasurement of Vessels, Section 44 of the Act of August 4, 1790). Paint can still be seen on many parts of the Murray Bay wreck, and this corresponds to the green-and-white scheme described in the 1870 Detroit newspapers.

The site has many fascinating aspects and details. It provides a wealth of technological information in spite of the damage that has been inflicted by divers over the years. Some of the most interesting features are related to the framing under the deck and the method of strengthening the wooden hull. Careful examination of the ship's interior shows long, inverted arches of wooden planks laid into the ship's sides, curving from the upper part of the stern, down toward the bilge amidships, and then back up to the

- A. Boiler Tubes and Debris (amorphous)
- B. Mary Jarecki Hull (34 X 140)
- C. Unidentified Side Section (10 X 30)
- D. Boiler Tube-Sheet (5 X 7)
- E. Staples Propeller (6 X 26)
- F. Staples Boiler (1) Loran 31474.0, 47421.1
- G. Staples Rudder (6 X 26)
- H. Staples Debris (100 X 150)
- I. Staples Boiler (2) (10 X 12)
- J. Sitka Hull (36 X 200)
- K. Sitka Side Section (20 X 20)
- L. Sitka Side Section (20 X 20)
- M. Gale Staples Bottom Section (20 X 30)
- N. Gale Staples Bottom Section (20 X 30)
- O. Gale Staples Bottom Section (20 X 30)
- P. Unidentified Side (Staples?) (9 X 85)
- Q. Sitka Stern (30 X 50)

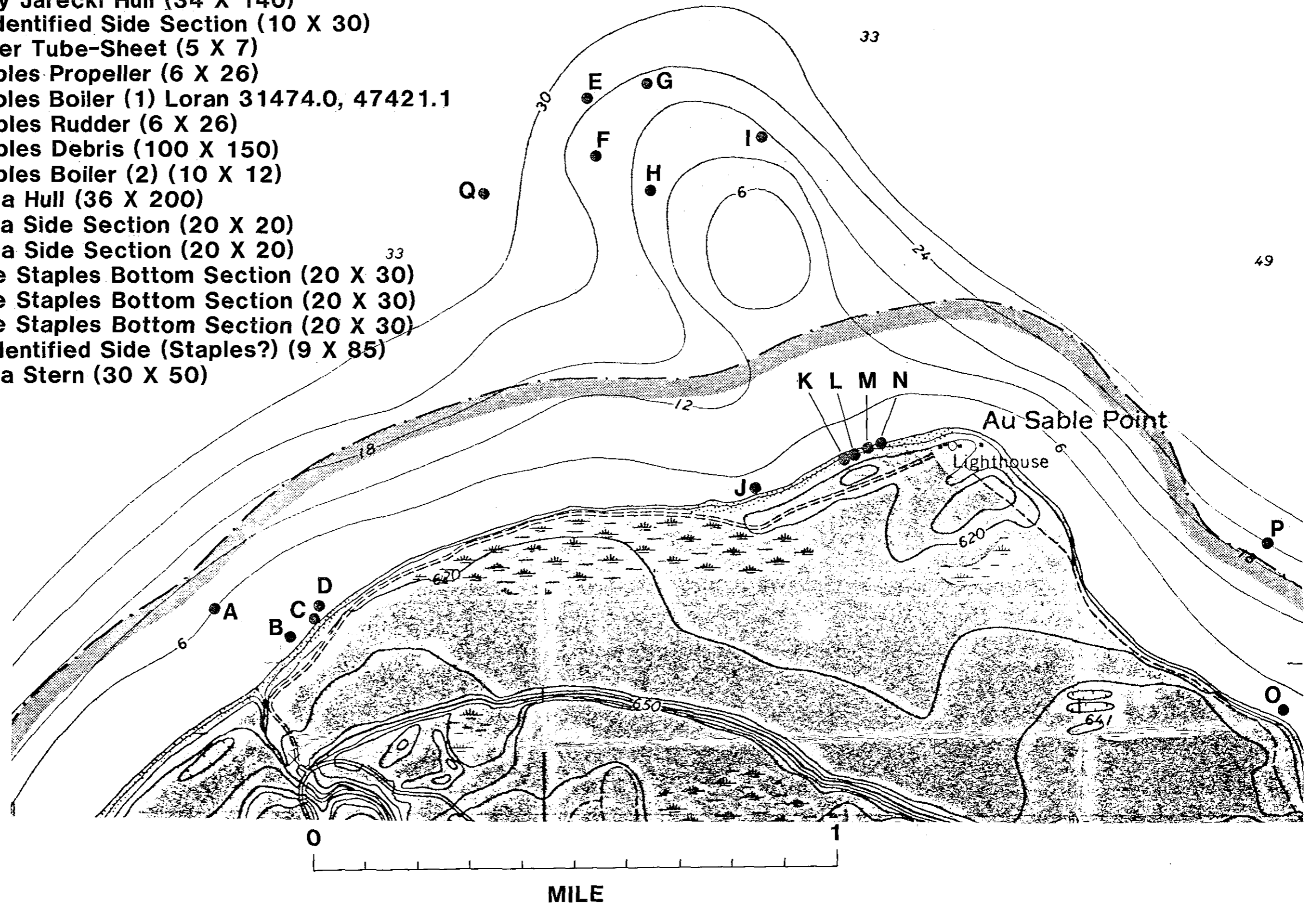


Fig. 4.6. Munising Channel wreck site locations.

deck under the bow. This is a "hogging arch," laid into the "ceiling" to prevent the ship's ends from drooping or flexing. In addition, the ship has numerous wooden "knees" under the transverse deck beams, most of them sharply inclined "dagger" knees that were designed to provide still more longitudinal strength. It is speculated that both the dagger knees and the longitudinal arches were put into the ship after the 1869 stranding on Lake Superior, but it is possible that they were part of the vessel's original fabric. Few examples of these arches have been observed on the Great Lakes, and virtually none where they could be so readily examined and measured. The arches consist of four strakes of 3-by-9-inch oak laid over the 3-inch ceiling. The dagger knees, probably tamarack, are 5 inches thick, ranging in size from 24 by 36 inches to a maximum of 28 by 58 inches, spaced at irregular intervals ranging from 30 to 60 inches. All knees are either straight vertical or slanted sharply forward; they are hung from the ship's deck beams. Horizontal "lodge knees" are also fixed to each of the deck beams and to several transverse beams that supported the cabin.

The BERMUDA is worthy of careful study and documentation because of the singular quality of its preservation and the very limited number of 19th-century sailing craft that have survived intact. The need for this documentation is strengthened by the threat to its permanence posed by heavy visitation by sport divers. Although the ship is not within the boundaries of Pictured Rocks National Lakeshore, it is an intact representative of the canal-type schooners MARY M. SCOTT, WABASH and ONEIDA CHIEF, all within the park and in various states of disintegration.

SMITH MOORE

Travelling from west to east, the second wreck in the immediate vicinity of Munising is the wooden bulk freighter SMITH MOORE, lying in the middle of the East Channel in about 95 feet of water. The wreck is certainly the most popular diver attraction in the area. It is nearly as intact as the BERMUDA, but much larger, more impressive, and more of a challenge to visit because its depth. The wreck lies just outside the Lakeshore boundary a few hundred yards west of Sand Point. Its LORAN coordinates are 31642.2 and 47442.2 and is usually buoyed with three great orange spheres.

History

The SMITH MOORE was built in 1880 by George Presley & Co. at Cleveland for a syndicate of Cleveland vessel owners. It was the first ship built by Presley & Co. after incorporation of the firm, although Presley himself was an experienced builder who had been a partner in earlier yards of some note. The Cleveland Herald (July 30, 1880) noted that the builders " . . . have naturally taken great pride in her construction." A lengthy and complimentary description followed:

Her general dimensions are as follows: length of keel 226 feet; breadth of beam 35 feet; depth of hold 18 feet. She has an arch below decks 130 feet long, six feet deep, and 4 1/2-in material. The keelson is 15x16 inches, with the sister keelsons 14 inches square. The knees are athwartships instead of fore and aft, and extending from side to side are 15 iron beams under the boiler. Her lower deck is of heavy white oak. All the frames are grooved, likewise the ceiling, allowing the application of brine to every part.

She is provided with a pair of condensing engines, 32-inch bore and 36-inch stroke. They were made by the Globe Iron Works, the excellent reputation of which concern fully guarantees their finish and quality. Her

boiler is 10 1/2-feet in diameter and 18 feet long. The cost of the new vessel when complete will be about \$90,000.

Capt. Smith Moore, who has supervised the construction, watching carefully every point in the building and giving her the benefit of his long experience as a practical navigator, is to command her.

She will be ready for sea in about 10 days. She has a capacity fully equal to that of the largest class of vessels, 55 to 60,000 bushels of wheat or 1,600 tons of coal. It is not yet decided whether she will enter the grain or ore trade.

The new steamer had two decks and three masts, with a single tall smokestack. It was launched July 12, 1880, inspected at Cleveland on August 5, and enrolled on August 9 (Permanent Enrollment No. 14, issued at the port of Cleveland) and awarded U.S. official number 115721. The document shows that the new craft measured 223.4 feet in length, 35.0 feet beam and 18.2 feet depth, 1,192.42 gross tons and 1,000.20 net tons. The owners were:

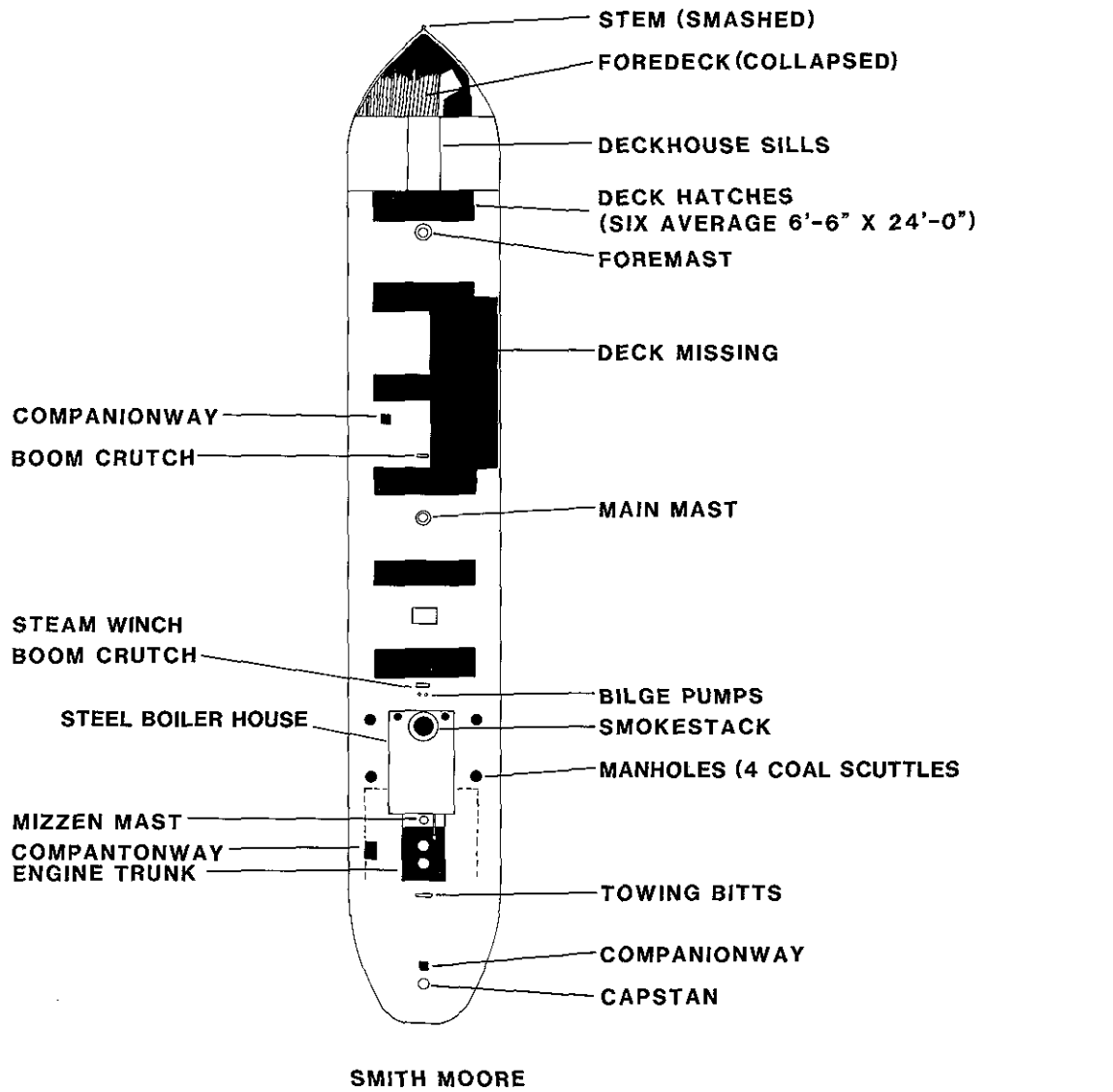
Smith Moore of Cleveland	1/2,
F.W. Pelton of Cleveland	1/3,
Harvey H. Brown of Cleveland	1/3,
John W. Moore of Cleveland	1/12,
Maria L. Pankhurst of Cleveland	1/18,
Jno. B. Cowle of Cleveland	1/18,
and H.D. Coffinberry of Cleveland	1/18,

Smith Moore was the ship's master, and he appears to have retained that title during most of the steamer's career.

The ship entered the grain trade in the fall of 1880, as evidenced by a brief note in the Cleveland Herald October 6 (1880), saying: "It is rumored that the propellor SMITH MOORE was chartered to carry wheat from Toledo to Cleveland yesterday at 3 1/2 or 3 3/4 cents [per bushel]." At that rate, the short trip from Toledo to Cleveland, barely 100 miles, would have grossed the tidy sum of \$2,100 for a few days work. When the SMITH MOORE was put into the ore trade during the next years, it averaged seven round trips every 60 days between Marquette and Cleveland, hauling 1,400 tons of ore at the rate of about \$1.50 per ton. This would have resulted in gross earnings of the same \$2,100 figure for a trip of six or eight days and about 1,200 miles (round trip). Unlike most of the other big bulk freighters of that era, the SMITH MOORE does not appear to have towed a consort barge during most of its service.

The ship's career was marred by few accidents, although it was reported in occasional groundings, but those befell every vessel in the industry in those days. It was slightly damaged by a fire while unloading cargo at Sandusky, Ohio, on September 6, 1884. According to the Marquette Mining Journal of that date, "she escaped by wetting down her cabins and cutting away the mizzen rigging." The boilers were overhauled at Marquette during the winter of 1886-1887, but there are no records of other, more extensive repairs to the ship.

On July 13, 1889, SMITH MOORE was maneuvering cautiously in heavy fog east of Grand Island, bound down the Lake with a cargo of 1,743 tons of ore. At 4:30 in the morning it encountered the upbound freighter JAMES PICKANDS, and the two collided in spite of



0 10 20 30 40 FEET

PETE LINOQUIST, 1988

Fig. 4.7. The SMITH MOORE's deck arrangement.

attempts to change course. Capt. Charles Ennis of the PICKANDS was interviewed at Marquette following the collision:

I was on the bridge myself. The weather was very thick, and I kept fog signals going regularly. It was about 4 o'clock and we were ten miles East of Grand Island. I heard another vessel making signals, but could not locate her until I saw her about 250 feet off, almost directly ahead. The lookout on the SMITH MOORE saw the PICKANDS at the same time and signalled starboard. The PICKANDS obeyed promptly, but the SMITH MOORE was heavily loaded. The boats struck a glancing blow and passed by. I checked down and waited to hear from the SMITH MOORE, but she made no signals, and I supposed her injuries to be slight and continued on my run (Duluth Evening Herald, July 16, 1889).

The JAMES PICKANDS was practically unhurt in the collision, but the SMITH MOORE was mortally wounded. It had been struck a solid blow to the starboard bow, and it was immediately obvious that the steamer would flood. Capt. James Morrison began blowing distress signals as he headed the heavily-laden craft for shore. The wooden steamer M.M. DRAKE found the MOORE at about 8 a.m. and took the crippled ship in tow for the harbor at Munising, hoping to beach it in shallow water. As the DRAKE and the MOORE rounded the east point of Grand Island at 10 a.m., nearing the safety of Sand Point, the injured freighter began swamping, and the DRAKE hastily removed the MOORE's crew and cast loose the tow line. The SMITH MOORE drifted slowly past Sand Point and plunged to the bottom with a rush of escaping air, blowing off the cabins as it disappeared beneath the surface (Marquette Mining Journal, July 15, 16, 19 and 10, 1889).

Commercial salvagers visited the SMITH MOORE wreck site early in September. Diver John Quinn carefully examined the ship and reported 103 feet of water at the bow and 95 at the stern, with the hull in good condition except for the collision damage. No attempt was planned for raising the ship that fall, and the owners made plans to purchase another ship instead (Duluth Evening Herald, September 9, 1889). The MOORE's cargo of soft, pasty ore made salvage impractical.

Site Description and Analysis

Today the SMITH MOORE lies exactly where it plunged to the bottom in 1889, but shifting sand has built up in great drifts around the wreck and much of the hull is buried. The sand has risen about 10 feet in the area of the ship's bow and more than 20 feet around the stern. The engine room is full of sand to a level about 18 inches above the main deck, obscuring some of the most interesting details of the site. The vessel's massive iron rudder and propeller, once easily observed and much photographed, are now buried deeply in sand. The three masts lie alongside the ship, similarly hidden beneath the swirling sand.

The cabins were all wrecked when the ship went down, but most of their outlines can still be traced where the sills and framing define their shapes and arrangements, both fore and aft. The SMITH MOORE had a fireproof iron enclosure around the boilers, and that still stands above the deck at the stern, pierced by an enormous opening at the top for the missing smokestack. The hull has some damage at the bow. The deck is caved in, both at the bow and amidships on the starboard side, but the remainder is intact. The deck is pierced by six cargo hatches and three small companionways, plus the engine-trunk aft of the boiler-house. Most of the deck openings can be penetrated with safety, although there is little but sand to see inside the wreck.

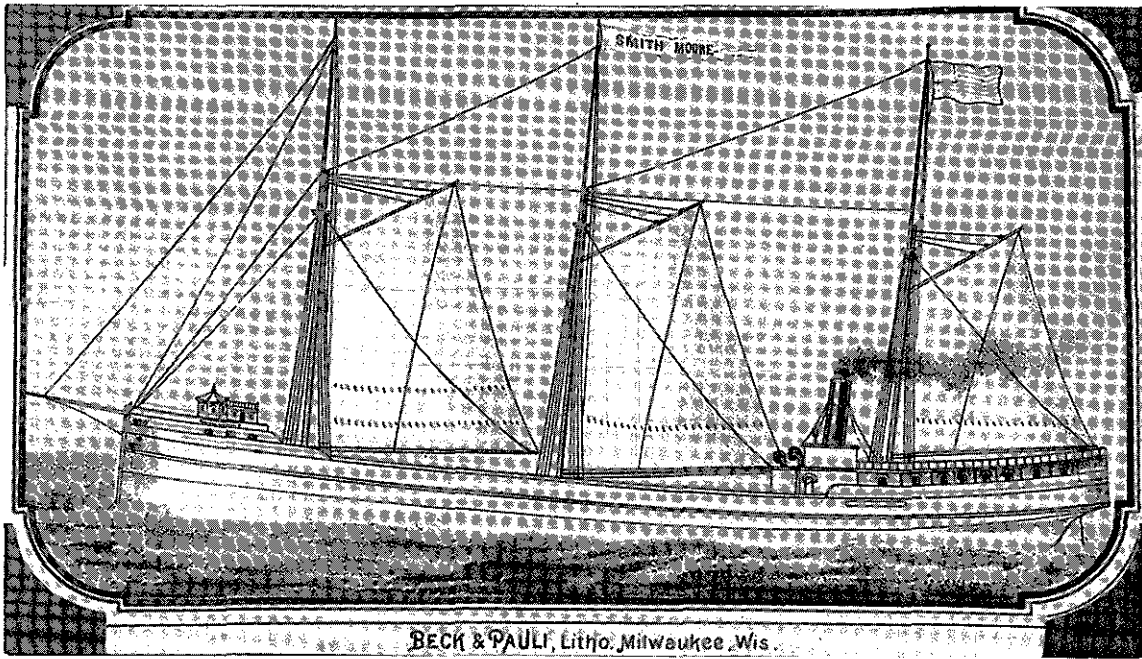


Fig. 4.8. A contemporary lithograph illustrates the silhouette of the SMITH MOORE. Canal Park Museum Collection.

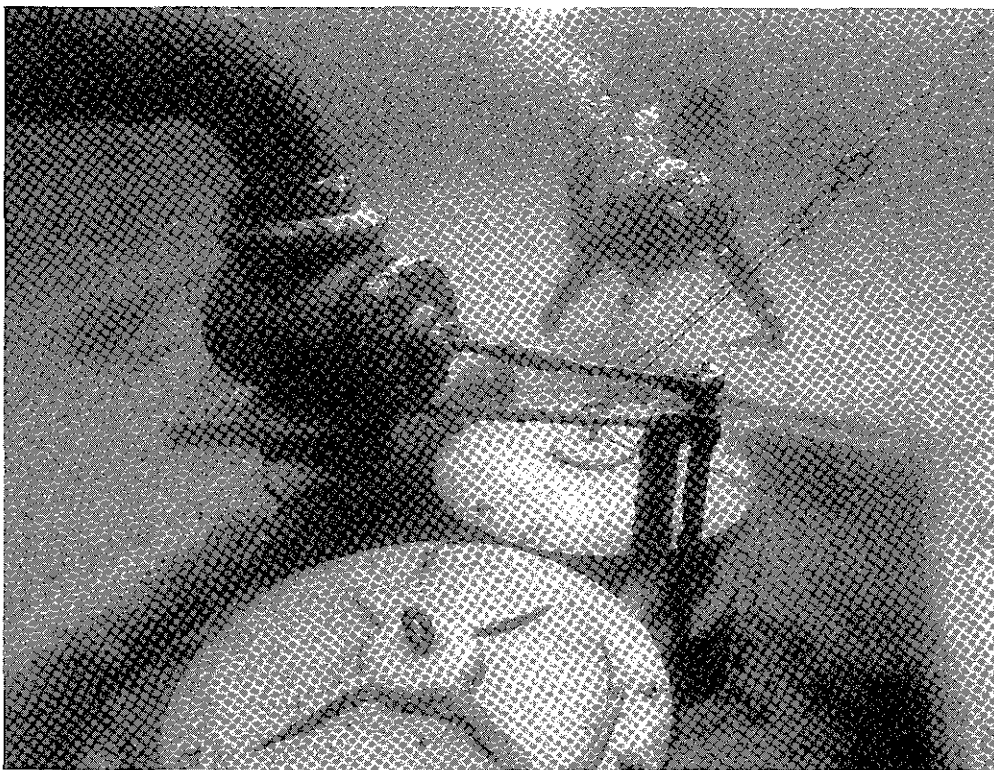


Fig. 4.9. The steamer's two-cylinder engine projects above the spar deck; the throttle valve is on top. NPS photo by Michael Eng.

Deck equipment, including steam winches, capstans, mooring bitts, pinrails, pumps, boom saddles and tackle, may all be seen in place. Lighter rigging, tools and equipment have been pilfered and removed. The ship's 3,000-pound anchors were removed some years ago, but most of the chain is reportedly still in the bow.

Much of the SMITH MOORE wreck still remains to be examined and documented in a systematic manner. None of the structural details described in the 1880 newspaper articles has yet been observed because of the accumulated sand and, as far as is known, the arrangement and equipage of the engine room has never been established nor recorded. The structural integrity of the hull makes it a valuable source of technological information, and we hope that further degradation of the wreck by natural processes or divers might be minimized.

MANHATTAN

Like the BERMUDA and the SMITH MOORE, the MANHATTAN is technically outside the boundaries of Pictured Rocks National Lakeshore, and yet it is so near that there are strong incentives for its study and interpretation by Park personnel. There are indications that portions of the wreck have drifted across the East Channel to the Sand Point area. Fragments have been observed occasionally within the Park, along with similar artifacts from the nearby HERMAN H. HETTLER wreck site. The main body of the MANHATTAN wreckage lies at LORAN coordinates 31648.3 and 47438.1, in water averaging 25 feet in depth.

History

The MANHATTAN, like the SMITH MOORE, was a wooden bulk freighter. Although built almost a decade later, it was considerably larger, and represents a distinctly more modern variant of the design. The MANHATTAN was a product of the Detroit Dry Dock Co. yards in Detroit, Michigan, and was built in 1887 for the Inter Ocean Transportation Co. of Milwaukee. Its measurements and configuration were similar to the SMITH MOORE, but the MANHATTAN employed much more ironwork in the structure, a distinctive change seen in the mid-1880s. According to the ship's original document (Temporary Enrollment No. 64 issued at the port of Detroit on April 12, 1887), it had two decks and three masts. It was 252.4 feet in length, had 38.0 feet of beam and 19.4 feet depth of hold, and measured 1,545.70 gross tons and 1,102.74 net tons. The ship was given U.S. official No. 91905. It was powered by a two-cylinder "fore and aft" compound marine engine from the Dry Dock Engine Works of Detroit, with 28- and 48-inch cylinders and a stroke of 40 inches. Rated at 980 horsepower, steam was furnished by two firebox boilers 9 1/2 by 14 feet (Great Lakes Register, 1899). The ship's wooden hull was reinforced with a network of diagonal steel straps that crisscrossed the stout oak frames. The MANHATTAN was provided with a steel boiler house, steam pumps, electric lights and a steam windlass, largely innovations of the 1880s.

Along with the MANHATTAN, the Inter Ocean fleet operated the big wooden steamers MASSACHUSETTS, MERRIMAC, MINNESOTA and MONOHANSETT, as well as three large consort-barges. They hauled all sorts of bulk cargoes, including grain, salt and iron ore, but they ran most frequently in the Escanaba (Michigan) and Cleveland iron ore trade. The MANHATTAN boasted a capacity for 2,000 gross tons of ore or 70,000 bushels of grain. Some of the principal officers and shareholders of the Inter Ocean Transportation Co. held interests in the railroads and ore properties north of Escanaba, and so it is natural that they ran largely out of that place. The firm had a reputation for modern, efficient and well-maintained ships, and they were also among the first Lake carriers to

adopt the use of steel in vessel construction. The MANHATTAN made good use of steel in reinforcing the wooden frames. Two years after its construction, the fleet ordered a "composite" steamer, the MANCHESTER, built with steel framing and wooden planking. In 1890 the company built the all-steel MARYLAND. Indeed, the firm became so committed to steel ships that it elected to sell off all its wooden ships in 1898, when it disposed of the MANHATTAN and three running-mates to the J.C. Gilchrist interests of Vermillion, Ohio for the modest total of \$70,000. The MANHATTAN alone was evaluated at \$55,000 at the time (Inland Lloyds Vessel Register, 1901). The firm was incorporated as the Gilchrist Transportation Co. of Mentor, Ohio in the spring of 1903, and permanent enrollment No. 129 was issued for the MANHATTAN at the port of Cleveland April 18, 1903.

The big ship served the new owners as efficiently as the original ones, but the MANHATTAN's career was brought to an abrupt end by an unfortunate accident on the night of October 25, 1903. The ship was downbound from Duluth with a heavy cargo of grain when it ran into foul weather and ran in behind Grand Island to lie at anchor overnight. The wind apparently died down around midnight and the steamer got underway again, but the steering chain broke as it threaded between the Island and the tip of Sand Point. The MANHATTAN swung to port and ran into the rocky bank of the Island about halfway between Sand and Trout Points. When the ship struck the shoal, furniture and stores were thrown across the decks, dishes, tools and tackle were dumped from cabinets and shelves, and a kerosene lamp was upset, starting a fire in the after cabins. When the fire was discovered, it was already too late to get it under control, and the crew was forced to abandon the ship while it burned to the waterline (Duluth News-Tribune, October 28, 1903).

Historian Frederick Stonehouse observes that the Gilchrist fleet suffered no fewer than seven vessel losses during the 1903 season (Stonehouse 1983:44), all old wooden ships. The newspapers hinted that Gilchrist stood to reap considerable insurance proceeds from the losses (Marquette Daily Mining Journal, October 28 and 29, 1903), as all of the craft were insured, while it was not typical for the company to carry any insurance at all! Inasmuch as the fleet included 57 steamers and 14 barges in 1903, most of them older wooden craft, the 1903 losses may not be entirely surprising (The Little Red Book, 1903). The MANHATTAN's official papers were surrendered at the Cleveland Customs Office on December 18, 1903.

The charred wreck of the MANHATTAN lay just outside the channel, and although some of its machinery and tackle were removed easily, the hulk could not be removed without considerable expense. In the summer of 1910, the federal government finally arranged for its removal along with another wreck at Vermillion Point:

Work will be started immediately upon the removal of the MANHATTAN and HURLBURT, which for many years have been a menace to mariners. Contracts were awarded yesterday by the local officials of the United States Corps of Engineers to Thomas L. Durocher of Sault Ste. Marie, Michigan, for the work . . . which must be completed before August 31.

For removal of the MANHATTAN, which was sunk at Grand Island about eight years ago, he will receive \$1,900 . . . The sunken vessels have been causing considerable trouble for the boats which have had to pass these points (Duluth Herald, July 30, 1910).

Little is recorded about the nature of the salvage on the MANHATTAN wreck, but it appears that Durocher stripped the burned-out hulk of all its ironwork and debris and simply knocked down the sides; the hull was never actually removed.

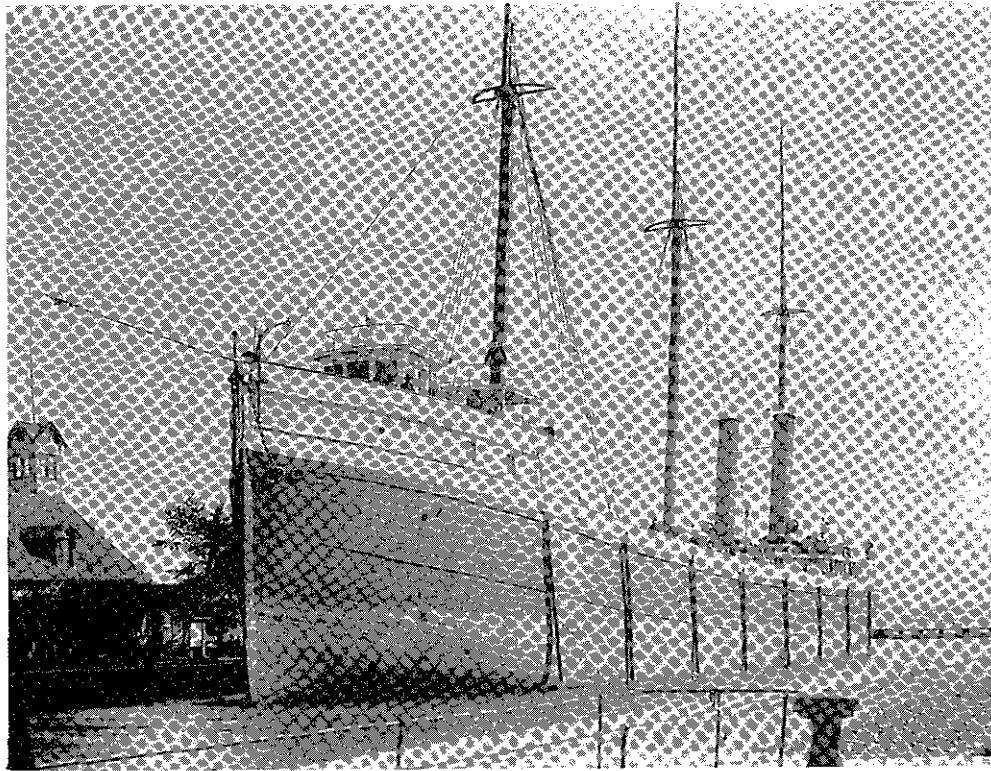


Fig. 4.10. In its original silhouette, the MANHATTAN sported three masts and two stacks. Milwaukee Public Library Collection.

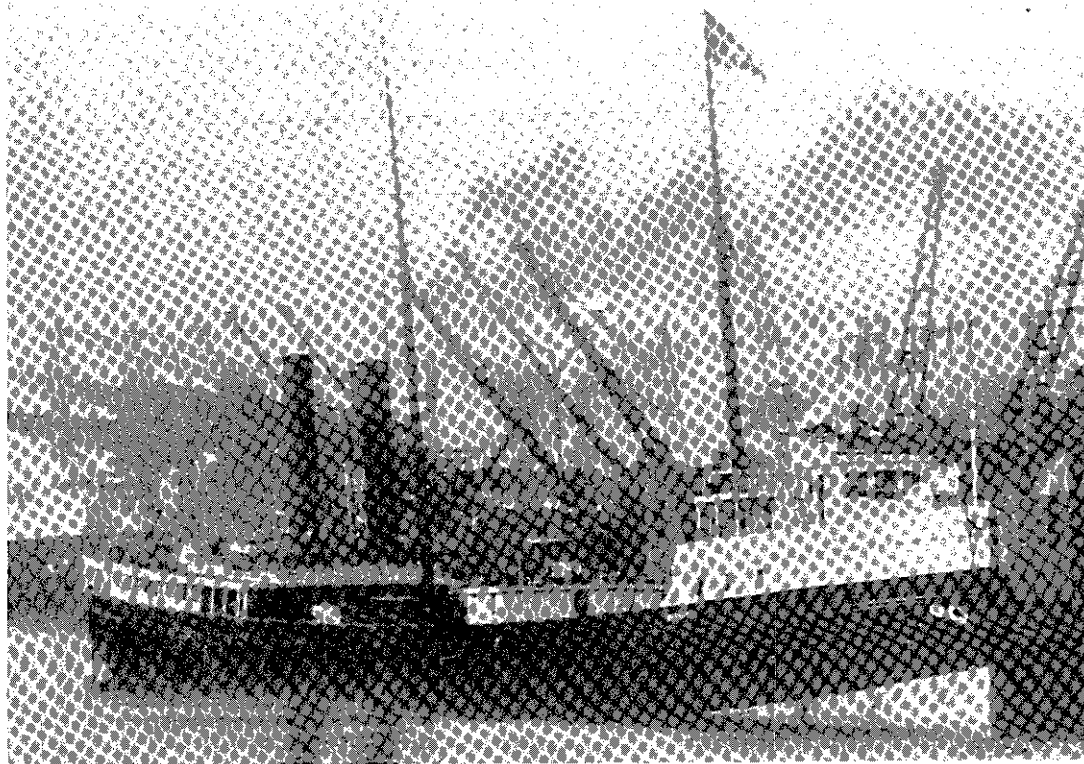


Fig. 4.11. The MANHATTAN was still a handsome steamer with Gilchrist colors and a reduced rig. University of Detroit Marine Collection.

Site Description

Divers report the ship's bottom, with its great longitudinal keelsons, is still largely intact. It is lying on a rocky shelf in about 20 feet of water, surrounded by boulders and beds of gravel. Sections of the sides lie scattered nearby, along with piping and iron work, davits and machinery parts. The engine and boilers are gone, as well as anchors and chains, auxiliary machinery and deck equipment. The huge rudder, however, still lies amidst the wreckage. It is not known whether the machinery was salvaged by the Gilchrists, or later by Durocher.

HERMAN H. HETTLER

The last of the four wrecks outside Pictured Rocks National Park is the HERMAN H. HETTLER, a fragmented wooden ship in water varying from 15 to about 40 feet just inside Trout Point at the southeast tip of Grand Island, at LORAN position 31632.2 and 47431.4. The wreck lies about a half-mile south-southwest of the bell buoy at Trout Point.

History

The HETTLER, originally called the WALTER VAIL, was built at West Bay City, Michigan in 1890 by James Davidson and Co. for the firm of Campbell and Cook of Michigan City, Indiana. With one deck and three masts, it was a wooden steambarge or "lumber hooker" and one of the largest of the type; it carried U.S. official No. 81263. The WALTER VAIL measured 200 feet in length, 35 feet beam, 13.3 feet depth, 726.33 gross tons and 641.58 net tons. Temporary enrollment No. 153 was issued at the port of Port Huron on May 23, 1890. The owners were listed as Campbell and Cook of Michigan City, Indiana, one-half interest, and Boyce Brothers of Muskegon, Michigan, one-half interest.

The ship was built of oak and heavily reinforced. Besides particularly heavy framing, it had steel arches in the sides, diagonal steel strapping, and special reinforcing in the bow for navigating in ice (Great Lakes Register, 1899). It was powered by a fore-and-aft compound steam engine with 22- and 42-inch cylinders with a 40-inch stroke, rated at 485 horsepower, and a firebox boiler 9 1/2 by 16 feet. The steamer was valued at \$80,000.

The VAIL regularly carried lumber, about a million board feet or 1,200 tons of it, and towed the 200-foot barges BALTIC and ADRIATIC. It often carried coal, grain and salt, as well as lumber products, and was a fine money-maker for the owners. The ship changed owners in 1893, when Henry J. Pauly of Milwaukee bought a controlling interest; he became sole owner in 1903. Four years later Pauly sold the ship to J.A. Calbick of Chicago. The steamer went through some physical changes, in 1896 and 1904. In the spring of 1913, the VAIL was sold to the Herman H. Hettler Lumber Co. of Chicago. Permanent enrollment No. 274 was issued at the port of Chicago April 15, 1913. The VAIL was rebuilt at the shipyard in Milwaukee and renamed the HERMAN H. HETTLER. The steamer changed hands one more time when it was purchased by the Wenonah Transportation Co. of Michigan City, Indiana in 1923. For the remainder of the HETTLER's career, it was managed by O.W. Blodgett of Duluth, an old hand in the lumber business.

The HERMAN H. HETTLER piled up on the reef inside Trout Point during a snowstorm on the night of November 23, 1926. It was attempting to get in behind Grand Island to

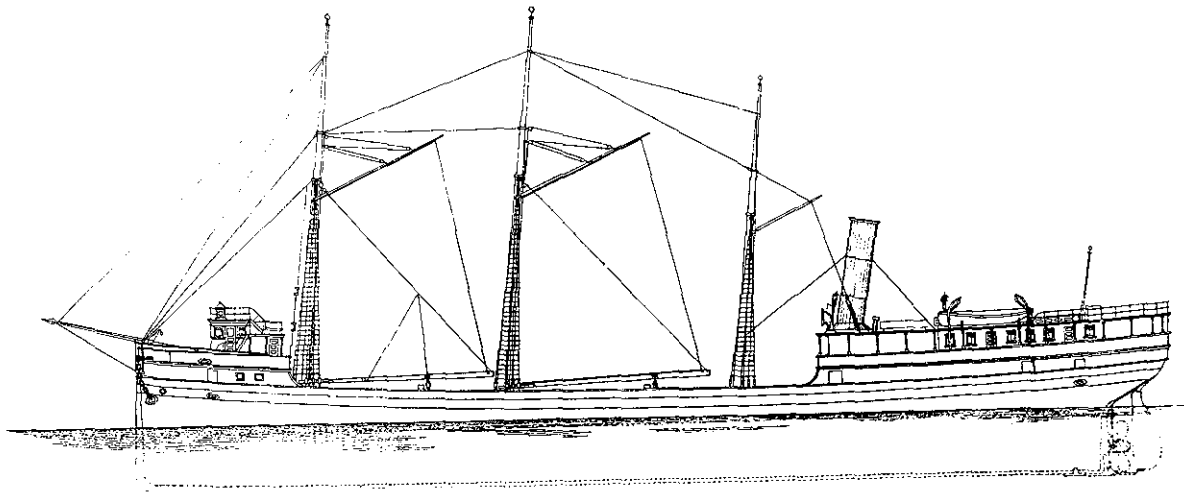


Fig. 4.12. The original profile of the WALTER VAIL is based on builder's plans. Historic American Merchant Marine Survey.

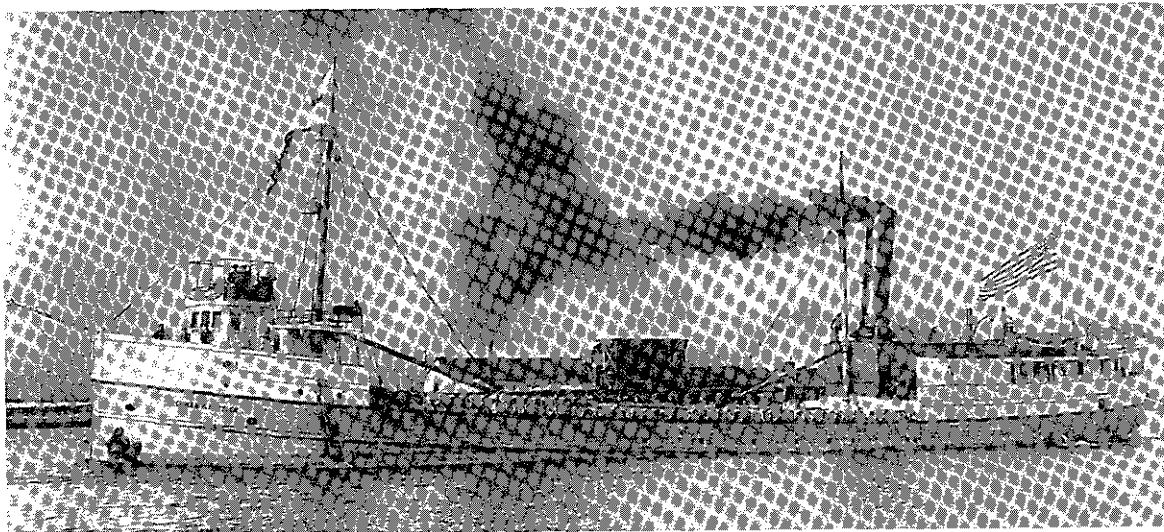


Fig. 4.13. The HERMAN H. HETTLER carried salt as well as lumber and coal cargoes. Milwaukee Public Library Collection.

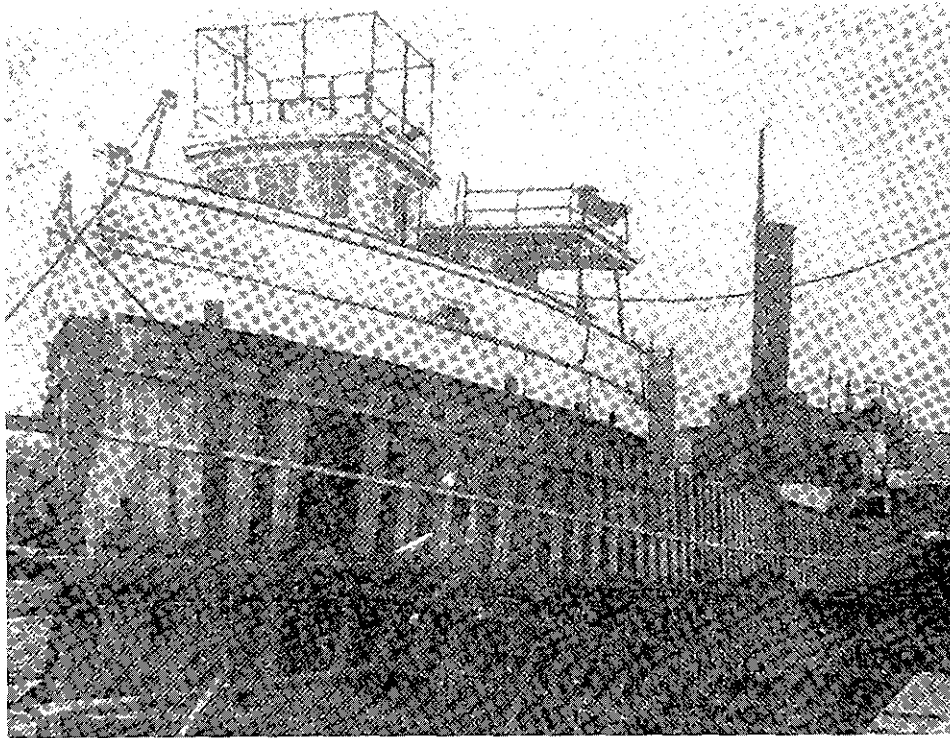


Fig. 4.14. The HETTLER is pictured receiving new frames during a 1913 rebuilding. Canal Park Museum Collection.

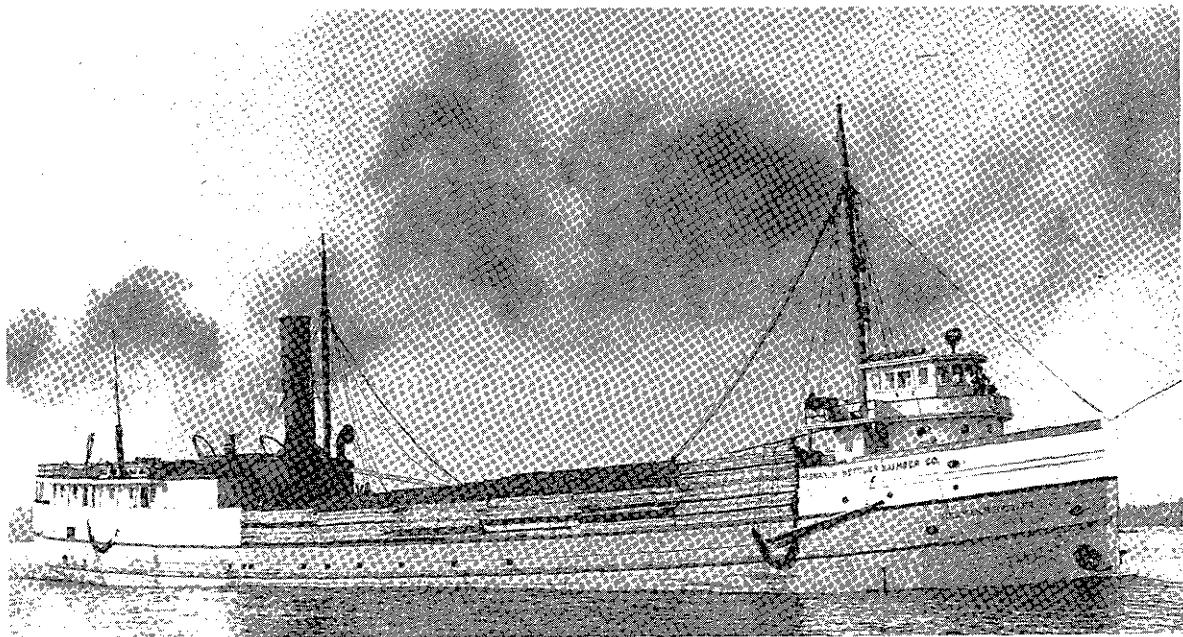


Fig. 4.15. During the last years, the HETTLER sported a modernized cabin and shortened spars. Milwaukee Public Library Collection.

shelter during inclement weather and high seas, when the ship's master, Capt. John M. Johnson, misjudged his position in the driving snow and ran onto a rocky shoal. The ship pounded badly during the night and opened up several bad leaks. In the morning, the crew got off in the lifeboats and were towed into Munising by the fishtug PREBLE. Before the HETTLER could be pulled free of the reef, a storm blew up on November 26, and the ship began going to pieces. The stern broke up in the 36-hour northwester, and the entire upper works was demolished. As a result, the ship was officially abandoned (Munising News, November 26, 1926, December 23, 1926). The HETTLER had been bound from Ludington, Michigan to Duluth with 1,100 tons of edible salt when it wrecked. The ship's documents were surrendered on January 17, 1927 with the notation . . . "Stranded Nov. 23, 1926, Grand Island, Lake Superior; 15 persons on board, no lives lost. Total loss."

Site Description

According to historian Frederick Stonehouse, the ship's hull was dynamited several years after the accident by the Coast Guard, and an examination of the site tends to substantiate that fact. The ship's heavy framing is ripped apart and scattered over several hundred feet of the bottom, and machinery parts and steel reinforcing lie everywhere. The hull shows clear signs that it did not disintegrate naturally, but was deliberately taken apart. Framing elements were not pulled apart as seen in most wrecks, but rather broken into sections.

Some relics of the HETTLER wreck may be seen at the Pictured Rocks Park Service headquarters in Munising. The ship's rudder and steering quadrant are displayed there, along with a section of the bulwarks from the starboard bow of the vessel. The rudder is carefully crafted and powerfully built with white oak 12 and 14 inches thick. A 56-inch tiller is attached. The quadrant has been separated from the rudder stock, but it is otherwise undamaged. The bulwark, measuring 6 by 8 feet, has distinctive features that may be readily seen in historic photographs of the HETTLER. Local residents recall sections of the ship's hull and decking lying in the shallow water around Sand Point for a few years after the wreck, and some of the clear pine decking was used to build a small warehouse by local fishermen (Paul Van Landschoot interview, April 25, 1989).

Pictured Rocks National Lakeshore

MARY M. SCOTT

The first or westernmost of the Sand Point or "SANDPIPER" wrecks is the bottom of a schooner or barge laden with iron ore. The wreck lies in about 15 feet of water 500 yards east of the Sand Point buoy and about 500 feet off the beach at the Point. It rests on a flat bottom with shifting white sand at position 46⁰27'54" north and 86⁰36'37" west.

History

The identity of this wreckage has never been clearly established. Local tradition among sports divers has been to use the fictitious name "SANDPIPER" for the Sand Point sites, assuming that the two or three different sections of wreckage represented portions of a single unidentified ship. Historian Frederick Stonehouse suggested that the wreck might be the schooner F. MORRELL, a canal built in 1866. He said:

The 144-foot, 369-ton schooner was downbound from Marquette with a cargo of ore when she was reported lost on a reef near Grand Island. The

loss of schooner and cargo was placed at \$23,000. The following year the small steamer J. K. WHITE worked on the wreck, removing her gear and part of the cargo. The schooner was apparently never recovered, as what is believed to be her remains are located in shallow water on the Sand Point Bar (Stonehouse 1983:19).

Stonehouse later cited a Marquette newspaper article that established the location of the MORRELL wreck on the other side of Grand Island, far from Sand Point (Frederick Stonehouse personal interview, February 19, 1989).

Julius F. Wolff Jr. mentions "a schooner SCOTT sunk near Grand Island" in 1870, with the following footnote:

There is a good deal of confusion in the records regarding the SCOTT wreck. National Archives T-729 ("Marine Casualties on the Great Lakes, 1863-1873," from Records of the U.S. Coast Guard) lists a schooner G.W. SCOTT stranded at Grand Island in August 1870 with nominal damage; Marquette Mining Journal, November 11, 1887, in its list of all Grand Island total losses notes a schooner MARIEN SCOTT; Munising News, October 21, 1921, cites a schooner MAY SCOTT sunk there in 1871. The Munising story described removal of the hulk by the Coast Guard. It appears we can be sure that a schooner named SCOTT was lost at Grand Island, but the exact name is unclear (Wolff 1979:20, 149).

In a chronological list of accidents in the Munising area, Stonehouse also refers to an 1870 incident when a schooner "G.W. SCOTT (was) stranded on Grand Island with little damage," undoubtedly based on the Coast Guard records in the National Archives, which are also cited in the Wolff book (Stonehouse 1983:66).

In fact, the "Sand Point West" wreck is probably the two-masted schooner MARY M. SCOTT, which went ashore on November 2, 1870, and went to pieces about 10 days later. The 1921 article in the Munising papers was nearest the truth. Local traditions must have preserved the identity of the wreck, although those memories have faded, and the name was forgotten. Like the BERMUDA and the F. MORRELL, the MARY M. SCOTT was a canal schooner. The MARY M. SCOTT was built at Conneaut, Ohio by Otis De Wolf. It was built for the firm of Hearn and Scott of Erie, Pennsylvania, along with the similar schooner M. COURTWRIGHT. Hearn and Scott, coal dealers, operated six schooners on the Great Lakes (Lake Vessel Registers, 1860, 1863, 1866). It appears from scant information contained in arrivals lists that the company's vessels were engaged in the general cargo trades on Lake Erie, carrying coal out of Erie, and a variety of other cargoes to Oswego or Buffalo from Cleveland, Toledo, Detroit and lesser Lake Erie ports. A large part of its eastbound trade was lumber. Hearn and Scott had the large steambarge OAKLAND built for them in 1868 for the lumber and coal trades.

The MARY M. SCOTT was named for the wife of one of the owners, and it was enrolled in the Presque Isle Customs District at Erie, Pennsylvania on June 12, 1857 with permanent enrollment No. 14; the official number was 16424. The length was 138.6 feet, breadth of beam 26.6 feet and depth 11.8 feet. The tonnage was originally listed at 361 tons, according to the style of measure employed between 1790 and 1864, and afterward 243.36 gross tons; this did not reflect some change in the ship's design, but simply the adoption of a new system of measurement used after 1864. The SCOTT was evaluated at \$11,400 and rated "A1" in 1860 (Lake Vessel Register).

In the spring of 1866, Hearn and Scott sold the schooner to Wiley M. Egan of Chicago, Illinois. Permanent enrollment No. 12 was issued at the port of Chicago, July 10, 1866,

and A.M. Graves was appointed master. The ship was valued at \$7,500 at the time (Lake Vessel Register, 1866). Egan had several schooners and barks in the Lake Michigan lumber and grain trades from about 1860 until after the turn of the century. In the 1890s he acquired two or three large wooden steamers (vessel and owner files, author's collection).

The MARY M. SCOTT changed hands one more time, when it was bought by P. Taylor and others of Chicago in May 1870. Permanent enrollment No. 225 was issued at the port of Chicago on May 21, 1870, and Andrew McNail became the master. The schooner ran into problems early in the summer of 1870 when it suffered storm damage at the foot of Lake Michigan, "STORM ON GREEN BAY - The Green Bay Advocate says that Capt. H.B. Faith of the schooner WINIFRED [sic] SCOTT reported that he saw off Chambers Island after the storm, the schooner MARY M. SCOTT, with her foresail and three jibs carried away . . ." (Milwaukee Sentinel, July 2, 1870). Before the season was out, the ship would encounter far more serious difficulties. The Marquette Daily Mining Journal of November 5, 1870, reported the clearance of a schooner "W.W. SCOTT" on October 31 with 395 tons of ore, bound for Erie; the article undoubtedly referred to the MARY M. SCOTT.

The Marquette papers made no further mention of the SCOTT, but the Milwaukee Sentinel carried the following story on November 9:

SUPERIOR - The schooners MARY M. SCOTT and ATHENIAN attempted to make the harbor at Grand Island during the gale on the night of the 2nd, but were driven ashore. The ATHENIAN, it is stated, can be gotten off in good condition. The SCOTT is broken in tow and rapidly going to pieces. The SCOTT measured 361 tons, rated B1, and was valued at about \$10,000. She was built at Erie in 1857. She is owned by Peter Taylor of Chicago, who has her insured for \$6,000, equally divided between the Merchants of Chicago and the National of Boston.

Three days later the same correspondent reported:

FOND HOPES BLASTED - Messrs Wolf & Davidson, our leading shipbuilders, were engaged in preparing an estimate on the cost of rebuilding the schooner MARY M. SCOTT when the intelligence of her total loss was received . . . (Milwaukee Sentinel, November 12, 1870)

Two days afterward, the paper confirmed the ship's fate with the cryptic statement, "GONE TO PIECES . . . the schooner MARY M. SCOTT, ashore on Grand Island, Lake Superior" (Milwaukee Sentinel, November 14, 1870). The Toronto Mail (November 18, 1870) picked up the news as well, "Milwaukee - The schooner M.M. SCOTT, ashore at Grand Island, Lake Superior, (has) broken up entirely."

The ATHENIAN was evidently freed without serious problems. There was no further reference to the ship in succeeding articles, and it continued in service for another ten years. The SCOTT's accident most likely did not involve any injuries to the crew, or that, too would have appeared in the paper. It does seem likely that at least some of the SCOTT's cargo and part of its outfit were salvaged in spite of the lack of newspaper coverage, just because the wreck was so accessible. The spars, rigging and tackle would have been well worth the effort, and the iron ore had substantial value, probably exceeding \$5,000.

Site Description and Analysis

The appearance of "Sand Point West" wreck is entirely consistent with a canal schooner's description. The wreckage lies in a single body, although portions of it are buried in sand. Because the sand tends to shift at the site, the wreck covers and uncovers alternately, depending on weather conditions and resultant currents. The wreck is at least 100 feet long, stretching from the after deadwood to a point forward of the centerboard box, where the sand obscures further remains. Most of the stern is under the sand, although the deadwood and sternpost project several feet from the bottom, and may be seen easily from the surface as a dark mass about 6 feet square. Maximum width of the wreckage is 23 feet 4 inches.

The exposed portion of the deadwood measures roughly 10 feet in length, 6 feet in height, and 3 feet wide at its widest point. It rises from the centerline keelson to support the vertical sternpost, most of which is still attached. Construction of the deadwood is very simple, even crude by most standards. It consists of several wedge-like pieces stacked one upon another, instead of the more common interlocking elements. Several strakes of planking are still attached, one of which bears traces of green paint over a layer of white.

About 20 feet from the deadwood, a 23-by-83-foot section of ship's bottom is exposed. The section of hull includes keelsons, frames, bottom and ceiling planking, centerboard trunk, and a few tons of silvery, crystalline ore. A mast-step may also be seen at the after end of the centerboard box, and there is a length of 1 1/2-inch round iron rod with a 3-inch eye in the end, lying about one-third of the distance between the mainmast step and the aft deadwood. Although the rod disappears into the sand, it seems to be attached to the vessel's centerline keelson. The centerboard box measures 23 feet in length, and it is offset to the port side of the centerline.

The iron ore found with the ship's remains was sampled and found to be a hard, Bessemer specularite from the famous Republic range west of Marquette, one of the upper peninsula's oldest and richest mine groups (George R. Spencer of Duluth, personal interview March 12, 1989). The ore could only have been loaded at Marquette.

The configuration of the ship's keel assembly is poorly understood because little of the structure is exposed. The compacted nature of the sand and fragmented iron ore in the lower portion of the hull prevents easy removal, and so it is very difficult to expose and examine the keelsons, although the layer of sand and ore covering them is not deep. The ship's frames are 10 inches wide and from 8 inches deep at the turn of the bilge to 12 or 13 inches at the centerline. They are made up of double futtocks in the customary fashion. Frame spacing is 22 inches. Planking is 2 1/2-inches-thick inside and out, with 4 1/2-inch strakes in the ceiling at the turn of the bilge for longitudinal strength. Fastenings are 5/8- and 3/4-inch round iron and 3/8-inch square nails. At the present time, no portions of the ship's sides have been found, nor any of the heavy forward deadwood assembly. Those portions of the wreck would have posed the most serious obstructions to boats, and so it is logical to assume that they were knocked down in the 1920s dynamiting. Portions of the ship's ore cargo may be seen distributed around the site, principally on the east side, showing the effects of blasting and ice movement.

Two artifacts found inside of Sand Point may be related to the MARY M. SCOTT. These are a wooden rudder on private property at a present-day hospital in Munising, just off Highway H-58, and a timber found on the beach just west of the National Park Service headquarters. The rudder is the size and configuration appropriate for a 145-foot schooner of the mid-19th century, measuring 5 feet in width and 21 feet in length. It

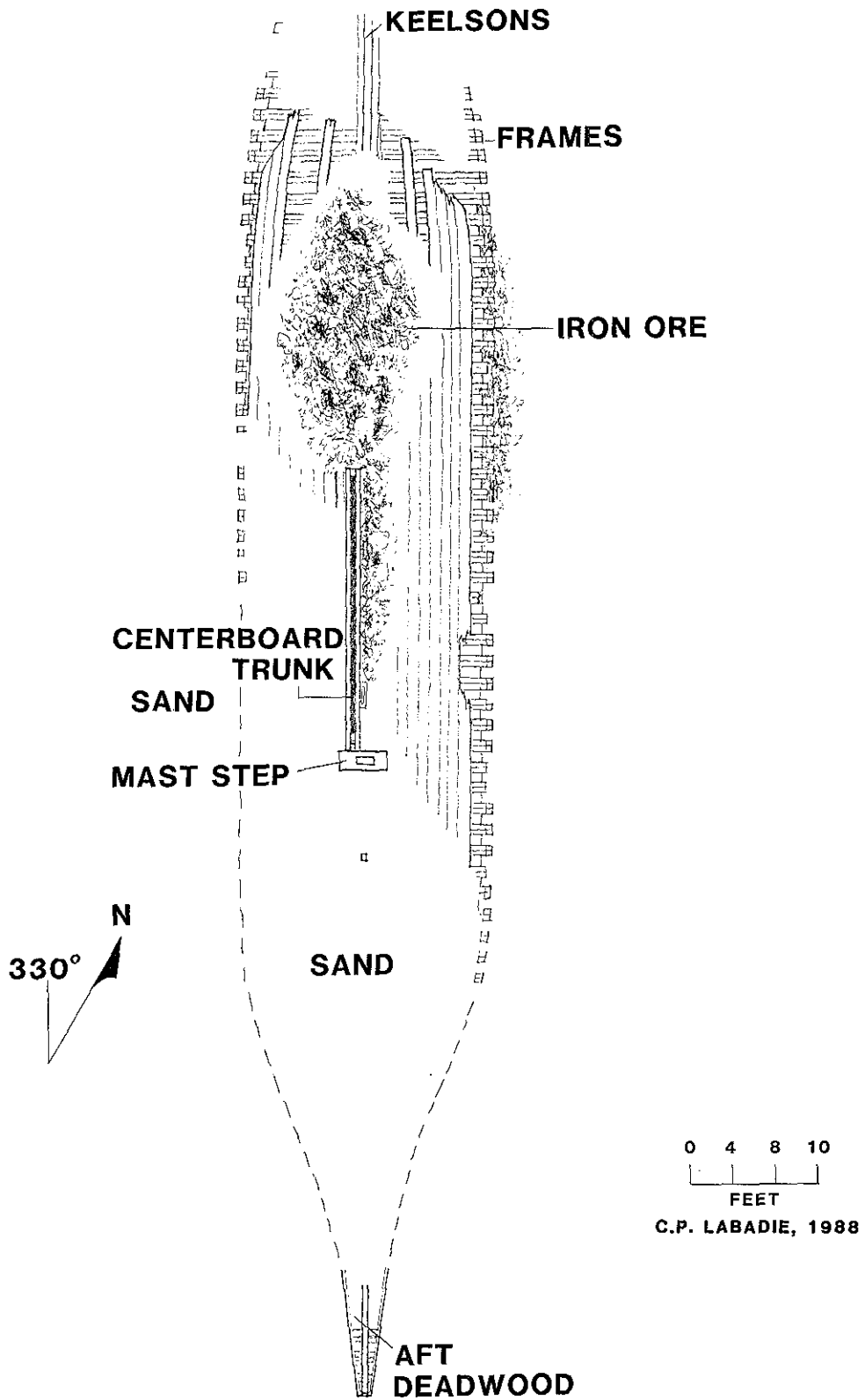


Fig. 4.16. MARY M. SCOTT site plan.

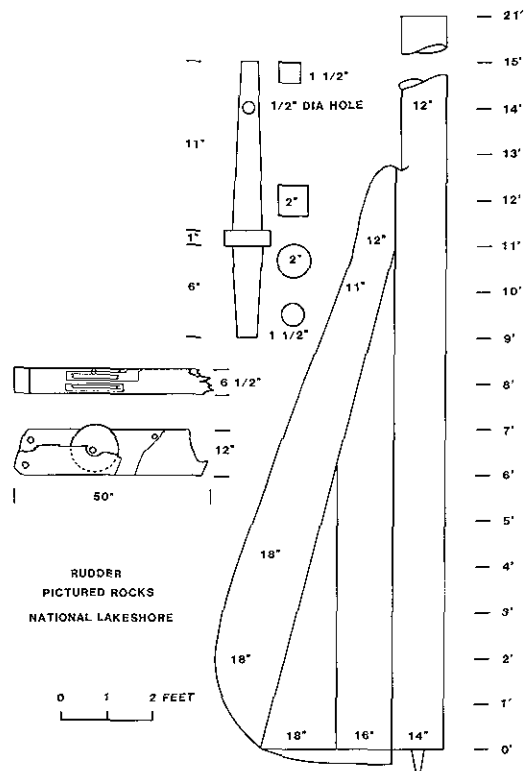


Fig. 4.17. MARY M. SCOTT rudder.



Fig. 4.18. The MARY M. SCOTT hull is broken forward of the centerboard trunk and iron ore lies all around the site. Photo by Ken Vrana.

shows the same unpretentious standard of construction demonstrated in the deadwood on the wreck. The rudder lies alongside the driveway to a private home, with a sapling birch tree growing through it. The small timber was found by alert Park Service personnel, and it is a schooner's cathead, a simple type of derrick used on the ship's bow to raise the anchor. It is 6 1/2-inches wide, 12 inches deep and 50 inches long, broken from a much larger piece, it is fitted with two 12-inch iron sheaves for the chain tackle, with a 7/8-inch iron shaft. The discovery of these two pieces leads to the conclusion that other wreckage from the SCOTT probably lies between Sand Point and the bayshore in the vicinity of the bathing beach (Ranger Fred Young, personal interview, August 8, 1988).

UNIDENTIFIED SCHOONER

The measurements of a wreck identified tentatively as "Sand Point East" suggest that it may be the remains of another canal schooner like the MARY M. SCOTT, but the only other craft of that description lost in the immediate area is the schooner-barge ELMA, which is believed to lie about a mile further east, close to Miner's Castle. There is a possibility that the "Sand Point East" wreck also represents portions of the ELMA, but that possibility seems remote because of the configuration of the two pieces of wreckage. The former consists of portions of the stern of a wooden schooner, and the latter is the bottom of a similar craft, representing nearly the entire length.

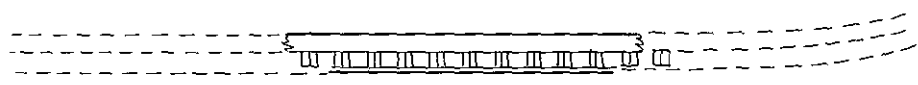
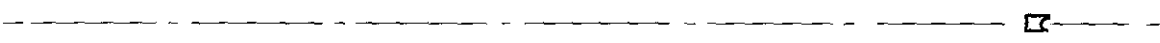
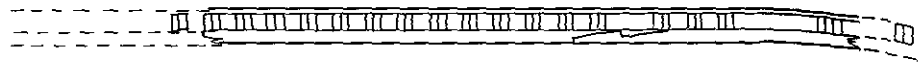
Site Description and Analysis

In the "Sand Point East" wreck, little more than the sternpost and portions of the two sides rise above the level of the sand, and even that is often covered by the sand. A large portion of the craft, if not the whole of it, evidently lies buried at the site, and could only be exposed by removal of a tremendous quantity of sand. The portion of the hull standing above the sand consists of the uppermost strake of the clamps, the shelves that support the deck beams, and the uppermost portions of the frames. One or two strakes of planking are on the outside surface. The top of the sternpost stands by itself about 20 feet away.

The exposed portion of the wreck is 26 feet wide and 54 feet long, representing the whole width of the ship, but little more than a third of its length. The frames are 6 inches deep and 9 inches wide at deck level, and spaced at 24-inch intervals (in contrast with the 22-inch spacing on the nearby SCOTT wreck). The clamps, which help support the deck beams, are 5 1/2 inches thick. Deck beams could not be found at the site, but their rabbets were 6 and 13 inches wide, spaced 3 feet apart. The shelves measured 5 by 12 inches. Portions of at least two knees were observed, but they could not be exposed sufficiently to obtain accurate measurements; spacing was on alternate deck beams, at about 72 inches. Fasteners were 3/4- and 7/8-inch round iron.

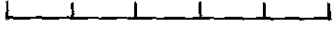
The sternpost stands 4 feet above the level of the clamps. It measures 12 inches across the tapers from 16 inches at the bottom to 12 inches at the top. The after surface is concave where it is hollowed to receive the rudder, and the curvature suggests a rudder stock of something less than 18 inches diameter.

A part of one iron chain plate was found well aft on the starboard side, suggesting a three-mast rig; in a two-master, the after (main) mast would have been located much farther forward. The chain plate is 1/2 inch thick and 3 1/2 inches wide, with 1-inch iron bolts; it is broken off at the level of the clamps.



UNIDENTIFIED SCHOONER

0 4 8 12 16 20



SCALE IN FEET

Fig. 4.19. Only the outline of the "Sand Point East" schooner is exposed above sand, showing sternpost, frameheads, and shelves.

MICHAEL GROH

A mile east of Sand Point and 3 miles west of Miner's Castle, there are two sections of wreckage in 10 feet of water. Like the MARY M. SCOTT, they are easily seen from the surface as dark masses against the light sandy bottom. The first section, lying about 300 yards from shore, is the stern and engine bed from a small steamer, without a doubt the steambarge MICHAEL GROH. The second piece is the remainder of the ship's bottom lying about 300 yards east of the unidentified "Sand Point East" wreck and 300 yards north of the stern and engine bed. The large hull section lies .2 miles (or about 400 yards) offshore and 1.5 miles northeast of the Sand Point buoy, at position 46°27'70" north and 86°75'87" west.

After wrecking near Miner's Castle in November 1895, the GROH was partially salvaged, and the remains were reportedly abandoned on the spot (ship files, University of Detroit Marine Collection). The two sections of wreckage fit the GROH's description. Historic accounts describe that the ship's hull broke in half at the boiler-house (Detroit News, November 25, 1895).

History

The MICHAEL GROH was an old vessel at the time it was wrecked, and had been through many accidents and rebuildings. The ship was built in 1867, among the very first ships of the class. The GROH was a steambarge or lumber hooker, especially designed to haul lumber and to tow loaded barges down the Lakes. These little steamers had powerful, tug-like engines, single decks and small cabins at the stern. After about 1880, they were usually built somewhat larger, and had their pilothouses on a raised forecastle. Steamburgages were the progenitors of the modern Lakes bulk-freight vessels, a very significant step in the vessel evolution process. Only eight or 10 steamburgages were built earlier than the GROH.

The GROH was built at Cleveland, Ohio by the respected firm of Quayle and Martin, for Thomas Manning and Michael Groh of the same place. It was not a large vessel, but measured 120.4 feet in length, 23.8 feet beam and 8.6 feet depth, and 174.15 gross tons. Permanent enrollment was issued at the Port of Cleveland, Ohio, on September 5, 1867. The GROH was awarded official No. U.S. 17572. The construction cost was \$15,000, and its capacity was 200,000 feet of lumber (Detroit Tribune & Advertiser, December 23, 1867).

No information has been found to date to describe the steamer's engine, but it was probably the simple and efficient high-pressure, noncondensing upright engine that was the mainstay of merchant steamers in that era; all that is known about it is that it was rated for 200 horsepower. It was undoubtedly coupled with a single, small firebox boiler.

The MICHAEL GROH served the lumber trade for almost 30 years, operating out of various ports as ownership changed from Cleveland to Milwaukee, Chicago, Michigan City, Sandusky and Milan (Ohio) over the years:

July 1, 1872

L.W. Nuttall of Manistee, Michigan	1/16
Wm.H. Gifford of Hudson, New York	8/16
Thomas S. Ruddock of Milwaukee	3/16

James H. Palmeter of Milwaukee and A.B. Leonard of Manistee	3/16 1/16
September 20, 1876	
Thomas S. Ruddock of Chicago	3/8
James H. Palmeter of Chicago	3/8
Azra B. Leonard of Manistee	1/8
and Lawrence W. Nuttall of Manistee	1/8
March 16, 1878	
James S. Wheeler of Chicago	
August 23, 1879	
Samuel K. Martin of Chicago	
September 26, 1888	
Henry W. Cook and A.D. Campbell of Michigan City, Indiana	
February 21, 1889	
Frank W. Harlow of Chicago	
March 13, 1890	
J.T. Johnson of Sandusky, Ohio	
March 5, 1895	
L.L. Stoddard of Milan, Ohio	1/3
and M.W. Lockwood of Milan	2/3

The ship ran principally from Saginaw Bay ports on Lake Huron from 1867 to 1872, and from Muskegon and Manistee on Lake Michigan during the 1870s and 1880s, hauling to Chicago. After 1890, the GROH worked largely on Lake Erie, but hauled cargoes wherever they could be found; it was also used on occasions as a wrecking steamer. The steambarge was extensively rebuilt at Muskegon, Michigan, in the winter of 1881-1882, at which time it was lengthened 20 feet, widened 2 feet and given a new boiler. The operation changed the length to 141.5 feet and the gross tonnage to 289.91. During its last year, the GROH was owned by Lockwood and Stoddard, as noted above (Enrollments from Records Group No. 41, U.S. National Archives, Washington D.C.).

The GROH loaded lumber at Marquette late in November 1895 and set out on November 21, with 325,000 board feet, bound for Cleveland. Just east of Grand Island, the little steamer's rudder broke from the shoe, and the ship was rendered helpless. A fairly heavy sea was running at the time, with the wind blowing out of the northeast, and the GROH drifted before it toward Pictured Rocks. The Detroit Free Press (November 22, 1895) described the events:

. . . the steamer fell into the trough of the sea. She rolled helplessly about, and her crew was unable to do anything to relieve her. The North wind drove her toward shore, and at 9 o'clock (November 22) she struck on the rugged shore. The heavy sea pounded the luckless boat onto the reef along the cliffs, and soon she filled, and sliding off the rocks sank in deep water. The crew had taken to the boats, and with difficulty made a landing on the bold shore. The spot where the GROH sank is near Miner's Castle, and in the same locality that the schooner ELMA was wrecked this fall. There was not nearly so much sea running today, or the crew could not have escaped . . . While the boat is badly battered, an attempt will be

made to raise her. She is an old boat, having been built in 1867. She is owned by J.T. Johnson of Sandusky and carried a crew of twelve men.

The Detroit Free Press of November 25, 1895 reported, "The steamer MICHAEL GROH is still grounded at Miner's Castle and has been abandoned to the underwriters." The Duluth Evening Herald also reported on November 25: The Gillette Towing & Wrecking Co. has closed a contract with the underwriters having the insurance on the lumber cargo of the steamer MICHAEL GROH to save all of the lumber possible. The wreckers receive two-thirds of the value of all saved, and it is thought that the greater part of the cargo can be recovered.

The Detroit Free Press went on on the November 29:

The tug CASTLE of the Inman Line of Duluth, left this evening to assist the tug F.W. GILLETTE in releasing the steamer MICHAEL GROH, ashore at Pictured Rocks. It is reported that the GROH was found intact, and not seriously damaged.

The Duluth Evening Herald of November 30 observed, "The northwest gale has broken up the steamer MICHAEL GROH, which is wrecked at the Pictured Rocks. The hull was previous to this storm, thought to be in good shape . . ."

The ship evidently sank to the deck after pounding on the rocky shelf west of Miner's Castle and at the time it was left by the crew, it was still intact. When the GROH was struck by the storm of November 30, the hull broke under the boiler, and any hopes of raising had to be abandoned. The salvors managed to recover 140,000 board feet of cargo, but the ship was a total loss, valued at about \$9,000 (Marquette Mining Journal, December 7, 1895). Historians William A. McDonald and Rev. Edward Dowling of Detroit assert that the ship's machinery was eventually salvaged from the site, but research has not been able to substantiate that fact, although the limited depth and easy access would certainly support its probability.

Site Description and Analysis

The remains found at the site consist of a two sections of ship's hull, one 15 feet long and the other 104. The smaller section includes the centerline keelson, frames, engine supports and bearing support block. At its forward extremity, the keelson slopes down into the sand bottom, so that the overall length of the wreckage cannot be established with certainty. The keelson measures 10 inches in width and 9 inches deep, and it is mounted on frames that are 10 inches wide and 9 inches deep as well, made up of double futtocks. In places the frames are tripled, so that they become 15 inches wide and 9 inches deep, spaced at 22-inch intervals, center to center; fastenings are 3/4- and 7/8-inch round iron, with 3/8-inch square nails used in the planking. Several irregular frames are spaced under the engine-mounts. Planking is 2-1/2 by 10-inch white oak, and the ceiling planks are exactly the same.

The engine-mount consists of two oak timbers 12 inches wide and 14 inches deep, running clear across the hull and resting on oak fillets of similar width. The engine was mounted on eight 1 3/4-inch threaded bolts, all of which are still standing and still intact; the threads are clean and undamaged, with no signs of the casting that made up the base of the engine. This is a clear indication of intentional and careful removal by salvors. Smaller (1 1/8-inch) threaded bolts were used for other, lesser machinery, such as the thrust-bearing. A number of bolts, nuts and hand tools lie in the bilge between the frames, either remnants of the ship's active working days or of the salvage work after sinking. The existence of these artifacts in clear view and in such shallow water

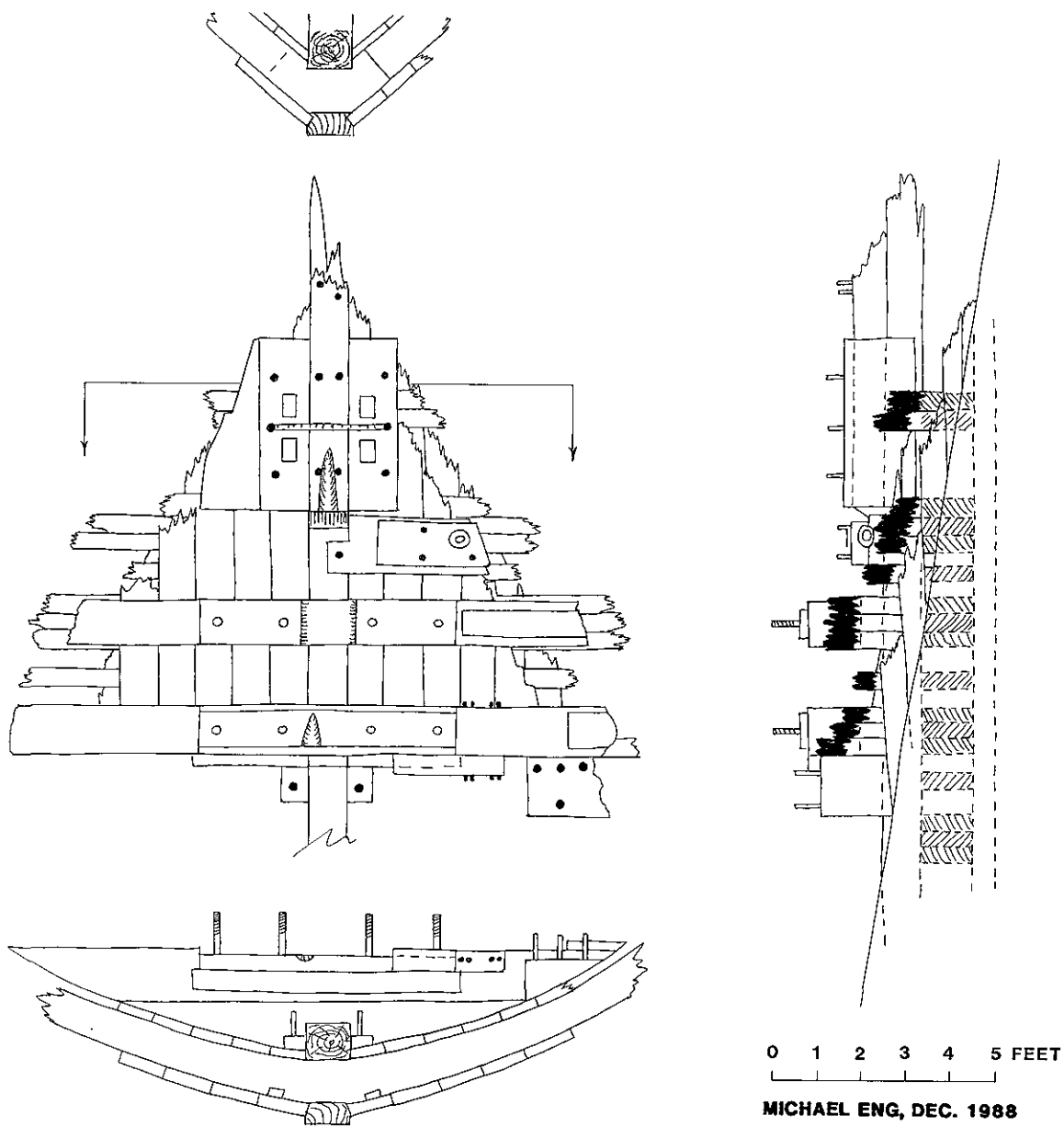


Fig. 4.20. The MICHAEL GROH engine bed.

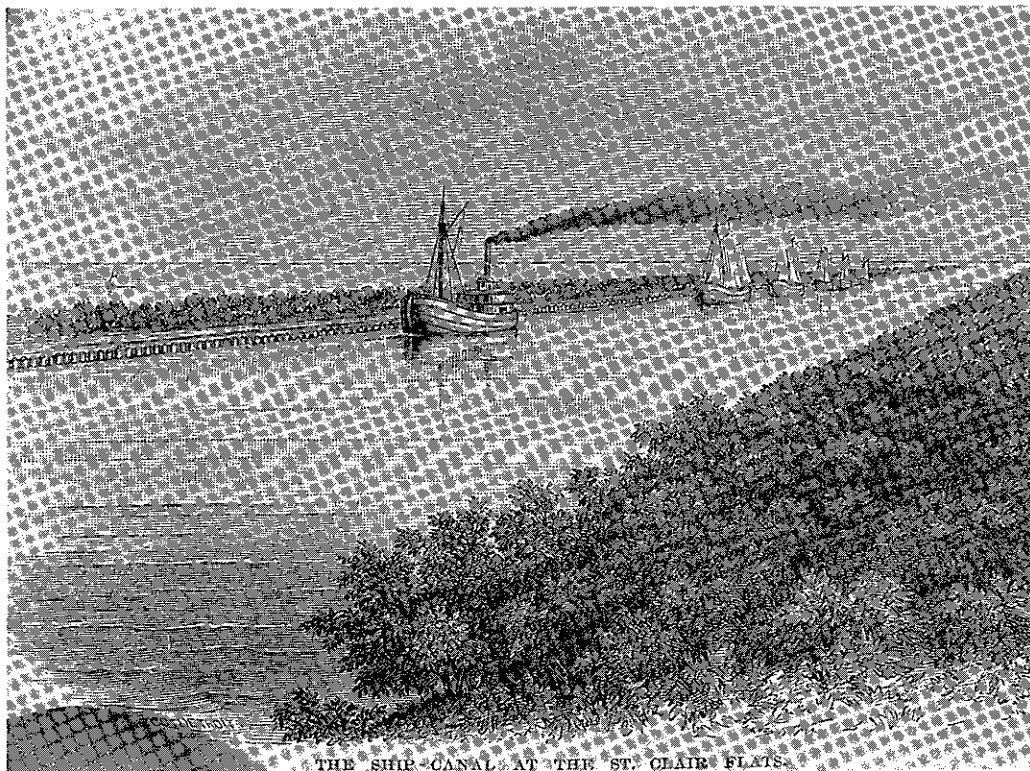


Fig. 4.21. The old woodcut shows an early steambarge with its tow of barges. The MICHAEL GROH is believed to have been similar. From Zachariah Chandler; an Outline Sketch of His Life and Public Services, 1880.

indicates either that the wreck is not generally known to the diving community, or that it is ordinarily covered with more sand.

A second, larger section of wreckage was discovered by divers after the 1988 field investigations (Peter Lindquist, personal interview October 28, 1988, and Bonnie Lindquist, personal interview, July 12, 1989). Because of the lateness of the season, it was not possible to inspect the remains, but an examination was made early in 1989. It showed that the 104-foot piece was 24 feet wide, with frames of double and triple futtocks much like the GROH's stern, each futtock sided 5 inches and molded 9 inches. The wreckage has a single centerline keelson of approximately 10 inches width, reinforced with an assistance keelson measuring 5 by 14 inches on either side, standing on edge. There is no centerboard trunk, but there is one mast-step on top of the keelson, fitted for a spar of approximately 22-inch diameter. Several details match the GROH's stern. The unusually proportioned assistance keelsons may have been added when the GROH was lengthened in 1882.

A popular Lake Superior shipwreck chart reports a shipwreck found in 180 to 190 feet of water "off Miner's Castle with a cargo of lumber," which "could be the GROH" (Midwest Explorer's League, Chicago, 1981). If such a wreck does exist, it is highly unlikely that it is associated with the GROH, as 180 feet of water does not occur within a mile of the rocks where the GROH struck and later broke up.

ELMA

Another wreck was discovered early in the 1989 season 300 yards east of the GROH's stern and 200 feet off the shore, lying in about 8 feet of water. ELMA's remains lie at position 46°47'57" north and 86°35'53" west. The 146 foot hull section is .17 miles distant, 170° from the MICHAEL GROH engine bed, 2 miles west of Miner's Castle. This exciting find appears to be the entire bottom of the schooner-barge ELMA, which wrecked near Miner's Castle on September 26, 1895.

History

The ELMA was built in 1873 with three masts and one deck. Intended as a towbarge, it was outfitted with short masts and sails to work offshore, in case it broke from the towing steamer. The ELMA was launched from the *Philander Lester shipyard* at Marine City, Michigan in the Spring of 1873 and enrolled at Port Huron, Michigan. It measured 165.2 feet in length, 30.0 feet beam and 11.0 feet depth of hold. It was 400.68 gross tons and 380.65 net tons. The ELMA's owners were Solomon S. Gardner and Charles C. Blodgett of Detroit. The new craft was valued at \$22,000 and rated A2, the highest classification given to barges. The ELMA's official number was U.S. 8895.

The ELMA and a sister ship called the HATTIE were operated in what was called "Blodgett's Propeller & Barge Line," hauling lumber products between Bay City, Michigan and Buffalo, New York. The two barges were towed by the old propeller-steamer PASSAIC, along with two other, much older barges. The PASSAIC was lost on Lake Erie in 1891, and it was probably for that reason that Blodgett sold the two barges not long afterward to William F. Warren of Tonawanda, New York. Warren paired the ELMA and the HATTIE with his steambarge P.H. BIRCKHEAD and ran them in the lumber trade.

On September 25, 1895, BIRCKHEAD left Baraga, Michigan with the barges ELMA, CHESTER B. JONES and COMMODORE in tow, all heavily laden with lumber. BIRCKHEAD was a very powerful steamer with a reputation for large tows, and this trip was no

exception. The JONES and COMMODORE were considerably larger than the 160-foot ELMA, and all four had large cargoes. On September 26 and 27, the steamer and its consorts sat out some bad weather in Marquette harbor, not wishing to take any foolish chances with a string of barges on the open Lake. The four left port on the evening of the September 27 when the wind dropped.

As the BIRCKHEAD and the tows approached Whitefish Point on September 28, the storm reappeared again and the towline broke between the steamer and the barges. The CHESTER B. JONES was blown helplessly toward shore, but was able to anchor a mile and a half off the beach and weather the storm for the next two days. The COMMODORE set sail and made it all the way down the Lake to the Soo, although it took a serious beating on the way. The BIRCKHEAD managed to get a line aboard the ELMA again and take it toward the shelter of Grand Island. The towline broke again when they were near Pictured Rocks, and the ELMA began drifting before the gale, all the time nearing the treacherous cliffs. The BIRCKHEAD was forced to abandon the tow and run for shelter. The ELMA made sail and managed to hold together until a short time later, when the rudder gave out. The helpless barge rolled terribly in the trough of the huge seas. The deck load of lumber went over the side first, and then the masts broke off. The ship began shipping water, and the crew was forced to pump continuously to keep afloat. The ELMA went onto the rocks about 100 feet off Miner's Castle, but swung away again and drifted westward down the shore toward Sand Point. It finally fetched up on the shallow sandstone sill against the bluffs. The ELMA was a complete wreck.

The Duluth News Tribune (October 2, 1895) carried a description of the events:

One of the crew took a yawl and attempted to get a line ashore, when the yawl was dashed against the rocks and went to pieces. The sailor got ashore with a heaving line and remained on a ledge of rock fifteen feet by three feet until morning, when he climbed to the top of the bluff and got the ELMA's line ashore. The crew were drawn on top of the bluff, where they remained from Sunday morning until Monday morning with only two loaves of bread to subsist on. Sailor (Rudolph) Yak met his death in attempting to swim ashore with a line, when the sea dashed him on the rocks, killing him instantly.

Capt. Thurston says the rocky bluff they were on was fully two hundred feet high. His wife and child who were with him were tied in blankets and taken ashore with lines. The BIRCKHEAD, in the meantime supposing all the crew of the ELMA drowned, sent the lighthouse keeper to look for the bodies. He found the crew on the bluff and took them to the BIRCKHEAD under Grand Island.

The newspapers on October 1, reported the ELMA lost with all on board, but they were able to communicate the happy news a day later that only one of the nine had died in the ordeal. The seven men and one woman and a child had suffered much from one day on the Lake and another day of freezing cold on their little ledge, but they survived to tell about it. Several accounts indicate that the crew sheltered themselves "about 75 feet above the Lake," rather than "on top of the bluff," but witnesses said it was a miracle that they found a way to get to safety at all.

Many other Lake vessels were damaged in the gale that took the ELMA, and a few became total losses. The big steamer CHARLES J. KERSHAW and its consorts, the barges MOONLIGHT and HENRY A. KENT, were all wrecked on Chocoday Reef near Marquette that day, and the schooner NELSON was blown ashore just west of Powell

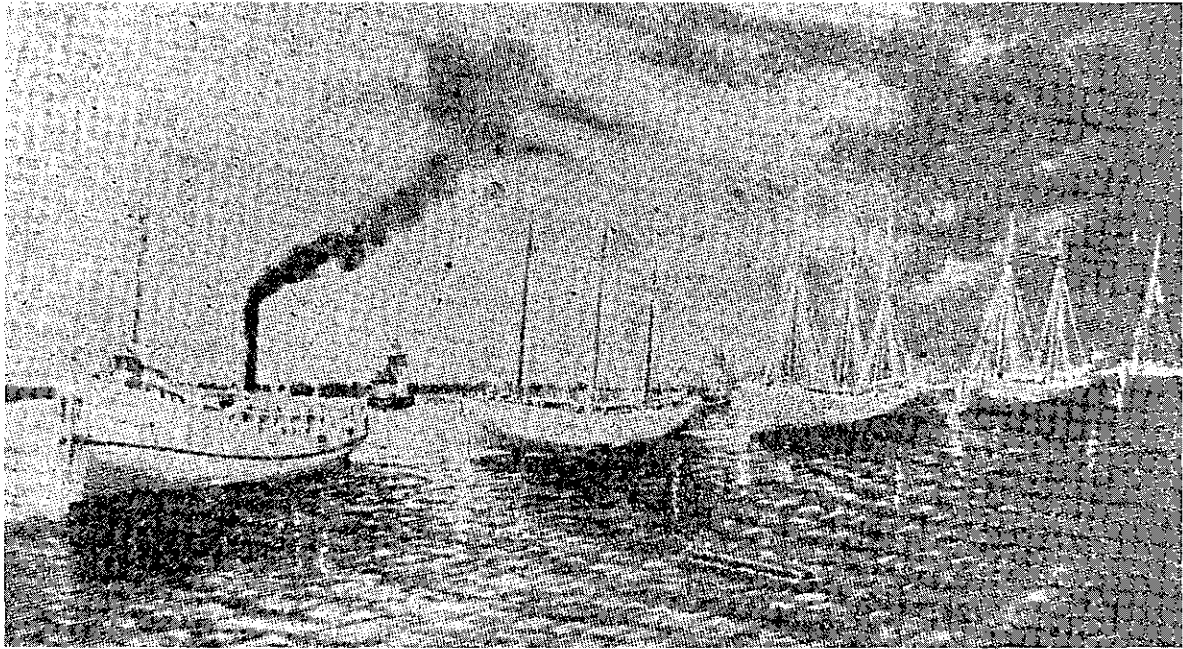


Fig. 4.22. The old steamer PASSAIC towed several barges. ELMA is thought to be the third barge behind the steamer in this painting. From Lynn's Marine Directory, 1917.

Point near Munising. The rescue of the ELMA's shipwrecked sailors, however, is one of the most often repeated tales of that memorable storm (Stonehouse 1983:31ff).

Site Description and Analysis

What is almost certain to be the ELMA wreckage is a 146-foot length of ship's bottom, with a backbone of multiple keelsons and all the transverse frames to the turn of the bilge. The wreckage lies on a nearly bare sandstone bottom, where loose sand often drifts in to cover it over and obscure it from view. The depth is barely 8 feet.

GEORGE

From the ELMA wreckage to a point about 2 miles east of Miner's Castle, no shipwreck remains are known to exist. The next shipwreck site lies at the point just west of Mosquito Beach, in the middle of Pictured Rocks, at Loran position 31604.5 and 47430.6, lying in 15 feet of water at the mouth of a tiny cove. This is the bottom of the 200-foot schooner GEORGE, which was smashed against the cliffs there in 1893.

The GEORGE was one of a class of about two hundred 200-foot sailing ships built for the Lakes grain trades between 1869 and 1874. The deepening of the St. Clair Flats above Detroit in 1870 made possible the introduction of larger, deeper ships than had been practical in earlier years, and vessel operators were quick to take advantage of the opportunity. Whole fleets of the big three-masted schooners and barkantines were constructed within a few years to haul the lucrative grain cargoes down the Lakes, and the GEORGE was among them. It was built as the GEORGE MURRAY by Greenleaf S. Rand at Manitowoc, Wisconsin, reportedly the largest ship of any kind built on Lake Michigan up to that time and among the last of the big new 200-footers. It was officially 202.8 feet long, 34.0 feet wide and 13.8 feet deep, measuring 790.45 gross tons and 750.93 net tons. The official number was U.S.85305 (Permanent Enrollment No. 6, issued at the port of Milwaukee July 17, 1873). The GEORGE MURRAY was owned by J.R. Slauson and others of Racine, Wisconsin and launched June 21, 1873. It was valued at \$55,000 (August Supplement to 1873 Hull Register).

The ship was sold during the winter of 1879-1880 to Wiley M. Egan of Chicago, and permanent enrollment No. 70 was issued at the port of Chicago February 17, 1880. Three years later, under Egan's ownership, it was renamed simply the GEORGE with enrollment No. 89, issued at Chicago April 27, 1883. In 1887 it was sold to James Scott of Oswego, New York with permanent enrollment No. 11, issued at Oswego March 15, 1887. The GEORGE's last owner was Miles B. Fox of Sandusky, Ohio, under whose name the ship was enrolled on April 18, 1890 (Permanent Enrollment No. 32, issued at the port of Sandusky); this final enrollment was surrendered at the Sandusky Customs office on November 20, 1893 with the endorsement "Vessel wrecked, total loss."

The GEORGE was the victim of a typical fall gale. It was enroute to Marquette with a cargo of 1,330 tons of coal when it ran into a snowstorm on the night of October 23, 1893. When in sight of Grand Island on the morning of the October 24, the wind swung around to the northwest and began to pick up in intensity. Capt. C.D. Roberts changed his course for the lee of the island and resigned himself to spending some time lying at anchor. At 5:00 a.m., however, one of the gaffs broke, and then the big schooner had the sails blown out by the force of the wind; it was still miles away from shelter at the time (Marquette Mining Journal, October 26 and 28, 1893). After drifting helplessly for an hour and a half, the ship anchored off the towering cliffs at Pictured Rocks, but soon dragged onto the rocks just offshore. As the wooden hull pounded, the crew struggled

to get the yawl into the water. They managed to row all the way to Grand Island to safety; miraculously, all eight crewmen and one woman survived. The trip was a terrible one, 5 miles upwind with murderous cross seas reflected off the lakefront cliffs.

The accident to the GEORGE was described briefly:

Marquette, Oct. 24 - The schooner GEORGE, owned by Miles Fox . . . stranded near Grand Island this afternoon. She lies in an exposed position and grave fears are entertained for her safety. The tugs BENHAM (and) GILLETT with the Life Saving crew of the Marquette station have gone to the relief of the distressed vessel. (A) heavy gale is blowing from the northwest (Duluth News-Tribune, October 25, 1893).

The same paper reported a few days later:

Marquette, Oct. 28 - The first snowstorm of the season is on today. The snow is dense and driven by a blizzard from the North. The schooner GEORGE, stranded on Pictured Rocks, is now totally destroyed, involving a loss of her cargo of 1,300 tons of coal. The valuation of the vessel and cargo were \$29,000. (Duluth News-Tribune, October 29, 1893).

According to author Frederick Stonehouse, the tug BENHAM did visit the stricken vessel and stripped about \$5,000 worth of tackle and equipment from the broken wreck (Stonehouse 1983:30).

Site Description and Analysis

The wreckage of the GEORGE lies in a dramatic setting, virtually in the shadow of the 150-foot sandstone cliffs and among the enormous rocks left at their feet. One large section of ship's bottom lies just outside a 300-foot cove in the stone wall, while other, smaller pieces lie against the shore and under rocks eroded from the cliff face. The largest section of the wreck consists of about 120 feet of the ship's bottom, lying on a relatively flat sand bottom among clusters and piles of boulders. Six large keelsons form the backbone of the ship, with sister keelsons and riders each 12 by 12 inches, and assistant keelsons 11 by 10 inches, all white oak, with 56- and 62-inch scarphs. The frames are similarly massive, measuring 12 inches wide and 13 inches deep in the bilge, and 14 inches deep at the centerline. The frames are made up with double futtocks, and fastened with 7/8-inch round iron. They are spaced at 22-inch intervals. The keel is sided 13 inches (width) and moulded 6 inches (deep). Hull planking is 3 inches thick and from 12 to 20 inches wide. The ceiling (inner planking) is 2 1/2 and 3 inches thick, with 6-inch-thick strakes at the turn of the bilge, where it is also edge-bolted for extra strength. The centerboard trunk measures 28 feet 9 inches in length, with 11 feet 9 inches of the centerboard still in the box; the orientation of the board indicates that it was down at the time of the ship's loss.

The outboard end of the large section of wreckage is cut away underneath, where there is what appears to be a scarph joint in the keel structure near the bow. The position of the centerboard box and the orientation of the centerboard within it prove that this is the forward end of the ship. No mast steps could be positively identified on the upper surface of the keelsons. Several lengths of six-strand 1 3/8-inch rope-core rigging wire were found near the forward end of the wreck, probably the shrouds from the foremast. Some steel strapping was also observed in the area, and although it was not measured, it was assumed to be chain-plates from the fore rigging as well.

About 150 feet from the main section in a southwesterly direction, lying among enormous boulders, is a smaller piece of wreckage, which represents a length of the

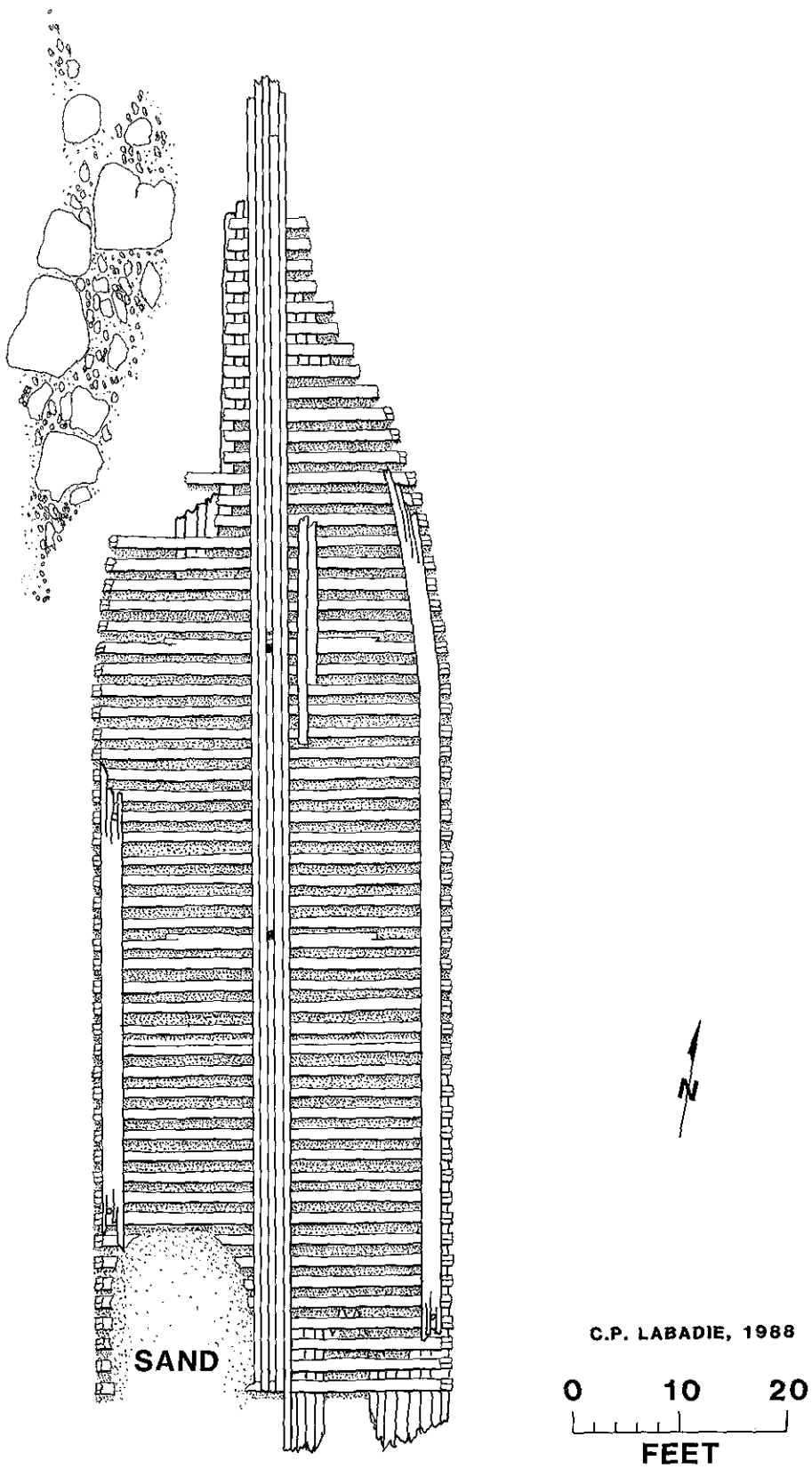


Fig. 4.23. Site plan of GEORGE.

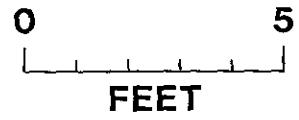
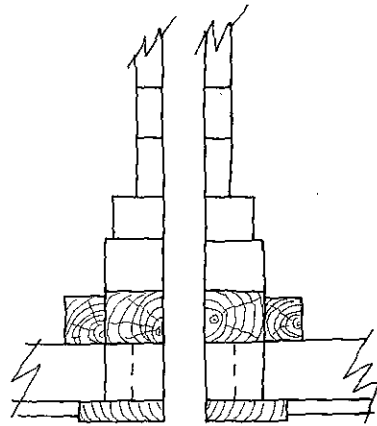


Fig. 4.24. Schooner GEORGE transverse section.

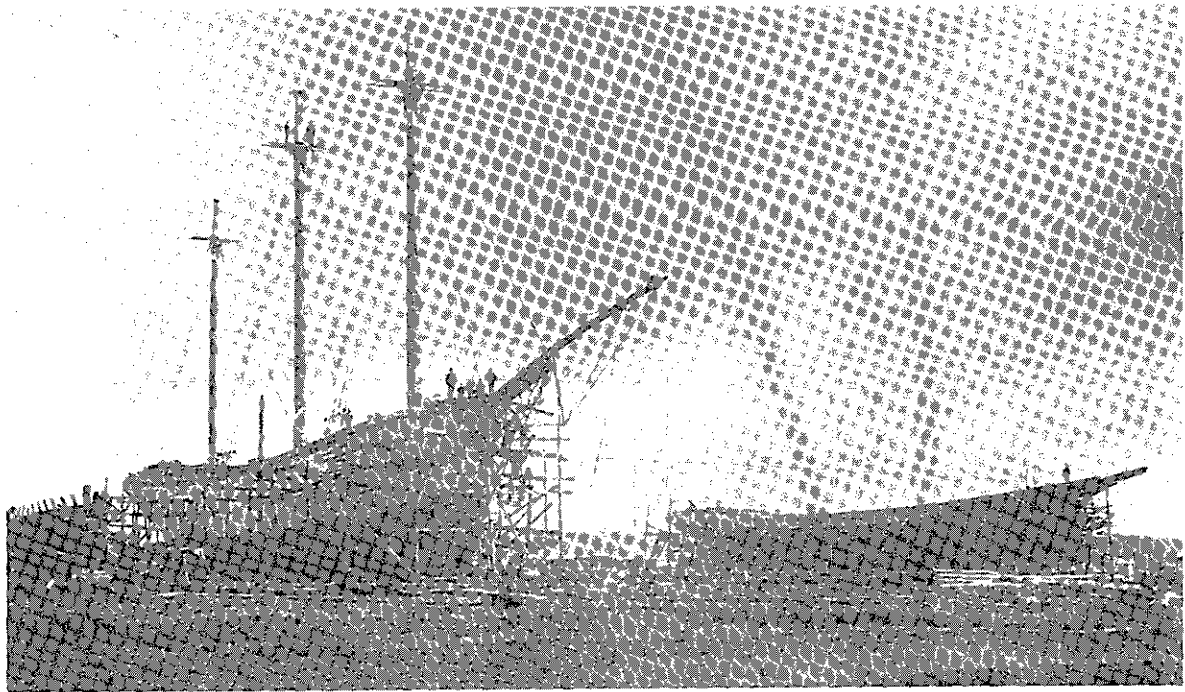


Fig. 4.25. For a few years in the early 1870s, many large schooners were built. The ANNIE M. PETERSON nearing completion at Green Bay in 1873. Henry N. Barkhausen Collection.

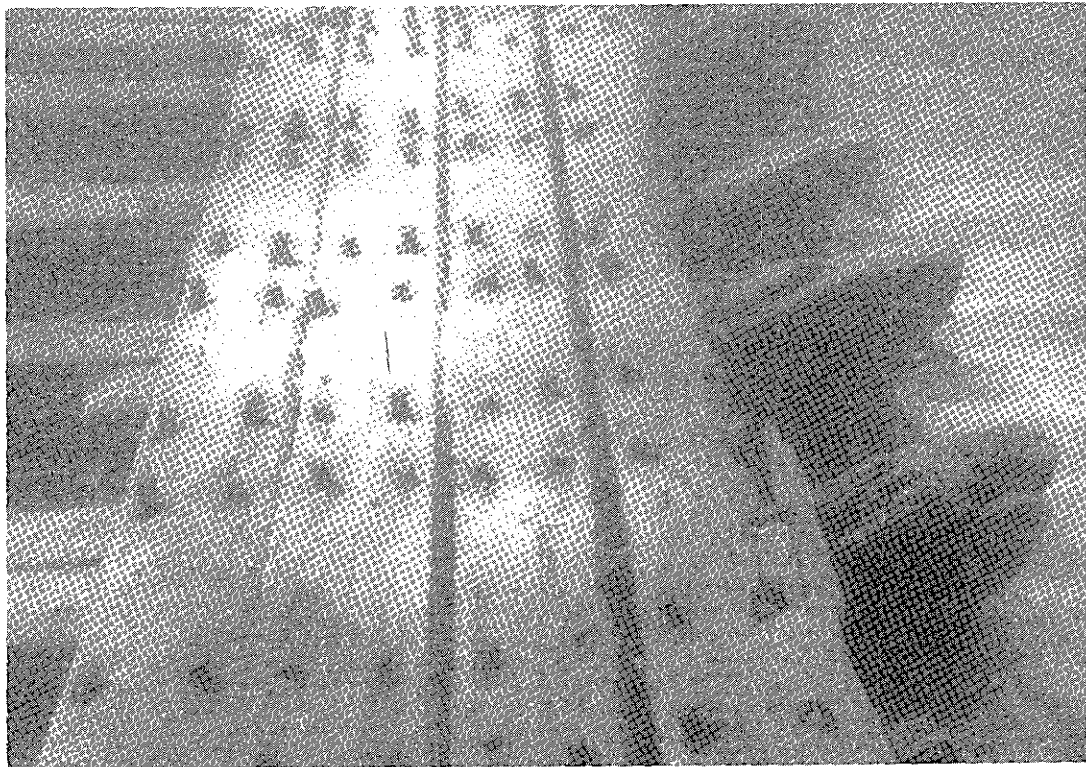


Fig. 4.26. Heavy 6-inch bilge ceiling demonstrates the GEORGE's strong construction. Photo by Ken Vrana.

ship's side. This piece measures 11 feet in width and 18 feet 10 inches in length. It includes frames and planking, but because it is flat, it was not possible to establish whether the upper surface was ceiling or outside plank, and therefore whether the piece was inside up or outside up. The frame spacing and planking characteristics confirmed that it was indeed part of the same ship, but little more than that could be determined. This piece is only 20 feet from the bluff. In the same vicinity, among and underneath the boulders, were many other discreet pieces of the ship, most of them portions of frames, all 6 by 12 inches in cross-section and from 6 to 10 or 12 feet in length. Some planking and various iron fittings were also found in the same area. Deadeyes and chain-plates, cleavices, chain, treenails and spikes, were also lodged between the rocks or exposed here and there in the sand and gravel that constantly shifts about.

The accumulation of artifacts near the base of the cliffs leads to the conclusion that the ship struck at that place. There is probably a good deal more yet to be discovered farther west from the main body of the wreck, either among the rocks or just outside them. None of the massive deadwood timbers from either the bow or stern were found, nor the rudder, or most of the sides. A more thorough examination of the area could result not only in a better understanding of the wreck process, but also in maximizing the attraction for the divers. A clue was found in the bedrock within the cove just west of the largest section of wreckage. It consisted of numerous parallel groves in the sandstone, where the huge wreck may have "migrated" along the relatively flat bottom, driven by the prevailing current and a hundred years of wind-driven ice. Much like stones borne along by a glacier, the protruding spikes and treenails of the wreck have left their tracks in the sandstone. Another interesting observation was the deposition of very heavy boulders on top of the wreckage. These rocks were at first presumed to have been moved by waves and ice, and while some such movement is likely, it is clear that most of the accumulation is from the sluffing off or eroding of the cliff face, often sending down great torrents of rocky masses to the shallow water below. Such a rock fall was observed at nearby Grand Portal during the 1988 field work.

WABASH

Between Grand Portal and Spray Falls lie the remains of the schooner WABASH, broken and scattered with its cargo. *The wreckage lies off Chapel Beach in three clusters.*

History

The WABASH (U.S. No. 80402) was built for the firm of Curtiss & Brainard of Toledo, Ohio. It was a product of the Bailey Brothers shipyard in Toledo, launched August 23, 1873. The WABASH was a "fore and after" (two master), measuring 140.0 feet in length, 26.0 feet beam and 12.0 feet depth of hold. It was 315.44 gross tons and had a carrying capacity of 20,000 bushels of wheat (Detroit Free Press, August 25, 1873). The ship's owners were principally engaged in the Saginaw and Toledo lumber trade, and the WABASH appears to have been intended for the Toledo and Buffalo grain traffic, where it was employed after completion. The ship was valued at \$23,000 (October Supplement to the 1873 Hull Register).

In 1881 the WABASH was sold to Palmer, Benham & Co. of Cleveland, coal and ore dealers, and was shifted to the Lake Superior trades. The firm operated a number of different steamers and barges at various times, and it is not clear whether the WABASH ran as consort to one of the firm's bulk freighters or ran independently under sail. In the summer of 1881, it was towing behind the steamer V. SWAIN. Newspapers reported that the two had been "secured [chartered] to make ten trips in the ore trade from

Marquette to Cleveland at \$10 per ton" (Cleveland Herald, May 21, 1881). The schooner could carry about 700 tons.

Late in the fall of 1883, the WABASH was still in the ore trade. November found it loading coal for Marquette and towing up the Lakes with the schooners C. G. KING and C. H. JOHNSON, all behind the powerful Cleveland tug SAMSON. Novembers are always ugly on Lake Superior, but November 1883 was worse than usual. A bad squall crossed the Lake on November 11, keeping everything in port. Three or four days later the Lake was still very rough and snowstorms were driven by intermittent northwest winds. SAMSON and its tows left the shelter of the Soo on the November 14 and headed up the Lake, thinking that the worst of the storm activity had passed. On the 15th, however, the flotilla met worsening seas and snowsqualls off the Sauble Dunes. As the wind swung to the northeast, they made their course for Grand Island, still 50 miles away, but the only shelter within reach.

Capt. C. P. Henderson recounted the events of the next hours:

. . . The fleet was running for Grand Island in a blinding snowstorm. The towline of the WABASH and both the fore and aft booms broke, and the vessel, being iced up, became unmanageable. Being off Pictured Rocks, she was kept from going ashore as long as possible. When the vessel was finally grounded, it was on a sand beach not over twice the length of the vessel. The first sea that struck the vessel after touching broke in the cabin and split the hull twice just abaft the foremast and aft of the mainmast. The vessel struck at 2 o'clock Thursday, and the next morning at 3 o'clock, the sea having moderated somewhat, a raft was made of pieces of the wreck and the crew of seven men all got ashore one at a time. Saved from the wreck, they were still in a perilous position, as there was a foot and a half of snow on the ground, and the men suffered a great deal from the cold . . . most of them being frozen . . . and they were (measuring on a chart) eleven miles from the nearest house, which they never could have made over the rough ground. That afternoon the SAMSON came along looking for the crew, and they were got on board nearly famished, not having a bit to eat for 30 hours. The crew were got to Marquette, and there the fares of those who desired to come home by rail were paid by Capt. Henderson, while the others shipped on other vessels.

The vessel is in a bad shape, and can hardly be saved. She is owned by Messrs Palmer & Benham and Thomas Murphy of Cleveland, valued at \$12,500, and insured for \$8,000. An abandonment and protest has been made out, but it is not known what the underwriters will do. It is hardly possible that they will try to release her considering her condition and the lateness of the season. If the vessel had gone ashore one-half mile either way from where she did, there would not have been the slightest chance for the vessel or crew, as they would likely have been dashed on the rocks (Chicago Inter Ocean, November 22, 1883).

Capt. "Sol" Ramage, master of the tug SAMSON, suffered a heart attack when he got back to Marquette, and he died, according to Henderson, because of "the exposure, as well as the fretting at the loss of the WABASH, which however, could not be attributed to him."

WABASH was a total loss, along with the entire cargo. As far as is known, no salvage was ever attempted on either. The storms that swept the upper Lakes during that one

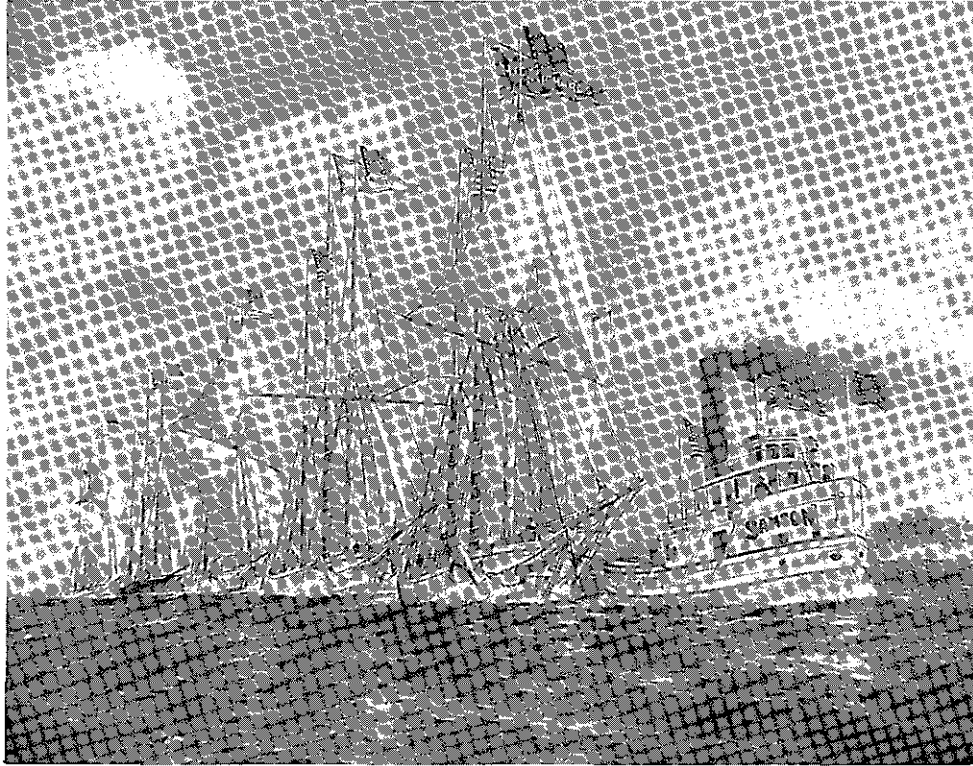


Fig. 4.27. A famous old painting shows the powerful tug SAMSON towing a string of schooners in the 1870s. University of Detroit Marine Collection.

week took a heavy toll, including the passenger steamer MANISTEE near the Apostle Islands with about 30 passengers and crewmen. Newspapers all over the region noted the unusual severity of the weather:

The following list of casualties . . . comprises all vessels that were forced ashore during the gale of last week only. The list includes seventy-two vessels of all classes and of these the alarming number of twenty-four are total losses, or are given up as lost . . . The total losses to the underwriters will be vast. The recent gale has been a most fatal one . . . (Cleveland Herald, November 21, 1883).

Site Description and Analysis

The keel of the WABASH lies in about 8 feet of water 150 feet offshore at Chapel Beach. It is positioned just west of the beach's center, corroborating the newspaper account that said, "If it had gone ashore one-half mile either way from where it did, there would not have been the slightest chance for vessel or crew, as they would likely have been dashed on the rocks." The wreck is only about 200 yards from sheer rock cliffs on either side. Little of the bottom structure is exposed above the white sand, but the centerline keelson lies at right angles to the beach, and covers a distance of well over 100 feet. It does not appear to be continuous, but is broken into three pieces, although the three are perfectly aligned. One section of bilge is also exposed above the sand for about 12 or 15 feet. One of the mast steps is clearly discernible from the surface.

A team representing the Alger Underwater Preserve conducted searches during the summer of 1985 that resulted in the discovery of what is undoubtedly another portion of wreckage from the WABASH. According to a news release, "part of the schooner is badly broken up in shallow water, and the remainder, including much of her coal cargo was found offshore in 40-50 foot depths" (Frederick Stonehouse, July 10, 1985). Stonehouse, who led the 12-man volunteer team, reported that the large field of coal and debris was found about 2 miles west of Spray Falls and 200 yards offshore, in 16 to 20 feet of water. The coal consisted of vary large lumps, some as much as two feet square. Hull timbers at the site were broken up and widely dispersed. Larger portions of the wooden hull were found at the deeper location, about 150 yards further out. Not far away the same team found a large field of underwater boulders and rock cliffs, which were previously unknown to the diving community and promise to be interesting new attractions. These "canyons" are outside the quarter-mile boundary of the National Park. Because little detailed information is available on the WABASH wreck site, further investigation is suggested. The site could be grouped with the nearby GEORGE and SUPERIOR wrecks to comprise an appealing dive when weather conditions are favorable, as the three sites are close together and located in an especially picturesque setting.

WABASH, like MARY M. SCOTT, ELMA, BERMUDA and ONEIDA CHIEF, was a "canaller," one of those hundreds of Lakes schooners built to fit through the locks of the old (second) Welland Canal, which connected Lake Ontario with the upper Lakes. It would be interesting to make a detailed analysis of its hull construction to compare it with the other craft of the same type in and around the Park. No such comparisons have been done to date on any group of similar Lakes ships, and the results would have considerable value to the academic and historical communities. The second Welland Canal was in use from 1845 to about 1883, and several hundred schooners and steamers were built to the 150-foot dimensions of its locks, superceded in later years by another class of vessels of 250-foot dimension.

SUPERIOR

One of the most tragic of the Pictured Rocks accidents was the loss of the steamboat SUPERIOR at Spray Falls in 1856. The loss of life, thought to be 42, is to this day the third-greatest in the history of Lake Superior navigation. The location is 46°33'45"N and 86°24'91"W.

History

SUPERIOR was a well known passenger sidewheeler that was constructed at Perrysburg, Ohio in 1845 for service between Buffalo and Chicago carrying immigrants to Illinois and Wisconsin. The steamer was 191.0 feet in length, 27.8 feet breadth (about 50 feet with the massive paddle-wheels) and 11.2 feet depth of hold. According to the official documents (Permanent Enrollment No. 1, issued at Port Huron, Michigan September 10, 1845) it measured 567 tons. The ship's 180-horsepower high-pressure inclined steam engine came from the older (1834) steamer COMMODORE PERRY, which had been rebuilt as a schooner in 1843. The use of second-hand engines was common in those days when the machinery was two-thirds the cost of building a steamer. Engines and boilers could be expected to outlast most wooden steamboat hulls.

The SUPERIOR had two decks, the upper deck being entirely used for passenger accommodations and the lower or main deck divided among crew cabins, offices, cargo space and ship's stores. Both decks were built on "guards" that overhung the narrow hull providing significantly greater capacity. The hold was below decks; it consisted of about one-third cargo space and two-thirds machinery space or fuel bunkers. The boilers were wood-burners, and a good deal of space was required for cordwood. Frequent stops were necessary for "fueling up" as well.

The steamer was launched on July 22, 1845 and fitted out during the last weeks of that summer. It made a few trips in the fall of 1845 between Perrysburg and Buffalo and then entered the Chicago trade in the spring of 1846, owned by Capt. David Wilkison of Toledo. SUPERIOR was part of a large fleet of sidewheel steamers that carried immigrants and settlers to the west during the 1840s and 1850s. Like its running-mates, the steamer carried several hundred passengers, plus live cattle, mixed cargoes of "package freight," boxes and barrels of everything from molasses and wine to manufactured goods, furniture, flour, or machinery. The holds were piled high with all manner of freight. SUPERIOR ran exclusively to Chicago during the later 1840s, earning a reputation as a fast, efficient carrier. The Buffalo Morning Express (May 26, 1848) commented "We see the steamer SUPERIOR running . . . with larger loads than have ever been carried by any boat on the Western Lakes." A few days later (referring to the same trip), the Detroit Free Press chimed in on May 29 (1848) "The SUPERIOR went up with enough passengers Saturday morning on board to people a small continent." The ship's arduous service in the Chicago trade was not always without incident, however. Accidents could cause the vessel long delays and costly repairs:

The steamer SUPERIOR, which left Friday evening (May 11) for Chicago, when off Silver Creek, broke her shafts, besides doing serious damage to her machinery. She was towed back to port by the BALTIMORE, and her lading (was) transferred to the WISCONSIN. It will take her several weeks to repair (Buffalo Morning Express, May 14, 1849).

In 1850, SUPERIOR was put on the Buffalo, Cleveland, Sandusky and Toledo Line, on which it served for the next several seasons. The ship's service on Lake Erie did not leave the ship without more scars:

ANOTHER COLLISION - The steamer ALABAMA, bound up, and the steamer SUPERIOR, bound down, came in collision during a dense fog off Barcelona (New York) on Friday night (June 6). The ALABAMA struck the SUPERIOR just back of her starboard wheelhouse and stripped her clean to the hull from wheelhouse to stern. She lost some of her freight, which was stowed on her guard, and it is feared that two or three passengers were (also) lost. The ALABAMA received but slight injury (ibid, June 9, 1851).

On October 14, 1852 the big steamer ran into the Canadian schooner LOWLAND LASS on Lake Erie at about 4:00 a.m., some miles off Dunkirk, New York. SUPERIOR took the damaged craft in tow and nursed it about 20 miles back toward Buffalo, when the schooner filled and went down before it could be beached. As far as is known, there was no loss of life, and the steamer suffered little damage in the incident (ibid, October 16, 1852).

In the spring of 1853, SUPERIOR was sold to William H. Forsyth and Henry S. Camp of Buffalo (Permanent Enrollment No. 23 issued at the port of Buffalo March 5, 1853). The new owners advertised the ship to run from Cleveland to Toledo daily with the steamer TROY in connection with the Michigan Southern Railroad. A year later, however, both ships were sold at auction in Toledo, the owners having apparently bankrupted. The Commercial Bank of Toledo bought SUPERIOR and, in turn, sold it to Albert T. Spencer, Frederick A. Howe, Jr., Gurdon S. Hubbard and Charles H. Hunt of Chicago. It was enrolled in their name at Chicago on August 15, 1854 (Permanent Enrollment No. 95).

A.T. Spencer & Co. at first sailed SUPERIOR from Chicago to Lake Michigan west shore ports. In the fall of 1855, however, Spencer formed the Lake Michigan & Lake Superior Transportation Co. to take advantage of the new St. Mary's Falls Ship Canal and trade to Lake Superior ports. He also bought the steamer LADY ELGIN and the propellers OGONTZ and ONTONAGON. The shipping line would become one of the best and most successful operations on the Upper Lakes. SUPERIOR, aptly named, called for the first time at Superior City on May 10, 1856. It was among the first ships to provide regular connections between that westernmost Lake port and the lower Lakes.

A routine trip in the fall of 1856 turned into an appalling tragedy for the steamer. It passed up through the Soo Locks on October 28, leaving on the morning of October 29. The steamer headed up the Lake with moderate southwest winds blowing; that same evening the wind swung to the northwest and began picking up. A heavy sea began rolling at the same time and the ship took on a steady rolling motion as it headed diagonally across the long swells. After dark, SUPERIOR passed the Sauble Banks, rounded Au Sable point and made course for Grand Island.

The trip turned into a nightmare when the ship's rudder was torn off at about 11:30 p.m. The steamer suddenly sheared off course to port and lurched to leeward as it rolled in the trough of the seas. Some of the heavy cargo shifted to the port side, which left SUPERIOR listing badly with water flooding into the gangways and windows. Within seconds the big ship lie helpless on the angry Lake, while passengers and crewmen began a pitiful effort to trim (level) the cargo and stem the leaks. Passenger Joseph W. Dennis described the calamitous experience in the New York Daily Times of November 16, 1856:

The captain and officers commenced throwing her deckload overboard. This was found a difficult operation on account of her being down almost on her beam ends, with heavy gangway planks lashed across her gangways to keep the seas out. It was now found that she was making water rapidly. Hands were called to man the pumps, but they were so

small as to be of little avail. By 12 o'clock the water had entirely extinguished the fires in her furnaces, the engine stopped, and all hopes of saving her were given up. I then went from the deck to the cabin to make preparations for going overboard in case she should sink, . . . as it was evident that she must soon do so . . . About this time the steward and the saloon-keeper began tearing off the doors of the cabin (and) laying them about so that they might be available for floats. I assisted them until the cabin was stripped on the windward side . . . the leeward side being piled high with furniture, stoves, etc. At this time the ladies were lying on the cabin floor, it being impossible for them to stand.

At half past one a cry was heard of "Rocks! Rocks!" This brought all to their feet, and a rush was made for the boats, there being only two which could be got at . . . They then threw over her small anchor, which held her until her stern struck the rocks. The first heavy sea broke her chain, and she came broadside on with a tremendous crash, which caused her to settle down very much . . . as soon as she struck I jumped overboard, anticipating the time of her breaking up, as I saw she must very soon go to pieces.

Dennis continued:

The first sea threw me nearly to the rocks but its return carried me back. I turned to look at the wreck, and saw that a heavy sea had carried away the cabin, boats and all, into the water, but the roar of the surf was so terrific as to prevent my hearing anything of the cries of the sufferers . . . I found myself lying on my face on the rocks with a heavy pile of driftwood upon me. Hearing voices beyond me, I crawled toward them, and found a number huddled together under the shelving rocks. The place where we were cast was not earth but was formed of fragments of rocks that had fallen from those that projected over. It was, I should judge, 100 feet long by 5 broad.

We shivered out the night, suffering intensely with the cold, and anxiously looking for daylight. From the time that the boat struck I am positive that she did not hold together more than 15 minutes before she was piled up on the rocks. At daylight, we discovered that her wheels were left where she struck, about 200 feet from where we were and projecting out of the water about 10 feet. On one wheel five persons were clinging and on the other two, still alive, every sea breaking entirely over them. They called to us for help, but it was to no avail . . . one by one we saw the poor fellows drop off, benumbed by the cold and unable to cling longer. After passing a miserable day, we built a shanty as best we could, of pieces of the wreck, wet mattresses, blankets, pillows, and huddled into it, closely together for warmth. We were now 18 in number . . . We subsisted on raw cabbage and some raisins . . .

A second survivor, A.J. Foster, described the terrible suffering following the wreck (Duluth Minnesotian, November 22, 1856):

We were looking among the rubbish and timber . . . and found the bodies of Capt. Jones, Mrs. Bennett and daughter. We kept exercising ourselves during the day to keep from freezing and at night made a shelter with mattresses and pieces of the wreck, and by that means passed the night. The sea still kept running high and wind blowing. Towards noon of the second day, the wind lulling and seas running down some about 4 o'clock,

we launched the boat with considerable difficulty, owing to our exhausted state. Eight persons got into the boat and landed a mile and a half distant on the beach. [Mate] David and two others returning, we all got in, making 13, and pulled for Grand Island . . . supposed to be six miles off.

The group of five men attempted to walk to what is now Munising, trudging painfully through woods and swamps with about 16 inches of snow on the ground. They finally reached the house of Trueman W. Powell on the west side of South Bay on the morning of the fourth day following the wreck. A second party failed to reach Grand Island in their first attempt by boat, being driven back by the wind. Three of the men started walking, and another ten made a second start with the boat, eventually landing on the Island about a mile east of the lighthouse. On the evening of the third day they landed and began walking through the woods the next morning to the Williams settlement on the west side of the Island. Two young boys in the group died in the woods just a few hours from safety.

Passenger Foster recalled returning to the scene of the wreck:

There had been no weather that a boat could go to the wreck until we arrived at Williams'. We got a boat, and Mr. Davis, myself and five others started for the wreck, found everything washed away except for the bodies of Capt. Jones and Mrs. Bennett. We started back. On our way (we) met the propeller GEN TAYLOR coming to our assistance. We were taken on board, and found the remainder of the survivors. We received all the attention Capt. Ryder and officers of the boat could give us. Mr. Williams sent someone to bury the boys. (Chicago Democratic Press, November 15, 1856).

The GEN. TAYLOR arrived in Detroit on November 14 with the first news of the tragedy, and the story was in the headlines for the next several days. The loss of life was variously estimated from 35 to 42 in contemporary papers, but there were no accurate records of who . . . or how many . . . were on board. The ship was evaluated at \$10,000 and the cargo at \$15,000 (Lake Underwriters Annual Report for 1856).

Parts of the ship's machinery were reportedly salvaged in 1857 and used to power a sawmill (Stonehouse 1983:14), although no details of the salvage have yet been found. An 1883 article in the Ishpeming Iron Agitator (Michigan) indicates that wreckers were grappling for iron at the wrecksite and succeeded in recovering the ship's safe with some silver and gold coins in it (August 11, 1883).

Site Description and Analysis

Today the wreckage of the proud old SUPERIOR covers and uncovers as the sands shift around just east of Chapel Rock at Spray Falls. The ship's old-fashioned steam boilers are usually visible even from the surface, lying in 8 or 10 feet of water just off the rocks to the west of the falls. Parts of the hull are more elusive.

The steamer's boilers lie scattered among huge rocks in an area about 150 feet square and varying from 8 to about 20 feet deep. Two of the boilers are complete, although somewhat crushed by decades of ice and storms. A third boiler has been bereft of its shell, so that the flues are exposed, but still pretty much in their places. All the boilers measure 44 inches in diameter and 20 feet in length; each has four 11-inch flues, all built up of 1/4-inch rolled iron plates and fastened with 3/4-inch rivets at 2-1/2 inch intervals. The boiler shells are made of 1/4-inch iron sheets 72 inches square, fastened with 1-inch rivets spaced every 2 inches. Although some soldered joints were seen in

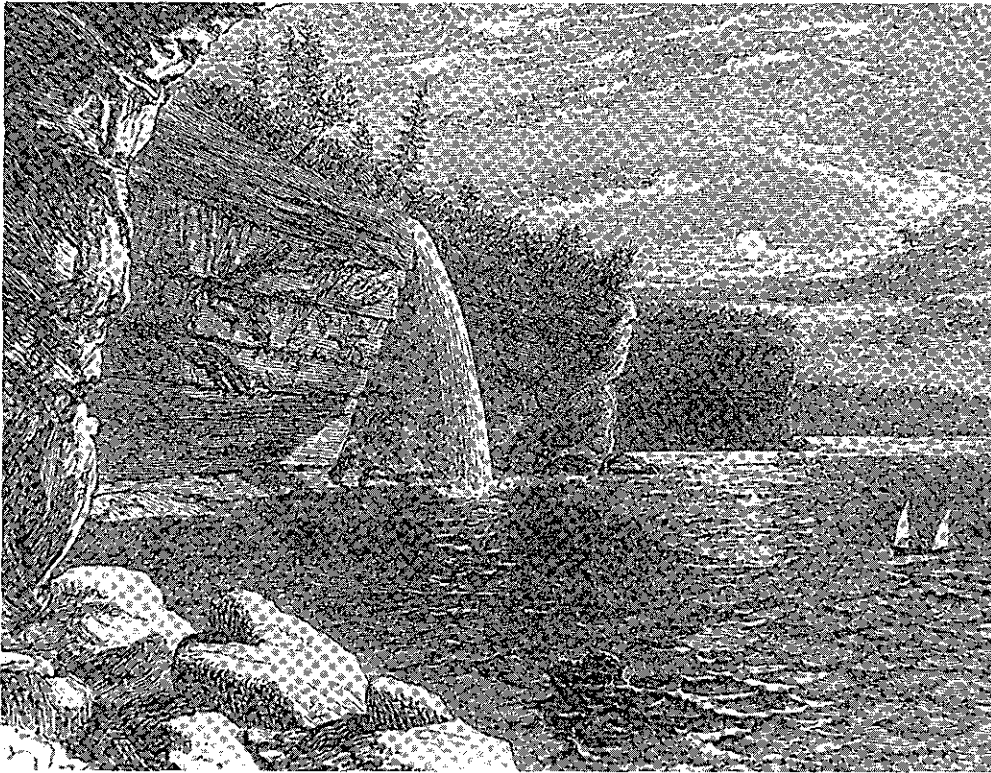


Fig. 4.28. Spray Falls, "the Cascade", was the site of the SUPERIOR's tragic loss. From Harper's New Monthly Magazine, May 1967.

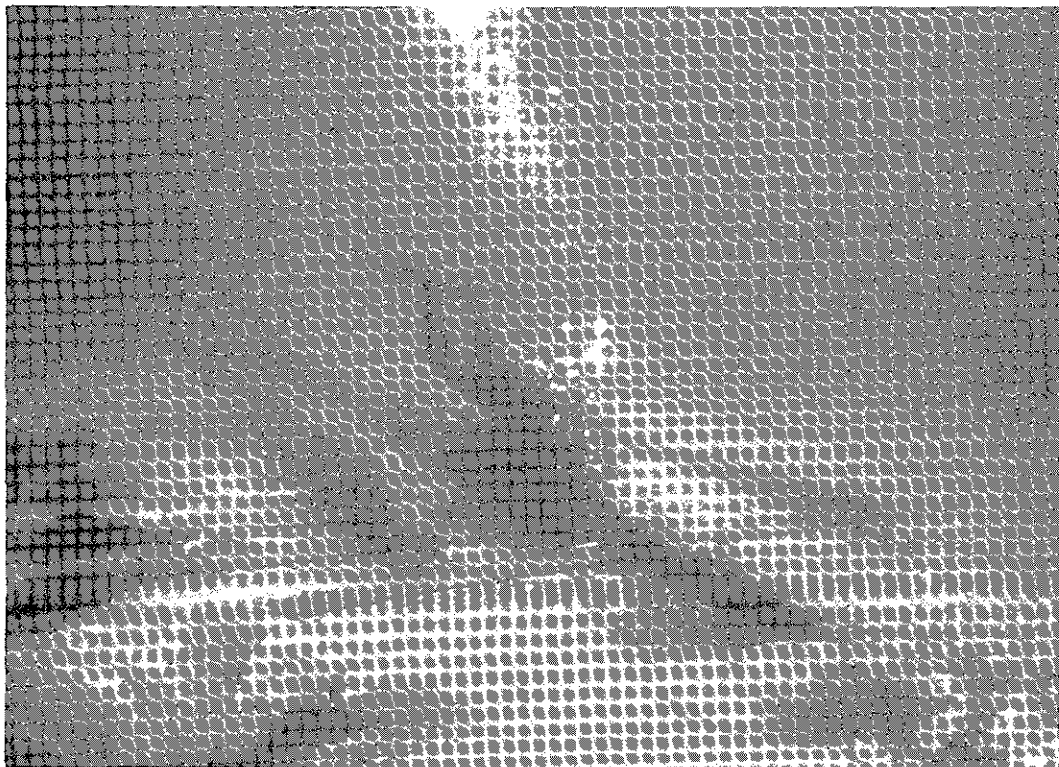


Fig. 4.29. Keelsons and frames, mark the grave of the passenger steamer SUPERIOR at Spray Falls. Photo by Frederick Stonehouse.



Fig. 4.30. The SUPERIOR's old-style locomotive-type boilers are built up of riveted sheets. Photo by Frederick Stonehouse.



Fig. 4.31. A diver sketches cast iron shaft support at the SUPERIOR wreck site. Photo by Ken Vrana.

various boiler parts, most joints were riveted. No threaded joints or couplings were observed anywhere in the ship's machinery.

These old-style boilers used a common, built-up brick firebox from which several fragmented grate-bars could be seen strewn around the site. No fire bricks were found, although these may be expected to have survived and probably lie buried in the sand. A large steam drum was found intact near the boilers, suggesting that the three boilers were laid together in a single "battery" (Bates 1968:41) after the fashion of Western River steamers. It is interesting to note that SUPERIOR's inclined high-pressure engines (from COMMODORE PERRY) were distinctly river-style in contrast to the "beam type" engines commonly used in Lakes craft. This suggests that the boilers, like the engines, came from PERRY, and therefore date to 1834.

In addition to the boilers, there are other elements of the ship's machinery at the site of the wreck. One large pressure vessel is very heavily constructed and appears to be one of the main engine-cylinders. Only selected dimensions were obtained from this piece, which measures approximately 16 inches in diameter and 12 feet in length, with a 4-inch opening in one end. Two cast-iron shaft-supports were also found, suggesting an 8-inch diameter paddlewheel shaft. There was no sign of the shaft or of any paddlewheel parts.

Along with a few elements of wooden framing, only a single 35-foot section of the ship's hull was found. It was a portion of the ship's bottom, with keelsons, frames and planking, representing no more than 20 percent of the total hull structure. This wreckage lies in 15 feet of water approximately 100 feet off shore and 300 feet west of Spray Falls, nestled among large rocks. Other portions of the ship's hull probably lie underneath the numerous rocks strewn nearby, many of which have probably fallen since the time of the ship's loss. The section observed has single-piece oak floors that reach right across the width of the vessel from bilge to bilge, in contrast with more recent wooden wrecks whose frames are built up of two or three futtocks laminated together. Each of the SUPERIOR's frames is sided 9 inches and moulded 10 inches, spaced at 22-inch intervals; they have 48-inch scarphs for the first futtocks of the frames, with 5/8-inch round iron treenails. The keelsons are 5x5-inch oak, with a rider measuring 5x9 inches on top of each. There are four such keelsons, the middle two straddling the centerline and probably used as "sleepers" to support the machinery. The ship does not appear to have been fitted with a centerline keelson at all, although a more careful examination of the wreck may provide a better understanding of the framing scheme. Indeed, the framing patterns of sidewheel steamers in general are very poorly understood, and a more extensive survey of SUPERIOR's remains is encouraged. The remains of several other sidewheeler steamers of SUPERIOR's era have been located in Lake Erie and Lake Michigan, although none has so far been systematically examined. None of these wrecks has much structural integrity, but each provides valuable contributions to a growing body of knowledge about their technology.

KIOWA

Off Twelve Mile Beach in about 40 feet of water lie the steel remains of the ocean-going steamer KIOWA, a World War I "Laker." KIOWA can be found at Loran coordinates 31499.8 and 47425.1.

History

The ship was one of a large class of deep-sea freighters built for the United States Shipping Board between 1917 and 1920. They were officially known as the "Frederickstad Design" (Dowling 1967:13) but because so many of them -- 498 -- were built at Great Lakes shipyards, they were commonly referred to as "Lakers." Patterned after a Norwegian North Sea design, the Frederickstad ships were single-screw, steel "three-islanders," with raised forecastle, bridge deck and poop. They were built as large as the old (third) Welland Canals would permit, being 253 feet 6 inches between perpendiculars, 261 feet 6 inches overall, with a beam of 43 feet 6 inches and a depth of 22 feet 6 inches. Most measured between 2,200 and 2,700 tons gross and carried from 3,500 to 4,200 tons of cargo.

KIOWA was U.S. No. 220780, built by the Detroit Shipbuilding Co. in 1920 at Wyandotte, Michigan and launched May 18, 1920. Although World War I had ended by the time the ship was constructed, it was built to the wartime specifications for the Independent Steamship Co., a subsidiary of the American Shipbuilding Co. of Cleveland (Dowling 1967:90; and 1978:113). The shipyard used materials left over from the wartime shipbuilding program and presumably available to them at very modest cost. The firm ordered ten of the postwar Lakers for Great Lakes operation.

KIOWA was Detroit Shipbuilding Co.'s hull No. 286. It measured 2,309 gross tons and 1,440 net tons, with dimensions of the standard Frederickstad formula. It was powered with a three-cylinder triple-expansion steam engine from the Detroit Shipbuilding Co., with 20-, 33- and 54-inch cylinders and a stroke of 40 inches. It was rated for 1,250 horsepower, and drove the ship at an economical 9 knots. Steam was generated in two scotch boilers of 13 feet 2 inches diameter and 11-foot length. The ship was undoubtedly fueled with oil (American Bureau of Shipping Register, 1928:74). KIOWA carried a crew of 7 officers and 15 men (Permanent Enrollment No. 38, issued at the port of Detroit October 19, 1920).

The ship had one deck and one mast, a single stack and six sampson posts for working cargo. KIOWA was fitted with four watertight bulkheads, a double-bottom water ballast system, two holds forward and two aft, each having a single, large hatch. With a "three island" configuration, a short boxey silhouette, and an array of posts and booms, KIOWA contrasted sharply with traditional Lake freighters. However, it still managed to compete successfully in the package-freight and at least some of the bulk-freight trades.

In the spring of 1927, KIOWA was purchased by O.W. Blodgett of Bay City, Michigan, a long-time vessel owner and manager; the similar CAYUGA was bought by Blodgett at the same time. Blodgett was principally engaged in the waning lumber trade, but his craft also carried salt, coal, limestone and other cargoes when the price was right. KIOWA and CAYUGA were the largest and most modern ships Blodgett ever owned, and among the last before his firm went out of business in the early 1930s. KIOWA was officially registered in the name of Blodgett's Kiowa Transportation Co. of Michigan City, Indiana (Consolidated Enrollment and License No. 36, issued at the port of Chicago on April 29, 1927).

Blodgett had KIOWA for little more than a year when it was involved in a costly accident on Lake Superior. On July 24, 1928, the ship ran onto Parisienne Island, not far from Whitefish Bay while navigating in a fog and seriously damaged the hull bottom; repairs cost \$30,000 (Wolff 1979:133). Sixteen months later the ship ran aground again, in an accident that ended its career.

On the last trip, KIOWA was heading down the Lake with a cargo of flax seed, bound from Duluth to Chicago, under the command of Capt. Alex Young. On November 30, 1929, it was caught in a gale on the open Lake, and the cargo shifted, giving the craft a bad list and rendering it virtually helpless. The Lakers had a reputation for rolling and, because of their short length, for pitching. The ship was out of control and taking on water through the numerous hull and deck openings on the lee side, which were now submerged. It drifted before a strong northwest wind and eventually fetched up in 30 feet of water about 4 miles west of Au Sable Point Light early on the morning of December 1. With the coming of daylight, Capt. Young launched the ship's lifeboat with four crewmen, in spite of blizzard conditions, in an attempt to alert the keepers at Au Sable Light. The boat capsized, however, and all five perished. One man regained the boat but subsequently died of exposure. The lighthouse crew finally spotted the ship early in the afternoon of December 1, and succeeded in taking off the 18 survivors with a surfboat and a small gasoline fishtug. The lighthouse crew was evidently assisted by two Grand Marais fishermen, who had been stranded by the storm at the lighthouse. In the meantime, the Coast Guard at Grand Marais had been alerted by the persistent blasts of the Au Sable fog signal and they came out in their power surfboat and removed the KIOWA's crewmen to the station. The steam fishtug JOSEPHINE ADDISON came out of Grand Marais earlier in the afternoon to recover the KIOWA's boat with the body of one of the crewmen (Wolff 1979:134). The gale was a particularly vicious one, damaging several ships and sinking one vessel on Lake Michigan with the loss of 16 lives.

Representatives of KIOWA's owners and underwriters attempted to inspect the derelict a few days after the stranding, but the weather continued rough until December 7 (Stonehouse 1983:60). When they were finally able to get aboard, they were unanimous in their judgment that KIOWA and the cargo were irretrievably lost. The ship's documents were surrendered at Chicago on June 30, 1930, with the notation "Vessel stranded (total loss), November 30, 1929, near Point Au Sable, Lake Superior. Twenty-three persons on board, 5 lives lost. Copy surrendered in lieu of original."

Some salvage work was done on the wreck immediately after the loss, and more ambitious work during the World War II scrap drives, at which time much of the superstructure was removed. Some sections of the hull were dynamited and fished out of the Lake at the same time. Much of the usable tackle, deck machinery and engine-room auxiliary equipment seems to have been taken in the spring of 1930.

Site Description and Analysis

Today about 80 percent of the ship's hull and most of the machinery may still be seen at the site of the sinking, although all of the superstructure is gone. The hull is split open and splayed out on the shallow sand bottom, and most of the component parts lie on an axis of about 320 degrees. The wreck is generally broken into large sections, most ranging from 50 to 80 feet long. The various sections are twisted and turned and spread apart, so that they are not easily recognized and are identifiable only with careful examination. The wreck is about 400 yards from the shore, and it lies just west of the middle stairway of the swimming beach below the Twelve Mile Beach campground. The lake bottom is composed of coarse white sand, and it is swept by a west-to-east current that varies in intensity with wind and weather conditions. The current is strongest at the surface, where it varies from 0 knots up to 1.5 knots. The current is seldom noticed on the bottom.

The bottom of the ship, or "tank top," appears continuous for much of the length of the 265-foot craft, extending from the after end to a point about 170 or 180 feet forward; on

the port side it extends about 30 feet farther. The poop and afterpeak are still attached to the bottom, and they stand high above the tank top and shaft tunnel, leaning about 30 degrees to port. The poop stands to within 10 or 12 feet of the surface. The sides have broken away from the stern at the afterpeak bulkhead; they are collapsed outward and somewhat to the port side. The bow is entirely broken away and shifted to port about 60 feet. The 34-foot forecastle stands on its stem somewhat to the west of the remainder of the wreckage, and like the stern it reaches to about 12 or 15 feet from the surface. The heavy windlass and its cast-steel bed have torn loose from the decking and lie overturned amid the wreckage, still linked to the bow's remains by twisted deck plates and by anchor chains that lead through the chain-pipes to the chain-locker in the forepeak. The forepeak and afterpeak sections may be seen from the surface as dark masses about 450 feet apart, lying on an axis that is nearly east-west.

Great lengths of decking were found in association with the sections of side structure. The massive hatch coamings are easily distinguished by their shape and hardware. The Lakers had deck hatches so large that they compromised hull strength, so the frames, or "coamings," around the hatches were built very deep and heavy to compensate for the size of the openings. In the wreckage, the heavy coamings have tended to hold together large sections of the decking. The ship's sides are more twisted and fragmented because the framing in the sides is not as heavy as the hatch coamings in the decks. One major transverse section of the main deck lies amidships on the port side.

One major transverse section of the ship's main deck lies amidships on the port side. Besides the narrow portions fixed to the hatch-coamings, this is the only large piece of decking at the site. It is pierced by a 3-by-5-foot opening for a companionway leading to the lower decks, with a 16-inch raised coaming around it. This hatch is the frequent subject of photographs by divers.

The midships portion of the wreck is probably the most fascinating part of the site. Most of the contents of the machinery spaces lie here, including enormous boilers and condensers, small tools, fasteners and machinery parts. One of the steamer's two scotch boilers lies very near its proper location, just forward of the engine bed and off to the starboard side. The boiler's 2-inch-thick rivetted shell is flattened, presumably by ice, and the internal tubes lie in and around it in a confused mass. The tube sheet, another large internal part of the boiler, lies about 30 feet away in a forward direction, and one of the three corrugated steel furnaces sits in the same general area. The second boiler has not been found, and there is some speculation about whether or not it had been salvaged. Since the large section of decking from amidships lies over the second boiler's position in the hull, it is possible that the boiler is also flattened and lying underneath. Another length of corrugated steel from one of the boilers was found about 30 feet outboard on the port side of the wreck, and that may substantiate the suspicion that the second boiler is crushed and buried in the debris of the decking.

The ship's engine is largely broken up, either from ice damage or from dynamiting. Most of its parts may be recognized near their appropriate locations, almost without exception pushed toward the port side. Lying within 30 feet of the engine bed are the crankshaft, bearings, slides, engine columns, connecting rods and broken cylinder castings. The cylinders are made up of 2 1/2-inch iron. The pistons were not seen, although they are undoubtedly nearby.

The field of engine-room debris surrounding the machinery measures about 750 square feet and consists of an immense mass of piping, structural members, valves, gratings, engine-room auxiliaries and machinery fragments. The pieces range from cast iron to

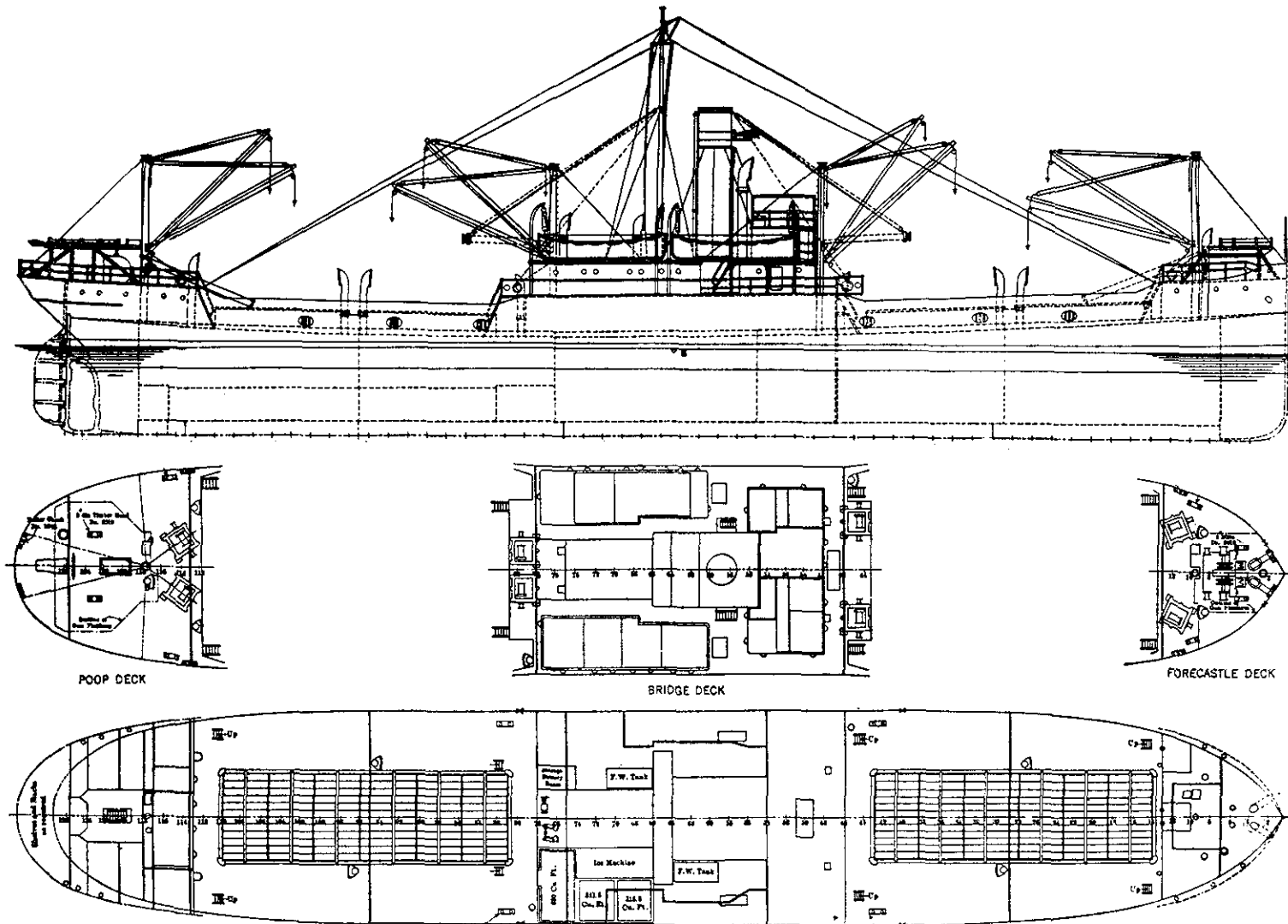


Fig. 4.32. The plan of Frederickstad-type ocean cargo ships illustrates the KIOWA's basic configuration. Marine Engineering, March 16, 1919.

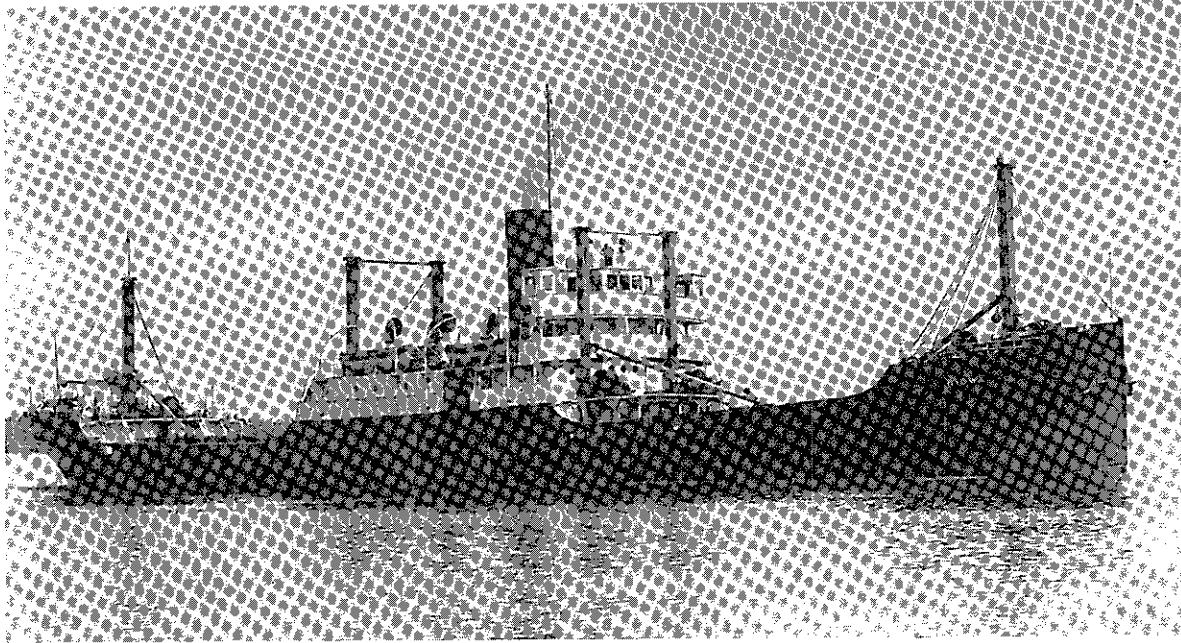


Fig. 4.33. This steamer shows typical ocean freighter silhouette, distinctly different from Lakes craft. University of Detroit Marine Collection.

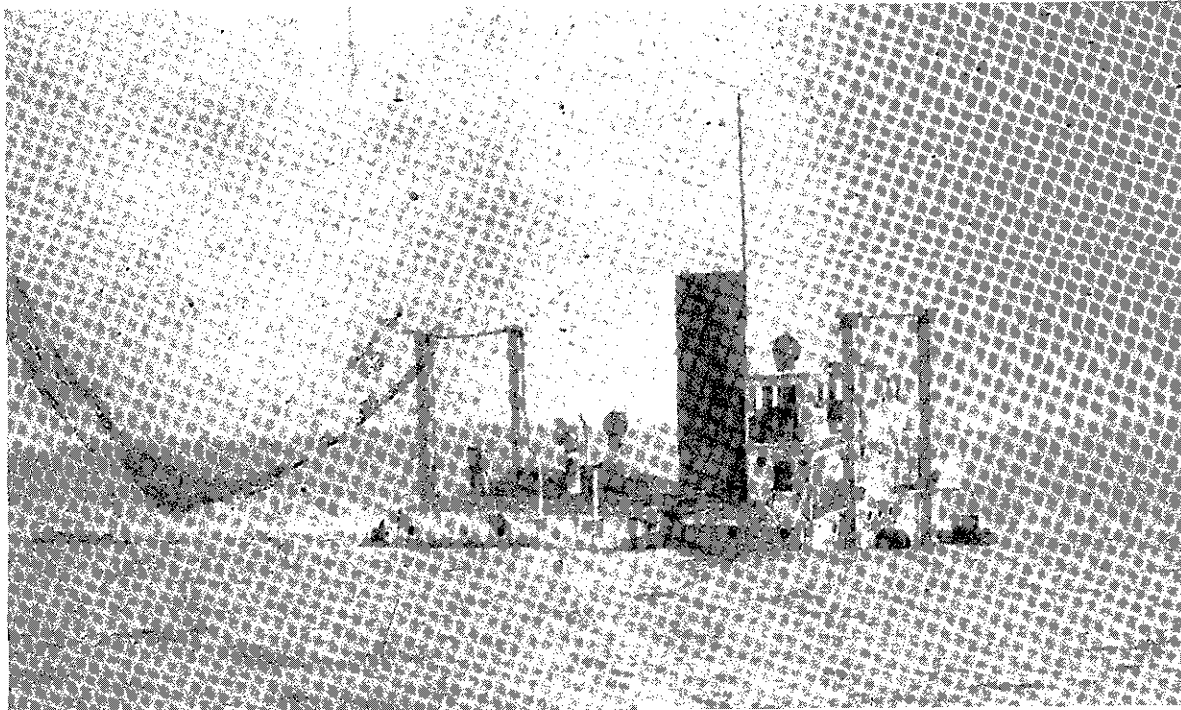


Fig. 4.34. A rare view captures the sunken and abandoned KIOWA wreck. Milwaukee Public Library Collection.

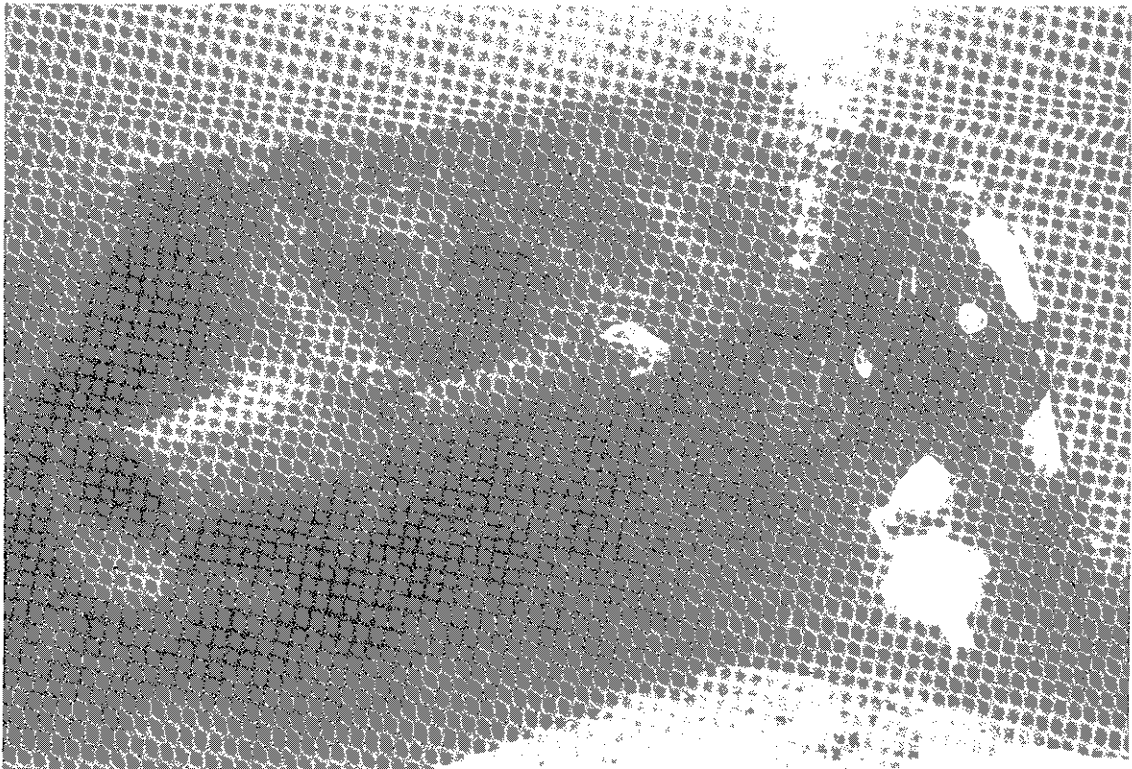


Fig. 4.35. Overturned windlass lies in wreckage of ship's bow. Photo by Ken Vrana.



Fig. 4.36. Diver examines details of steam pumps in the KIOWA wreckage. NPS photo by Michael Eng.



Fig. 4.37. The KIOWA site plan.

cast and forged steel, bronze, brass, copper and babbitt metal, all lying on a bed of sand and small rocks. The ship's bilge or tank top underlies the whole area, in places exposed and in others under several inches or a foot of sand. For much of the after end of the ship, the tank-top plating is intact, although it is torn up in places, exposing the "floors" or bottom frames.

Auxiliary equipment in the midships portion of the ship included several steam pumps, ballast pumps and injectors. There are also electrical dynamoes, refrigeration compressors, air pumps, ballast manifolds and every conceivable size and description of piping. Large condensers and distillers are reminders that the KIOWA was an ocean ship designed and outfitted for salt-water service because such devices were seldom used in lakes craft, which drew fresh water from the lake for boilers, sanitary systems and drinking.

None of the ship's masts, deck machinery or rigging was found at the site. It appears that the ship was stripped to the waterline by salvagers and scavengers. The superstructure and all associated fittings and appurtenances are also conspicuously missing. The ship's plans illustrate at least eight steam winches on deck at the time, four heavy kingposts and tons of rigging. No signs were found of ship's instruments, running lights or the bell, and there are no oral traditions in the Munising area about their removal. As far as is known, no salvage was documented in local newspapers.

MARY JARECKI

The first wreck east of Twelve Mile beach is the wooden bulk freight steamer MARY JARECKI, victim of an 1883 stranding. The ship, heavily-laden with iron ore, ran ashore in a fog off the mouth of the Hurricane River, where the remains may still be seen today, resting on the bare sandstone bottom just outside the breakers. The long oak keelsons, studded with iron treenails, are just above water.

History

MARY JARECKI was an ore boat or "bulk freighter" built in 1871 at Toledo by Bailey Brothers for the firm of Shepard, Henry & Co. of Erie, Pennsylvania. The ship was named for the wife of one of the owners and was awarded U.S. official number 90271. It seems to have been a single-decker although the more common configuration consisted of two decks. The ship was fitted with two masts and one very tall smokestack. It had a raised poop deck and a very small pilothouse on the forward end of the main deck. The JARECKI did not have a raised forecastle, only a small bulwark around the bow. It measured 179.6 feet in length, 32.7 feet beam and 13.2 feet depth, with gross tonnage of 502.30 (Temporary Enrollment No. 3 issued at the port of Toledo on May 10, 1871). According to an inspection report prepared in 1879 (Certificate of U.S. Steamboat Inspection Service issued at Erie, May 1, 1879; Institute for Great Lakes Research, Perrysburg), it was provided with a single-cylinder non-condensing high-pressure steam engine from the T & J McGregor Iron Works of Detroit that had a 27-inch cylinder and a 32-inch stroke. The ship's boiler was an 8-by-18-foot tubular marine boiler.

Upon completion at Toledo, the ship appears to have been towed to Detroit for the installation of machinery. The Detroit newspapers described the event:

The new steamer MARY JARECKI is just receiving her finishing touches, and will clear in a day or two for a Lake Superior port. She is one of the staunchest steamers every built at Toledo. Her cabin is on the upper

deck, which extends about one-third the length of the boat. It is furnished in good style, is large, and well arranged and will afford comfortable quarters for the officers and about 40 passengers. Her fuel will be carried on deck, leaving her hold clear for ore. She has also been provided with sails. She is painted green with white upper works, and carries two masts (Detroit Free Press, May 13, 1871).

JARECKI was valued at \$46,000 (June Supplement to 1871 Classification List) and rated "A1."

Shepard, Henry & Co. were prominent shippers of coal and iron ore and, soon after completion, they engaged the new steamer in the trade between Escanaba, Michigan and Erie, carrying coal up the Lakes and ore back down. While JARECKI was still on the stocks, they engaged the same builders to construct a large schooner-barge as a tow consort (Detroit Free Press, May 13 and Jul 11, 1871). FRED KELLEY was launched for that purpose in July of the same year. The two were paired together in the Escanaba trade for the remainder of 1871, when KELLEY was rebuilt as a steamer, too. Two brand-new barges were built in 1873, one for each of the steamers (Erie Morning Dispatch, November 2, 1872). M.R. WARNER was built to be the JARECKI's consort and ran with it for the next 10 years. The steamer carried 1,000 tons and the barge nearly 1,500 tons. The 200-foot WARNER was described as one of the largest craft of the type (Detroit Free Press, May 11, 1873).

It was typical in nineteenth-Century Lakes navigation that commercial craft were subjected to the risk of frequent accidents, and the JARECKI was no exception to the rule. On October 30, 1872, it ran onto shoals at Summer Island on Lake Michigan in heavy fog. It was released only after much of the cargo was lightered off (Chicago Inter Ocean, October 31 and November 5, 1872). The MARY JARECKI was ashore at Rock Falls, Michigan, on Lake Huron on October 5, 1874, along with the barge WARNER, reportedly having strayed off course due to smoke from forest fires. JARECKI was pulled off on October 12 and taken to Detroit for some \$2,000 worth of repairs (Toledo Blade, October 14, 1874), and it appears that M.R. WARNER was not salvaged until the following spring. JARECKI suffered an explosion in the steam syphon while sheltering at Washington Harbor on Lake Michigan on October 5, 1880, badly scalding two crewmen (Chicago Inter-Ocean, October 10, 1880).

The ship was considerably rebuilt at Erie in 1879. The records indicate that it was given a second deck, thereby deepening the hold and increasing cargo capacity to 1,200 tons. The gross tonnage was increased from 502.80 to 645.64, and the value from \$23,000 to \$28,000 (Permanent Enrollment No. 11, issued at the port of Erie April 19, 1880; Lake Hull Register, 1879; and Vessel Classification, 1882). JARECKI's original carrying capacity was modest, even by the standards of that day, and except for the fact that it was paired with some capacious and efficient consorts, such as WARNER, it could hardly have been a good money-maker. Following reconstruction, it would have been competitive with other bulk freighters of the same size. There are hints that the steamer may also have been underpowered for its size (John E. Poole notes, Institute for Great Lakes Research, Perrysburg).

In 1880, JARECKI was sold by Shepard, Henry & Co. to John R. Barker of Chicago, who also purchased the schooner C. A. KING for its tow. The pair were employed carrying iron ore from Marquette to Milwaukee for the rolling mills there (Herman G. Runge notes, Milwaukee Public Library). In spite of the 1871 newspaper reference to JARECKI's maiden trip to Lake Superior, it appears that it was only at this time that the ship began regular trips to that place.

MARY JARECKI ended its career abruptly in the summer of 1883. It was bound down the Lake from Marquette with Capt. Anthony Everett in command, and the holds full of heavy ore. Steaming into thick fog on July 4, the ship strayed south of its intended course and plowed ashore about a mile and a half west of Au Sable Point and several hundred feet off the beach.

A STEAMBARGE STRANDED - The steambarge MARY JARECKI, bound down with a cargo of ore, taken on at this port, ran on the rocks at Point Au Sable the morning of the 4th. She was under full headway at the time, the weather being thick, and the captain from some cause unaware that his vessel was considerably out of her course. Her momentum was sufficient to carry her nearly three feet out of the water in front.

After the mishap, the captain proceeded to Sault Ste. Marie, and got the tug MYSTIC to go to her assistance with a lighter and steam pump. They worked the pump a large part of Saturday without lowering the water an inch, when the tug left her, it being apparent that she was too badly broken up below to be saved. She now lies where she struck, the captain and crew having deserted her.

There was \$20,000 insurance on the vessel, and her owners have abandoned her to the underwriters, choosing to regard her as a wreck, which she probably is, the belief being that she is broken amidships.

The JARECKI was built at Toledo in 1871, was repaired quite thoroughly in 1880, ranked as A2, and was valued at \$28,000. Her cargo was of Erie ore, delivered to the purchasers here. Whether the ore was insured or not by the owners we have not succeeded in ascertaining (Marquette Mining Journal, July 14, 1883).

It is not clear whether or not JARECKI had the consort-barge in tow at the time of the accident, but C. A. KING does not appear to have stranded when the steamer did.

Besides being stranded, the ship had hull damage and was taking on water. Some repairs would have to be made on the spot, and much of the heavy cargo would have to be removed. The salvagers did not come immediately, and three days later vesselmen reported a heavy northwest wind blowing; they predicted that the ship would go to pieces (Chicago Inter-Ocean, July 7, 1883). A telegram was published in the papers a few days later:

Special to the Inter Ocean - The steambarge MARY JARECKI, on Point Sable, Lake Superior, has been abandoned. She is raised amidships, and probably is broken. Her boiler has shifted. One steam pump could not lower the water. The captain is in Sheboygan and the crew at the Sault. Everything possible will be saved (Chicago Inter-Ocean, July 10, 1883).

and later:

The Detroit Free Press says the tug OSWEGO was expected to leave last night for Lake Superior to rescue the steambarge MARY JARECKI, ashore with a cargo of iron ore at Point Au Sable. She takes with her the lighter VAMPIRE, together with steam pumps, a diver, hawsers, and everything that may prove necessary in releasing the stranded steamer. The JARECKI was abandoned some days ago, and is said to be in very bad condition (ibid, July 14, 1883).

Over a month later, the wreckers had not yet succeeded:

The wrecking tug KATE WILLIAMS has been at work on the wrecked propeller MARY JARECKI for the past couple of weeks, and she may have been got off by this time. The tug was provided with a full wrecking outfit and a force of divers. The bottom was found to be in a badly damaged state, being pounded full of bad holes, which the divers were patching up at the last report we had from there. When this was done, six large steam pumps were to be set to work pumping the water out of her, and an attempt then made to raise her with pontoons. The captain in charge anticipated no difficulty in raising her, and thinks that he will deliver her at the dry docks in a short time (Marquette Mining Journal, August 25, 1883).

The efforts of the best wrecking personnel on the Lakes were to little avail, as the steamer was so badly twisted and the bottom so badly damaged that it could not be made to float. As a result, the insurance companies decided to give up any further attempts at costly salvage work and to recoup some of their losses by simply selling the wreck:

Crosby & Dimmick offer for sale the wreck of the steambarge MARY JARECKI, including engine and boiler, as she now lies on Point Au Sable, Lake Superior . . . All bids should be addressed to No. 35 Central Wharf, Buffalo (Chicago Inter Ocean, August 21, 1883).

The firm of S. A. Murphy & Co. of Detroit contracted to remove the machinery from the ship (Detroit Free Press, August 25, 1883). At least part of the cargo and most of the usable machinery and tackle were recovered, and a September storm finally broke up the ship (Log of the Au Sable Light Station, Records Group 26 in U.S. National Archives). A salvage tug was reported recovering further items of value from the site as late as the summer of 1884 (Marquette Mining Journal, July 4, 1884). The ship was valued at \$28,000, although insured for only \$20,000, and the cargo insured at \$12,000.

Site Description and Analysis

JARECKI's remains today consist principally of a 140-foot section of bottom, lying in water no more than 6 feet deep, about 200 yards east of the mouth of Hurricane River. The wreckage lies at right angles to the beach and about 50 feet offshore, on a flat sandstone bottom with a light covering of gravel and cobblestones. The wreck lies on a compass heading of approximately 320° with the bow out. It shows no evidence of machinery mounts nor the irregular frame-spacing characteristic of the machinery spaces, and so there is every reason to believe that it represents the bow of the ship rather than the stern. The historic newspaper accounts indicate that the hull was arched and breaking, and that appears to have happened just forward of the engine and boiler room, chronically a weak point in steamship hull structure. Some very heavy pieces of iron ore were found resting in the wreckage, further indications that this portion of the ship was the cargo hold. With a length of 140 feet, this section of hull represents approximately 75 percent of the overall length of the ship.

There has always been some contention about the identity of this wreckage. As a matter of fact, there are relatively few diagnostic features to support the argument that it is the JARECKI, but there are enough to be fairly certain nevertheless. First of all, the ship is a bulk freighter because it has a series of parallel longitudinal stringers or "side keelsons," a feature peculiar to bulk freighters. Secondly, there is iron ore in the ship and lying along the beach for several hundred feet in the direction of Hurricane River, and only the SITKA, the UNION and the MARY JARECKI were known to have wrecked

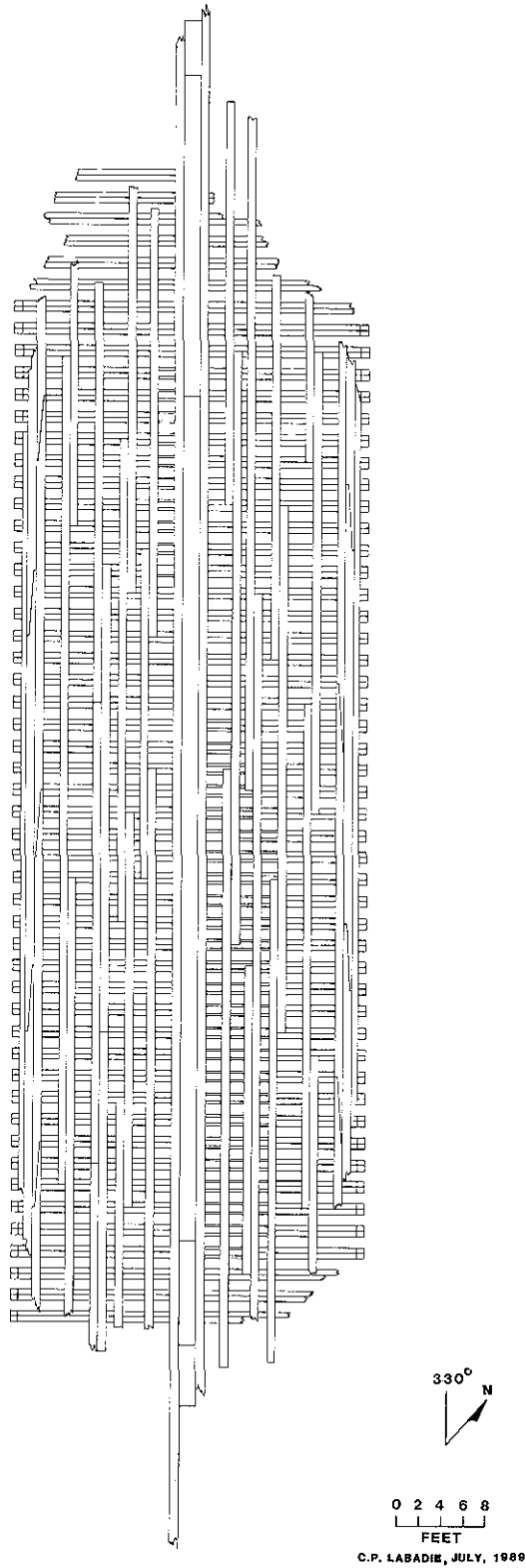


Fig. 4.38. The MARY JARECKI site plan.

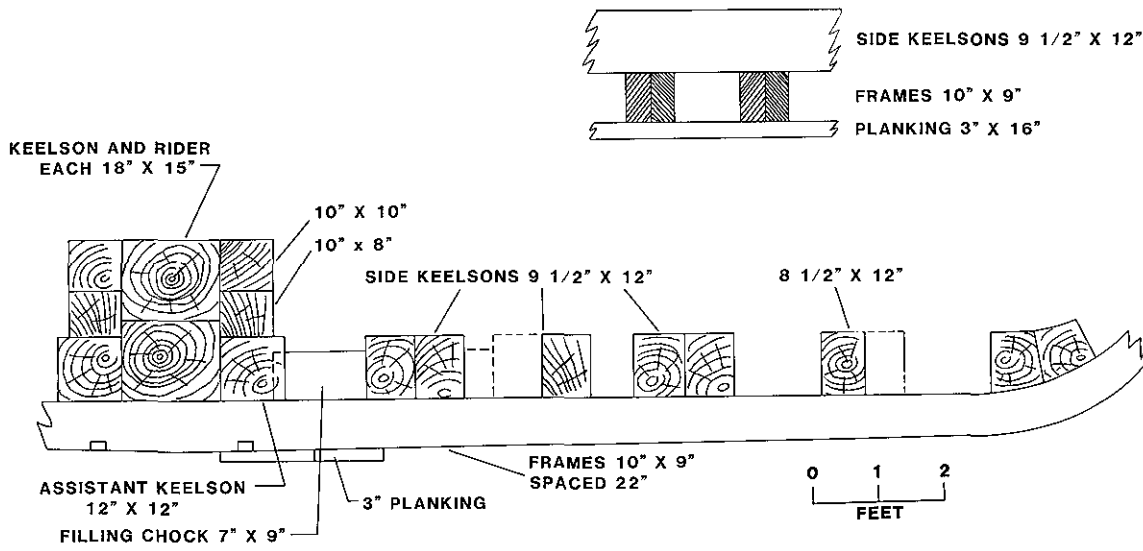


Fig. 4.39. The MARY JARECKI cross-section.

with ore in the vicinity. Inasmuch as the Hurricane River wreck has a width of at least 28 feet, it is too wide to be the UNION and too narrow to be the SITKA. Finally, the wreck does not have the diagonal steel strapping typical of Lakes freighters after about 1880, which is known to have been used in the SITKA and the GALE STAPLES, the other large Au Sable wrecks. Those arguments rule out all but the MARY JARECKI. The method of framing observed in the Hurricane River wreck is similar to that seen in other 1870s freighters, with transverse frames that are relatively narrow in their siding (width). A second feature that seems characteristic of that period is side keelsons that are lap-jointed, longitudinally rather than scarph-jointed as they are in later ships.

The hull is characterized by conventionally built transverse frames spaced 22 inches on centers, and made up of doubled futtocks. Each frame measures 10 inches in width and 9 inches in depth at centerline, tapering to only 6 inches depth at the turn of the bilge; this is much lighter than usual. The backbone is composed of 8 longitudinal keelsons of various cross-sectional sizes, stacked in such a way that they make a single girder 29 inches deep and 44 inches wide, running the full length of the hull. There appears to be no iron used in the framing or the keelsons, except for the fasteners, which are 3/4- and 1-inch round iron. Six-foot-long hook-scarphs are used to join elements of the keelsons longitudinally, and each is keyed with a 5-inch hardwood "coak," probably made of locust; some of the scarph joints run vertically through the timbers rather than the common horizontal arrangement.

The longitudinal side keelsons are of special interest. There are eight (four on each side), each measuring 9 inches in width and 12 inches in depth. For much of their length, the side keelsons are doubled, although the doubling is staggered in what appears to be random order. Outboard of the side keelsons, there are heavy 8-inch-thick ceiling strakes at the turn of the bilge. The hull appears to be very strongly built in its longitudinal members, but its transverse or athwartships strength seems very modest by comparison. Most steamers of the JARECKI's dimensions have frames 12 to 14 inches in depth in the bottom, while the steamers are only 9 inches deep. It is in partial compensation for the light frames that transverse "filling chocks" are fitted between the side keelsons at frequent intervals in the bottom, lying on top of the frames and stiffening the whole structure.

The MARY JARECKI was one of the first five or six Lakes steamers built for the iron-ore trade, but it was different from any of the other bulk freighters. It was single-decked like the earlier steam barges built for lumber cargoes, although it was large like other bulk freighters and fitted with the special standardized hatches for the ore docks. The design was more transitional than any other Lakes craft, having some of the characteristics of both vessel types. The JARECKI's reconstruction in 1879 made it more of a conventional bulk freighter, and yet its remains provide our generation with a wealth of information about the evolution of the type. The wreck shows elements of steam barge and of bulk freighter design, and it demonstrates how 19th-century shipwrights solved hull-strength problems imposed by that evolutionary leap. The ship's designers chose to make the long hull strong by incorporation of numerous heavy keelsons. The architects of other early bulk freighters chose to make their craft stiff and strong by incorporating two decks. The latter alternative proved to be the most practical, and it is to this day the general pattern for bulk freighters on the Great Lakes. After a few years of operation, the JARECKI was altered to adopt that design.

About 300 feet east of the MARY JARECKI's hull bottom, there is another section of wreckage very close to the beach that appears to be from the same ship. This feature measures 10 by 33 feet overall. It includes about a dozen frames and 10 strakes of planking. The piece has a slightly convex shape to its upper surface, suggesting that it

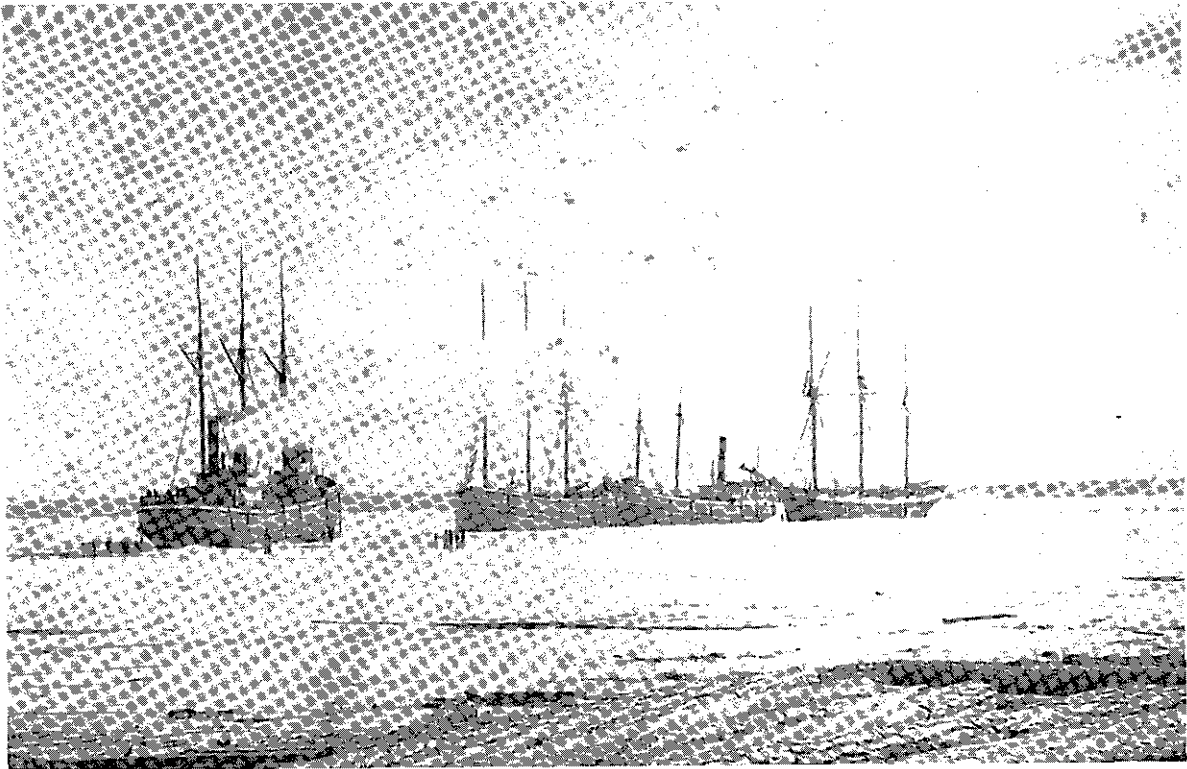


Fig. 4.40. The JARECKI (third from left) is shown with the consort M.R. WARNER in the late 1870s, stuck in the ice. Delta County Historical Society Collection.

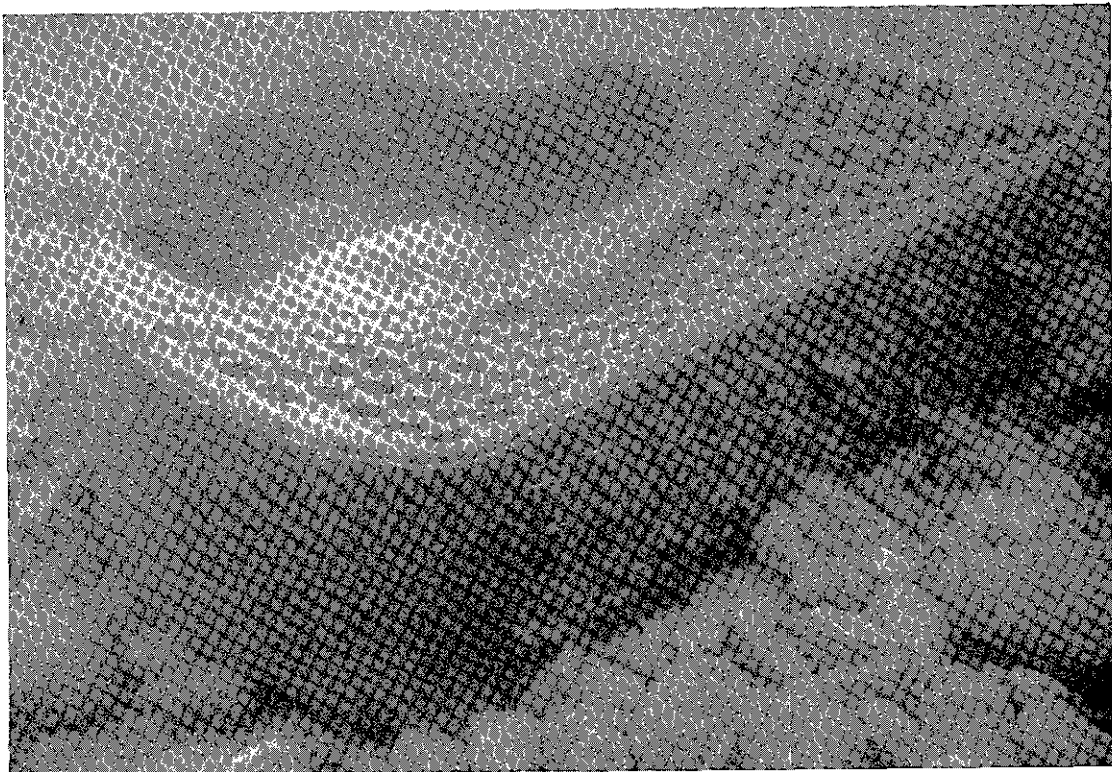


Fig. 4.41. This tube sheet is the internal portion of a boiler believed to be from the MARY JARECKI. Photo by Ken Vrana.



Fig. 4.42. Wreckage found near Hurricane River appears to suggest construction with small frames. NPS photo by Toni Carrell.



Fig. 4.43. This 1966 view shows the same section before frames were eroded by sand and gravel. Photo by Julius F. Wolff Jr.

represents some part of the side of the ship. There are no planks on the upper (outer) surface of the frames, but those on the under (inner) side of the frames, the ship's ceiling, measure 4 inches in thickness and from 12 to 16 inches in width. The frames are built up in the usual fashion, with paired futtocks and, as in the ship's bottom nearby, they are spaced at 22 inches on centers. The frames are sided 10 inches and moulded 7 inches. Fasteners are all 3/4-inch round or 3/8-inch square iron.

This section of wreckage gives the appearance of very light construction, and suggests a small vessel of 100 to 150 tons, although the width of the planking (12 to 16 inches) is not compatible with a small ship. In fact, the action of waves, sand and ice have reduced the size of the frames through decades of exposure. Slides taken during the mid-1960s show the same wreckage with far more substantial frames, still full-bodied and square in cross section. The appearance of the same frames in 1988 was rounded, eroded, and much diminished in size. The larger size of the frames and the spacing, makes the piece compatible with JARECKI's bottom structure. The hull section is narrow, and it has neither the bilge curvature from the bottom portion of the sides, nor the deck-support features from the top of the sides, but only the mid-section of the sides. Construction of the sides at deck-level would be of very great interest because the clamps and shelves, those longitudinal members supporting the deck beams are among the most important structural elements of a wooden hull. Much attention was clearly given to longitudinal strengthening by MARY JARECKI's builders, and the broken remains tell us much of their ingenuity.

Not far removed from the JARECKI's hull bottom and the apparent side remains lie several other features scattered about on the flat sandstone bottom, some probably from the same vessel. A considerable quantity of ore may be found along the shoreline west of the wreck, as mentioned above. This ore was sampled and found to be similar to that found in MARY M. SCOTT at Sand Point, being a hard silver-gray granular rock. It proved to be a muscillite specularite schist from the Republic Range near Ishpeming (George Spencer, personal interview at Duluth, March 11, 1989).

There are grooves in the rocky Lake bottom, all parallel to the shoreline, evidence that the 140-foot section of wreckage has migrated in an easterly direction along the beach from some earlier position nearer Hurricane River. Several hundred feet offshore there are numerous sections of iron pipe and a scattering of steel sheets about 5x8 feet in dimension. It is suspected that these are elements of JARECKI's machinery, perhaps portions of the boiler-sheathing; they may offer a clue to the exact location of the ship's stranding. Today they lie in 15 to 20 feet of water, slightly more than the ship would have been drawing with a full load of ore. With what is known of the currents along the shore and the movement of ice during the winter months, it would not be surprising to find the remainder of the ship's stern in slightly deeper water just to the west of the Hurricane River and west of the debris field just described.

Another feature that may be part of the JARECKI is the tube-sheet from the smoke-chest of a firebox boiler. This was found in 6 feet of water about 150 feet west of a small point of rocks and some 300 feet east of the 140-foot hull section. The piece measures 6-feet by 7-feet 1-inch across the face, and it is 2 feet 6 inches in depth. It is pierced for 130 3-inch tubes, and apparently fitted for either 3 or 5 flues. The JARECKI was reported by the Steamboat Inspection Service to have an 8-by-18-foot boiler, and this internal section may be a portion of it. Wreckage that appears to be tubes, staybolts and shell-plates farther offshore support the theory that the JARECKI's boiler was destroyed rather than salvaged.

ONEIDA CHIEF

Three different schooners were reported to have wrecked west of Au Sable Point in the general vicinity of Hurricane River. The smaller section of wreckage near the JARECKI's bottom was thought to have come from one of them. Julius F. Wolff Jr. (Wolff 1979:27) suggested that the wreckage came from the ANNIE COLEMAN, a small schooner reportedly wrecked in a fog on July 19, 1879 (Marquette Mining Journal, July 26, 1879). Another possibility is suggested by an entry in the log of the Light Keeper at Au Sable Point in July 1896:

The schooner VOLUNTEER was wrecked on the beach 4 miles west of the lighthouse on the 15 (sic) in a gale from the N.W. (Official Log of the Au Sable Light from Records of the U.S. Coast Guard, Records Group 26, U.S. National Archives).

Interestingly, the author of this publication has been unable to find any information at all on schooners of either name. Although neither story can be entirely discounted, there is some doubt that ANNIE COLEMAN or VOLUNTEER ever existed.

The 10-by-33-foot section of wreckage is believed to have come from JARECKI, but one more possibility exists. The schooner ONEIDA CHIEF is known to have wrecked in the vicinity of Au Sable Reef on May 31, 1868, carrying a load of pig iron. A single weather-worn pig was found only a few hundred yards from the wreckage during the 1988 field investigations. The 16-inch cylindrical billet was discovered in 8 feet of water about 500 feet offshore on a compass bearing of approximately 260 degrees from Au Sable Point Lighthouse, or a thousand feet from the wreckage, on a flat, nearly featureless sandstone bottom with a few shallow pockets and ridges sheltering gravel and debris.

History

The ONEIDA CHIEF was a two-masted wooden schooner of 127 feet length and 252.60 gross tons (at the time of loss). It was slightly smaller than the "canallers" BERMUDA, MARY M. SCOTT, ELMA and WABASH, which also wrecked in the Park, but was certainly built to trade through the old Welland Canals. The ship's early history is confused due to errors in official records and the loss of others. Several sources indicate that the ship was built in 1847 at Clayton, New York by John Oades (Lake Vessel Registers, 1860, 1863, 1864 and 1866), but no official documents have been found to substantiate that fact, in spite of careful and repeated searches. The indices (Abstracts of Enrollments for Great Lakes Ports, 1816 and 1911, Records Group 41, U.S. National Archives) fail to show any record of the ONEIDA CHIEF between 1847 and 1855. The first document shown for the ship is dated April 2, 1855 (Permanent Enrollment No. 32, issued in the District of French Creek, New York), with the notation "new." It appears that the compilers of the Lake Vessel Registers confused the ONEIDA CHIEF with the earlier schooner ONEIDA, which was built at the same shipyard and lost in a collision with the steamboat in the fall of 1853.

If we are correct, the ONEIDA CHIEF was built by Oades at Clayton in the winter of 1854-1855 for D.C. Pierce of Cape Vincent (New York). It was enrolled in his name in the French Creek District on April 2, 1855, with a tonnage of 266-46/95, according to the old style of Customs-House measurement (pre-1864). Because none of the ship's documents before 1862 have survived, there is no record of the original dimensions. There is a slight but seductive possibility that the older ONEIDA was recovered after its 1853 sinking and rebuilt the following year as the ONEIDA CHIEF; that would explain the confusing entries in the Lake Vessel Registers, which are ordinarily authoritative records.

Following is a summary of the enrollments for the ONEIDA CHIEF:

April 2, 1855 - French Creek (NY) District; D.C. Pierce, owner.

April 26, 1856 - Same owner and district

April 2, 1857 - Same district, D. Mather, manager owner

April 13, 1858 - Same district, D. Mather and A.F. Barker, owners

April 1, 1859 - Same district, same owners

August 21, 1861 - Same district; vessel rebuilt, 334-26/95 tons, 126 feet 0 inches length, 24 feet 8 inches beam and 11 feet 7 inches depth, same owners

August 14, 1862 - Milwaukee District; Frederick L. Wells of Port Huron, Michigan, managing owner

September 22, 1862 - Detroit District; Frederick L. Wells and Edmond Fitzgerald of Port Huron, Michigan, owners

April 24, 1865 - Detroit District; vessel readmeasured according to new customs laws; 127.0 feet length, 24.9 feet beam and 11.0 feet depth; 252.60 gross tons, owners above

June 27, 1866 - Detroit District; John Hibbard of Port Huron and Wm. B. Hibbard of Milwaukee, owners

March 9, 1868 - Milwaukee District; Charles H. Wheeler and Oliver W. Gunnison of Milwaukee, owners

Although the records leave many questions about the ONEIDA CHIEF, they do leave us with several fascinating facts. The ship's original owner, D.C. Pierce, was an interesting figure who owned several brigs and schooners at Cape Vincent, New York. He was among the first Great Lakes vessel owners to trade overseas when the St. Lawrence Canals opened to American vessels in the 1850s. Pierce made handsome profits in coastal ports in the United States and as far away as Liverpool and Hamburg by selling Lakes cargoes, or even the ships themselves. As far as is known, the ONEIDA CHIEF was not used in the ocean trades, although several other Pierce vessels were, between 1859 and the mid-1870s (John E. Poole notes, Institute for Great Lakes Research, Perrysburg, Ohio).

The ONEIDA CHIEF was involved in a variety of "scrapes" as were all ships in that era, but one incident stands out, described in contemporary newspaper articles:

The schooner PERSEVERANCE of the Lake Navigation Company and the schooner ONEIDA CHIEF collided off Point Aux Barques on Sunday night, the 18th inst. The PERSEVERANCE was loaded with wheat from Waukegan for Buffalo. Her bowsprit and headgear were carried away, the stem nearly broken off, and her rails broken. She reached Detroit leaking badly and in tow of a tug, with pumps going constantly. She went into drydock without discharging cargo, which will be damaged.

The ONEIDA CHIEF was upbound. She was struck just aft of the fore-rigging and was badly stove in, causing her to leak badly, too. She also reached Detroit Tuesday afternoon in tow and will have to go into the dock (Detroit Daily Advertiser, October 2, 1857).

Both vessels survived to sail again.

We know from the abstracts and enrollments that the ship's tonnage was increased from 262-49/95 to 334-26/95 tons (old style) in 1861, and we may assume that the ship was lengthened at that time. This was not entirely uncommon in spite of the complicated nature of the task with wooden hulls, and it is still done with steel ships today. Because the older documents for the ONEIDA CHIEF are no longer in existence, we do not know the vessel's original length.

From 1863 to 1865 the schooner was owned by Capt. Edmond Fitzgerald of Port Huron, who was also the ship's master. Fitzgerald was the oldest of six brothers who were all Lakes captains (Cutler 1986:11ff), and he achieved wealth and prominence as a ship builder and owner. He was the grandfather of Edmund Fitzgerald of Milwaukee, for whom the famed large twentieth century lakes freighter was named.

The ONEIDA CHIEF was wrecked at Au Sable Point on May 31, 1868. The accident was detailed in the papers a few days later:

TOTAL LOSS OF THE SCHOONER ONEIDA CHIEF - Chas. H. Wheeler, Esq., of this city, yesterday received a letter from Capt. Adiam of the ONEIDA CHIEF, dated at Sault Ste. Marie, announcing that his vessel ran ashore upon Point Sable, Lake Superior, last Saturday morning, and soon after striking broke in two and became a total wreck. The crew escaped to the shore with difficulty, as quite a heavy sea was running, and the coast is very rocky. Before starting for their homes, Capt. Adiam and his crew stripped the vessel of her canvas and running gear. The underwriters will no doubt secure the remainder of her outfit as soon as possible. The ill-fated vessel was bound from Marquette to Cleveland with a cargo of pig iron. She is insured in the Security and Western Companies of Buffalo for \$10,000, which will nearly cover the loss. Her cargo was probably uninsured . . . (Milwaukee Sentinel, June 5, 1868).

A second note followed a few days later:

THE ONEIDA CHIEF - The Detroit papers state that the ore cargo of the ill-fated schooner ONEIDA CHIEF was insured for \$19,000. It is quite probable that a large portion of the cargo will be recovered . . . (Milwaukee Sentinel, June 8, 1868).

Site Description

The only evidence of the ONEIDA CHIEF's remains appears to be the single pig of iron discovered during the 1988 field work, and even that cannot be irrefutably attributed to the ship, although no other craft are known to have wrecked in the vicinity with such a cargo. Furthermore, the iron pig offers only the barest clue about the location of the ship's stranding because of the time elapsed since the loss and the known propensity of Au Sable wreckage to move considerable distances. Local tradition indicates that commercial fishermen from Grand Marais were aware of iron pigs on the west side of Au Sable Reef and recovered large quantities for use as anchors. One former Grand Marais resident recalls piles of the pigs alongside a fisherman's shack on the waterfront in the 1940s (James G. Becker, personal interview, March 15, 1989).

The iron pig found during 1988 was approximately half way between Hurricane River and the Au Sable Point Lighthouse. Consistent movement of waves and ice from west to east suggests that the site of the ONEIDA CHIEF's wreck would be west of that location, or in the same general area as MARY JARECKI's remains. There is virtually no sand or gravel at Hurricane River to conceal wreckage, and so the assumption might be made that the ship's remains are either offshore or entirely consumed by time and tide. A detailed search of the whole area from Hurricane River to Au Sable Reef would help to clear up questions about both JARECKI and the ONEIDA CHIEF, and perhaps to establish whether or not ANNIE COLEMAN and VOLUNTEER really exist.

SITKA

The reef at Au Sable Point hides more secrets than any other area of Pictured Rocks National Lakeshore. Historical records indicate that there have been at least 21 strandings on the reef, although most of the vessels were pulled off. Many of the accidents resulted in jettisoned cargo or accidental loss of deck equipment, but three relatively large ships became total losses there. They are the steambarge UNION and the wooden bulk freighters SITKA and GALE STAPLES. The schooner ONEIDA CHIEF cannot be far from the western extremities of the reef, either, and portions of that wreckage may very well be mingled with the remains of the three steamers.

History

The bones of SITKA and GALE STAPLES are largely mingled, and they present some interesting problems in differentiation. In many ways, the two craft were much alike. Both of the ships were double-decked wooden bulk freighters. Each had four masts originally, and two in later life. SITKA was built in 1887 and STAPLES in 1888, and their yards were just 150 miles apart. SITKA was 272 feet long and STAPLES 277. Each of the ships had two boilers and two smokestacks. Before the present investigations, little was known about the two craft that could easily distinguish them, but some important differences emerged that have made their identification relatively simple.

Capt. Thomas Wilson of Cleveland was among the Lakes' most respected and most successful vessel owners in the 1880s and 1890s. Sailing under his banner were some of the finest and largest carriers on the Lakes at the time he ordered SITKA in 1887, including the Lakes' first steel-hulled ore carrier, SPOKANE. In 1887 alone, he built for his fleet the steamers MISSOULA, SITKA and YAKIMA, and the big four-masted schooner-barges YUKON and ANNABEL WILSON, the most significant growth his company had ever seen in a single year. Wilson also had several partners who owned shares in his ships (Meakin 1988:1ff).

SITKA was built by the well-known firm of F.W. Wheeler & Co. at West Bay City, Michigan. It measured 272.55 feet in length, 40.50 feet beam and 19.40 feet depth of hold. The gross tonnage was 1,740.57 and net tonnage 1,227.73 (Temporary enrollment No. 22, issued at the port of Port Huron, Michigan on August 16, 1887 from Records Group 41, U.S. National Archives). The ship was patterned after two earlier Wheeler-built freighters, F.W. WHEELER and W. H. GRATWICK, and was reportedly built from their plans (Marquette Daily Mining Journal, August 17, 1887). According to the first enrollment, the ship was owned in the following shares:

Thomas Wilson of Cleveland, Ohio
Oscar T. Flint of Buffalo, New York

4/16

4/16

David Morgan of Republic, Michigan	2/16
B. L. Powers of Cleveland, Ohio	2/16
W. D. Rees of Cleveland, Ohio	1/16
Mrs. D. Morris of Cleveland, Ohio	1/16
R. McLaughlin of Cleveland, Ohio	1/16
and Ed Morton of Perry, Ohio	1/16

Capt. Ed Morton was also listed as master

SITKA was powered by a triple-expansion steam engine from Frontier Iron Works of Detroit, with 20-, 32- and 52-inch diameter cylinders, a stroke of 42 inches, rated for 800 horsepower at 85 revolutions. The two boilers were the watertube type from the M. Riter Works of Buffalo. The craft had diagonal steel straps on her wooden frames, a steel boiler-house, steam pumps and a reinforced bow (Great Lakes Register, 1899). SITKA was launched on August 13, 1887, at a cost of \$110,000, was inspected and enrolled three days later, then assigned U.S. official No. 116174 (Herman G. Runge notes, Milwaukee Public Library).

The ship must have been launched with the rigging and outfit complete, because the newspapers reported that just four days after christening, "Capt. Thomas Morton will command Wilson's new steamer SITKA, launched at Bay City on Saturday. She goes to Two Harbors for her cargo" (Marquette Daily Mining Journal, August 17, 1887).

There is no evidence that the steamer towed a consort on that first trip, but it is clear that SITKA was regularly towing the barges ANNABEL WILSON and M. E. TREMBLE a few weeks later in the coal and ore trades.

SITKA was designed and built to earn freight money by carrying big cargoes and towing big barges. It carried 2,600 tons of cargo. During the ship's career, it was paired with some of the largest barges in the trades, both Wilson craft and other chartered vessels. The Wilson barge ANNABEL WILSON was a 180-footer and WADENA was 220 feet long, but YUKON, a 270-footer, was SITKA's usual consort and was one of the largest schooners ever built on the Lakes. During 1888 and 1889, the steamer towed the new steel whaleback barges 101, 102, or 103, built by Capt. Wilson's friend Alex McDougall. McDougall began building the whaleback type vessels in 1888, and two years later he built the first whaleback steamer. Thereafter, McDougall towed his own barges. SITKA was consistently paired with YUKON after that date.

In an apparent effort to increase SITKA's speed and towing capability, it was reboilered in 1890 with a pair of brand-new Cleveland Ship Building Co. scotch boilers. They measured 11 feet in diameter and 12 feet in length, rated for 150 pounds of steam pressure (Great Lakes Register, 1899). In 1890, the ship was rated "A1" and evaluated at \$105,000 (Inland Lloyds' Vessel Register, 1890). It was also in 1890 that SITKA's owners incorporated as the Wilson Transit Co. of Wickliffe, Ohio, with Capt. Wilson as President (Permanent enrollment No. 60, issued at Cleveland, Ohio March 27, 1890); Fairport, Ohio was listed as the steamer's home port.

Thomas Wilson died in March 1900, and in the spring of 1903 his heirs sold SITKA to the Gilchrist Transportation Co. of Cleveland (Permanent enrollment No. 107, issued at Cleveland, Ohio April 14, 1903), because the Wilson fleet was modernizing with the addition of new steel ships. SITKA was given an overhauling at Cleveland with new deck beams and other repairs, although it was rated very highly by the underwriters (Inland Lloyd's Vessel Register, 1902). The steamer rated A1-1/2 and \$65,000, which is very good for a 15-year old wooden ship, evidence that it was well cared for by the original owners.

At the time of loss, SITKA was loaded with ore from Marquette and bound down the Lake for Toledo:

Sault Ste. Marie, Oct. 5 - THE SITKA ASHORE - Tugs and the lighter RESCUE have been dispatched from here to the assistance of the steamer SITKA, ashore at Sable Point, Lake Superior. As the boat is lying in a position exposed to the northwest storm, it is feared that she may be badly damaged (Duluth Evening Herald, October 5, 1904).

Reports continued to come in during the next days:

STEAMER SITKA ASHORE - Heavy fogs and high winds on the upper Lakes were responsible for the number of disastrous accidents to vessels plying those waters yesterday. A fierce northwest storm swept over Lakes Superior and Michigan yesterday and forced many boats to seek shelter. Yesterday's was the first heavy weather vessel captains have had to contend with this fall.

The steamer SITKA of the Gilchrist fleet, bound down with a cargo of ore from Marquette, is ashore at Sable Point, Lake Superior, about 60 miles above Whitefish Point.

A dispatch received at the office of the Gilchrist Transportation Company yesterday stated that the stranded boat was full of water and that the captain had left her. Capt. F. E. Johnson is master of the SITKA (Toledo Blade, October 6, 1904).

The following day the news was worse:

SITKA BROKEN UP; SEAS WASHING OVER THE SHIPWRECKED BOAT - Grand Marais, Oct. 6 - Today's storm on Lake Superior has completed the destruction of the steamer SITKA, stranded on Big Sable Point. The big seas are washing entirely over the craft, and it is believed she will be entirely broken to pieces when the storm has subsided so that wreckers can get to her.

Her crew left the wrecked boat last night before the storm began and are all safe on shore (Duluth Free Press, October 7, 1904).

Another paper commented:

Captain Johnson, master of the steamer SITKA, stranded on Big Point Sable, Lake Superior, wired today that the boat is breaking in two aft of the main mast. Her rudder is gone and the deck houses washed away. Capt. L. H. Weeks, commodore of the Gilchrist fleet, has gone to the wreck (Cleveland Plain Dealer, October 7, 1904).

The Life Savers described the events in some detail:

American steamer SITKA stranded at 6 PM, October 4 on a rocky ledge 9 miles west of [Grand Marais] Station. Upon learning of the casualty, the Life Savers pulled in a surf-boat to the steamer, reaching her at 11 PM. At request of [her] master, a surfman was dispatched to procure tugs, while the rest of the life-saving crew stood by the ship. At 5 next morning the wind and sea so increased as to endanger the lives of those on board the vessel, and loading their personal effects into two yawls, all hands, 17 men, were taken to a sand beach near Big Sable Lighthouse, where a safe landing was effected. The wind had now increased to a gale,

and the sea was running high; the stranded ship soon broke in two, later becoming a complete wreck, and was stripped by wreckers, the surfmen assisting in this work (Annual Report, U.S. Life Saving Service, 1905).

According to historians, the ship was valued at \$45,000 and the cargo at another \$8,225 (Beasons Marine Directory, 1905:22, and Herman G. Runge notes, Milwaukee Public Library). The ship reportedly carried no insurance (Stonehouse 1983:46), not an uncommon practice in two or three of the larger fleets. Insurance premiums took a huge bite out of profits, particularly in the last weeks of the season, when the rates skyrocketed.

One historian notes:

On their way back to Grand Marais, the Life-Savers stopped at the wreck and salvaged her compasses and other valuable navigation equipment . . . The following day, at the request of the master and Capt. Weeks, Commodore of the Gilchrist fleet, the crew in their surfboat was towed out to the wreck behind the tug SCHENCK, and assisted in stripping her of salvagable items (Stonehouse 1983:46).

SCHENCK was the salvage tug dispatched from the Sault a few days before, but no mention was made of the lighter RESCUE at the scene, and so it is not clear just how extensive was the recovery of "salvageable items." The brief mentions in Stonehouse's account and in the Life Savers' report do not give the impression of major commercial salvage, nor has any other mention come to light of a second or later attempt, in spite of the shallow water, the relatively recent manufacture of the ship's machinery, the simplicity of locating the wreckage, and the several weeks remaining in the 1904 navigation season. The fact that Gilchrist operated several other ships of similar design and tonnage at the time also suggests the practicability of recovering usable machinery and tackle from SITKA.

Site Description and Analysis

The reef at Au Sable Point stands out into Lake Superior very nearly a mile from the foot of the white sand bluffs. The reef itself is relatively flat, with a banded red and white sandstone surface. It is almost featureless, marked only here and there with shallow depressions, long fracture lines, or with ridges standing a foot or two above the bottom. *The only loose gravel or debris rests under the ridges and in cracks, or in the little bowls formed by hollows in the soft rock.* The place forms a placid and beautiful seascape when sunlit in the summer months, but it must be a terrible place when huge combers rake its surface in the fall and winter, sweeping in unencumbered from the north and west. Lake Superior stretches unbroken for 150 miles from this place. The reef slopes very gently to lakeward, going from a few inches in depth at the shore to about 15 to 18 feet at its outer edges. It runs generally down the shore toward the west, tapering toward shore down beyond Hurricane River. *Its eastern boundary forms a relatively distinct shelf that runs almost straight northwest from the lighthouse for fully a mile.* The abrupt dropoff on the east side forms a great basin punctuated with tall ridges, undulating sandstone formations and large rocks. It is the perfect place to shelter broken wooden hulls, and a particularly challenging environment for exploration or investigation.

Much of the reef is strewn with the widely-scattered bolts, rods, straps and treenails of wooden hulls. Here and there are boiler grate-bars, furnace doors, nondescript machinery castings, or pieces of pipe -- all the more durable remnants of fragmented ships. About five-eighths of a mile off the lighthouse are two boilers, a rudder, a

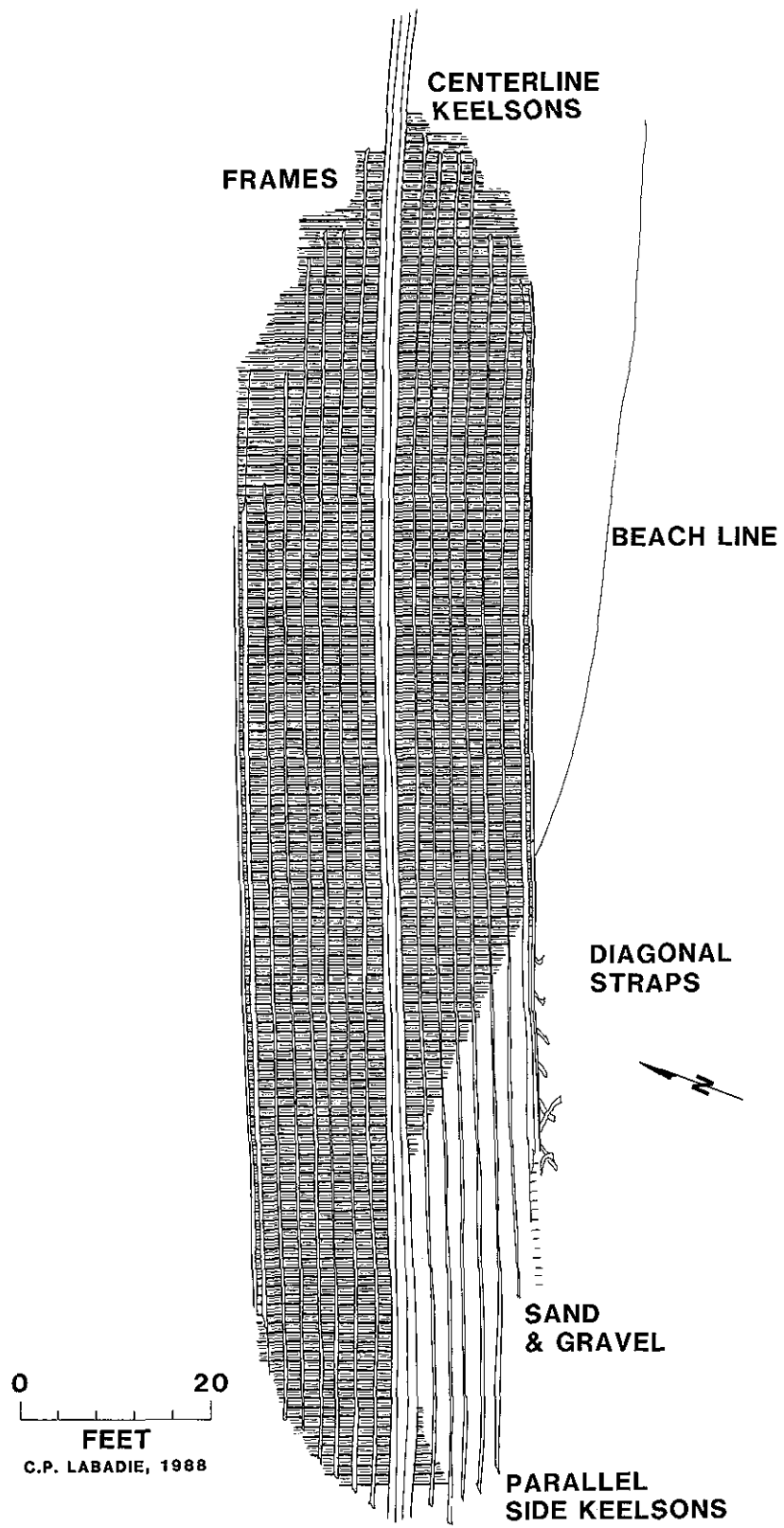


Fig. 4.44. The SITKA hull.

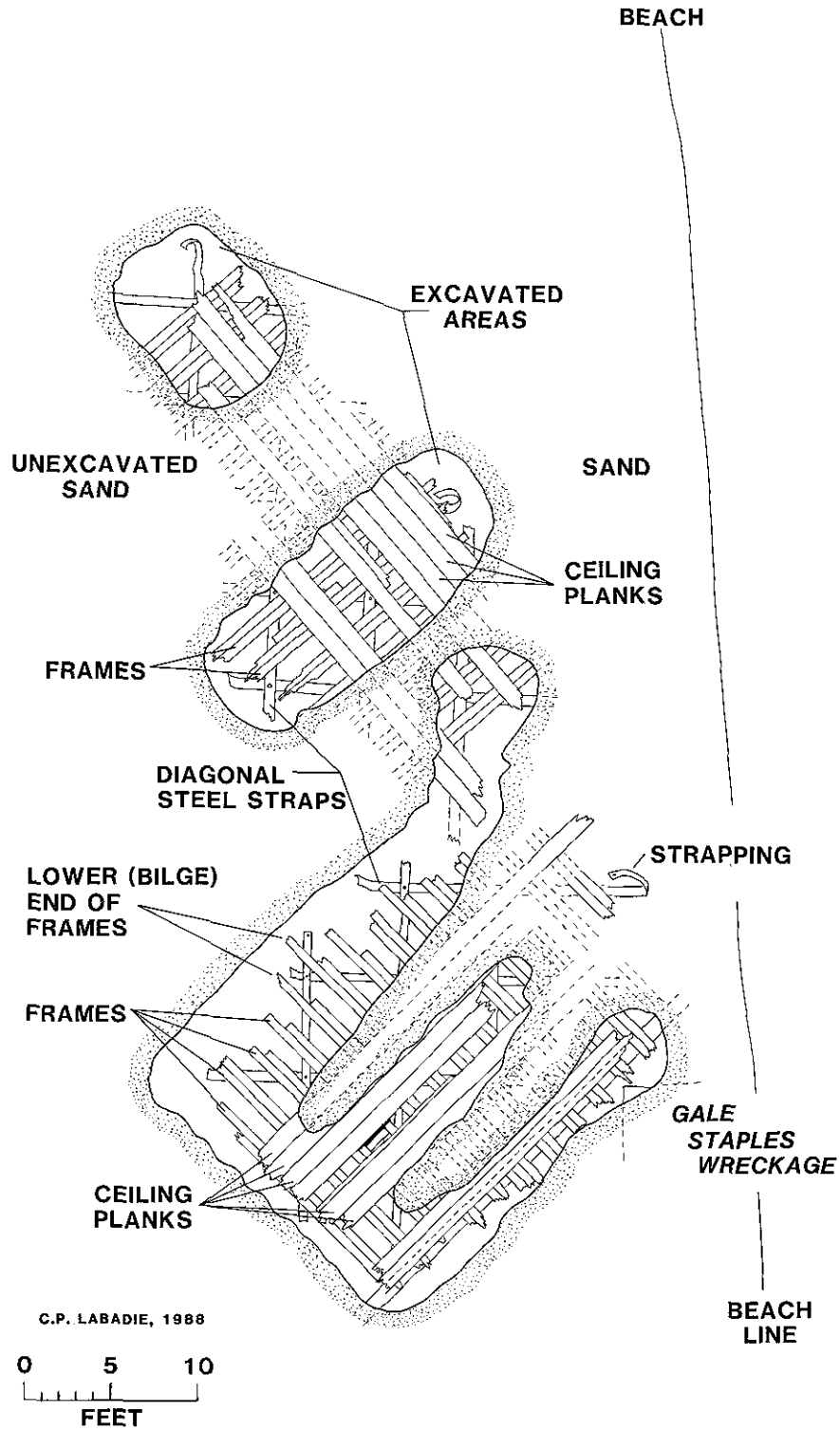


Fig. 4.45. The SITKA site plan.

propeller-wheel, a large field of engine room wreckage, a section of rail, and an iron capstan. All of these artifacts lie within a few hundred feet of each other in 12 or 15 feet of water.

Along shore on the reef are numerous large sections of hull structure, ranging from 30 to about 200 feet in length, some lying in 2 or 3 feet of water and others up on the sand or buried just beneath it. These masses of jetsam range from a point 2,000 feet west of the lighthouse to some 1,000 feet east of it, including at least six large sections and many smaller, loose artifacts. In addition, other sections of wreckage were seen east of the Point, although that area was examined only superficially. There are indications of much more yet to be discovered there.

The question of salvage is not as significant in studying the remains of the ship's hull as it is in sorting out the machinery on the reef. As we shall see later; the hulls are another problem. The confused array of wooden hull sections along the shore at Au Sable Point has long puzzled beachcombers and historians alike. The large section of bottom lying in the little cove a half-mile west of the Lighthouse has been presumed to represent SITKA, while the scattered pieces further east (closest to the Lighthouse) was thought to be UNION and STAPLES, and perhaps pieces of MARY JARECKI. The hull in the cove measures 198 feet in length and 40 feet in width, and so could only be SITKA or STAPLES because of their size; no other craft in the vicinity had so great a beam. There are no known plans in existence for either of the two ships, although plans did surface recently for SITKA's two near-sisters, the F.W. WHEELER and W.H. GRATWICK. These drawings (Hulls No. 30 and No. 31, F.W. Wheeler & Co. drawings, Institute for Great Lakes Research) show construction exactly like that seen in the large wreck, detail for detail. The plans confirm that the wreckage in the cove is indeed SITKA's. It represents about two-thirds of the ship's bottom, corroborating the statement that the ship broke abaft the mainmast or at a point just forward of the boiler room. The hull lies on a compass bearing of 070 degrees with the bow toward the lighthouse in 2 feet of water and the after end on the beach to the west. Nearly 100 feet of the stern is missing.

Construction of the hull is characterized by a backbone built up of several 16-inch centerline keelsons, tripled oak frames, and no fewer than 14 longitudinal keelsons in the bottom. The three principal keelsons form a mass of oak 16 inches deep and 40 inches wide, which runs the entire length of the ship. The builder's plans show that there were originally two more layers of assistant keelsons or "riders" on top of them, making a great spine of oak timbers roughly 3.5 feet across and 4 feet deep. The side keelsons are 8 inches wide and 16 inches deep, providing a great deal of strength in the bottom. At the turn of the bilge, there are six strakes, each 8 inches thick to reinforce that weak portion of the hull. Additionally, there are 3/8-by-5-inch steel straps running diagonally from the bilges up the sides, spaced every 6 feet. Bottom planking measures 4 inches in thickness, although little of it could be exposed for measurement. Frame spacing is 22 inches, and fasteners are 3/4-, 7/8- and 1-inch round and 3/8-inch square spikes. There are also 5-by-16-inch oak chocks fitted between the centerline keelsons and the first strake of side keelsons on every frame. The frames measure 16 inches in depth at the centerline and 12 inches at the turn of the bilge, with three 6-inch futtocks in the bottom and two up the sides.

In an easterly direction from the SITKA's bottom, the next wreckage lies 800 feet away, or nearly midway between the ship's bottom and the Lighthouse. Here, on a small sandy point, are four different pieces at the shoreline and a fifth, smaller section lying just offshore. The two pieces farthest to the west lie largely buried in the white sand, well up on the beach. Both are portions of the sides from the SITKA, conforming exactly

to details of the old Wheeler shipyard plans. Each of the two sections shows the turned-up heels of the frames, which mark the line of the bilge (the lower extent of the side), and the distinctive diagonal steel reinforcing straps may also be seen at several locations. Because the straps only extend a short distance under the turn of the bilge, they are a feature clearly indicative of side structure. The first piece measures 17 feet 5 inches in width and 30 feet in overall length, and lies on a heading of 045 degrees. The second piece is only two feet away at its nearest point and lies on a heading of 310 degrees. It measures 20 feet 6 inches in width by 27 feet in length, and represents the entire height of the side of the ship, from the turn of the bilge at the bottom to the spar deck on top, complete with the "clamps" that helped support the decks, and remnants of the shelves and support-knees. In this piece, the diagonal straps are connected at their upper ends to the "sheer-strap," a steel belt 1/2 by 10 inches that ran the entire length of the ship near the deckline. This feature, along with stubs of shelves and knees, is absent in the first section. Both sections lie inside up.

The next two pieces of wreckage lie just to the east of the SITKA's side sections, and have been identified as portions of the GALE STAPLES. They will be described later. About 50 feet east of the STAPLES' sections, however, another long, narrow piece was seen lying in about 3 feet of water 25 or 30 feet offshore. This is a section of bilge from the SITKA, with 14 short sections of frame and 4 strakes of heavy bilge-ceiling lying at right angles to the shore; it measures approximately 4 by 30 feet. The frame spacing, at 22 inches, and the size of frames and bilge-strakes, match the same details in the bottom and sides of the SITKA nearby.

No other wreckage was seen during the 1988 investigations that could be positively attributed to the SITKA, but sport divers describe an extensive field of wreckage just off the western perimeter of the reef, lying in 25 feet of water. The divers' descriptions lead to the conclusion that the wreckage represents the SITKA's after end and portions of the sides (James G. Becker, personal interview, March 15, 1989). According to the divers' accounts, there is a piece of ship's bottom at least 60 or 80 feet in length and very heavily built, with frames, keelsons and machinery-supports, but no engine or boilers. There are smaller sections of hull, too, at least one of them a section of side with its distinctive knees standing in a row, and another piece lying outside-up nearby; the two sections reportedly lie at right angles to each other near the piece of bottom structure. In the same area are a length of tailshaft with a propeller attached, and a pile of engine room pipe fittings, all the hallmarks of a steam vessel. This whole field of wreckage lies 335 degrees from the SITKA's bottom at the shoreline, and almost exactly a half-mile from shore.

The best-known, most visible and most substantial artifacts at Au Sable reef are two great steel boilers lying right on the reef in no more than 15 feet of water. The black masses of the boilers can be easily seen from the surface, and there are a variety of other shipwreck features lying nearby. All are commonly thought to have come from the SITKA, but it appears that they are, instead, from the GALE STAPLES. The wreckage on the beach and that observed west of the reef in the deeper water account for approximately 70 percent of the SITKA's hull. The machinery appears to have been salvaged, in spite of the lack of any historical accounts, and the remainder of the hull is either buried in the sand at the beach or entirely disintegrated. The bulk of the remaining wreckage on the reef and along the shoreline seems to be associated with the STAPLES.

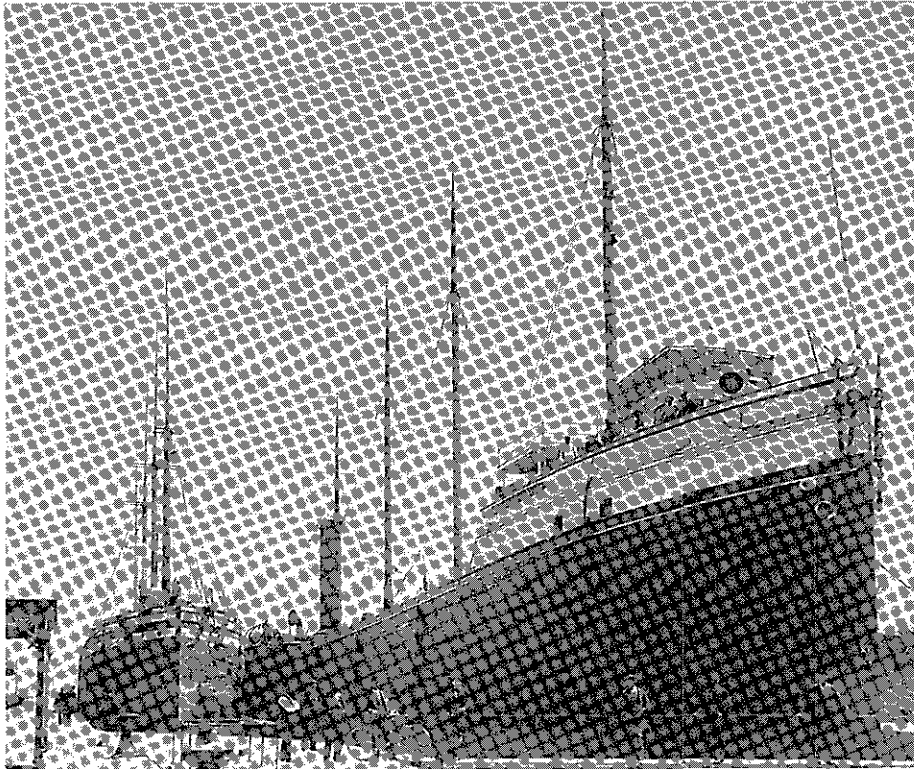


Fig. 4.46. While in the Wilson fleet, the SITKA usually towed the big barge YUKON. Dossin Great Lakes Museum Collection.

THE WILSON TRANSIT CO.

THOMAS WILSON, President and General Manager.

THOMAS WILSON,
 General Freight and Vessel Agent.

Office, Wilshire Building,

Telephone No. 805.

CLEVELAND, Ohio.

Str.	OLYMPIA,	2,400	Tons.
"	YAKIMA,	2,400	"
"	MISSOULA,	2,400	"
"	SITKA,	2,300	"
"	WALLULA,	2,000	"
"	SPOKANE,	2,200	"
"	C. TOWER, Jr.,	2,200	"
Schr.	WADENA,	1,900	"

Fig. 4.47. An 1891 advertisement lists the SITKA among Wilson's steamers. Beesons' Marine Directory, 1891.

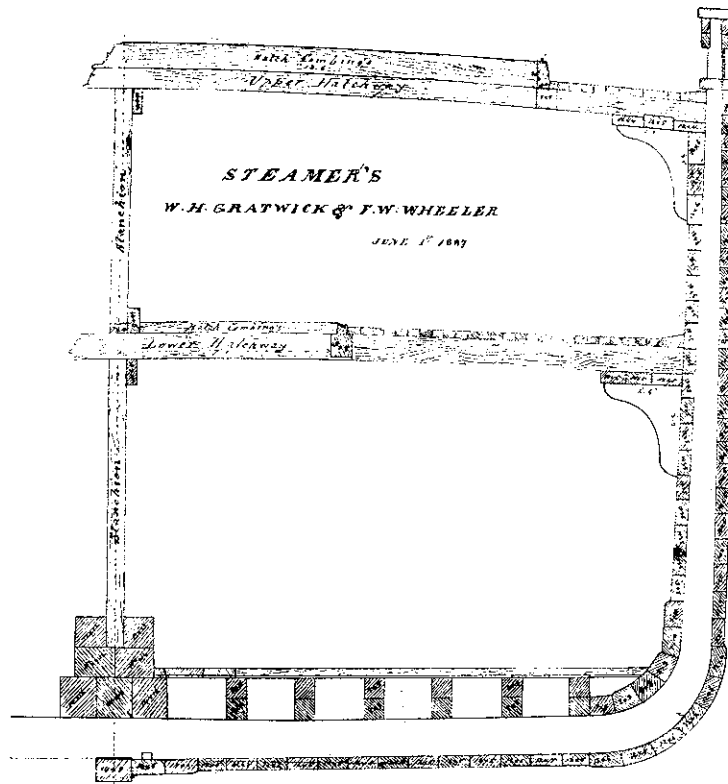


Fig. 4.48. Shipyard plans for the sisterships W.H. GRATWICK and F.W. WHEELER corresponds exactly to the SITKA details. Institute for Great Lakes Research, Perrysburg, Ohio.

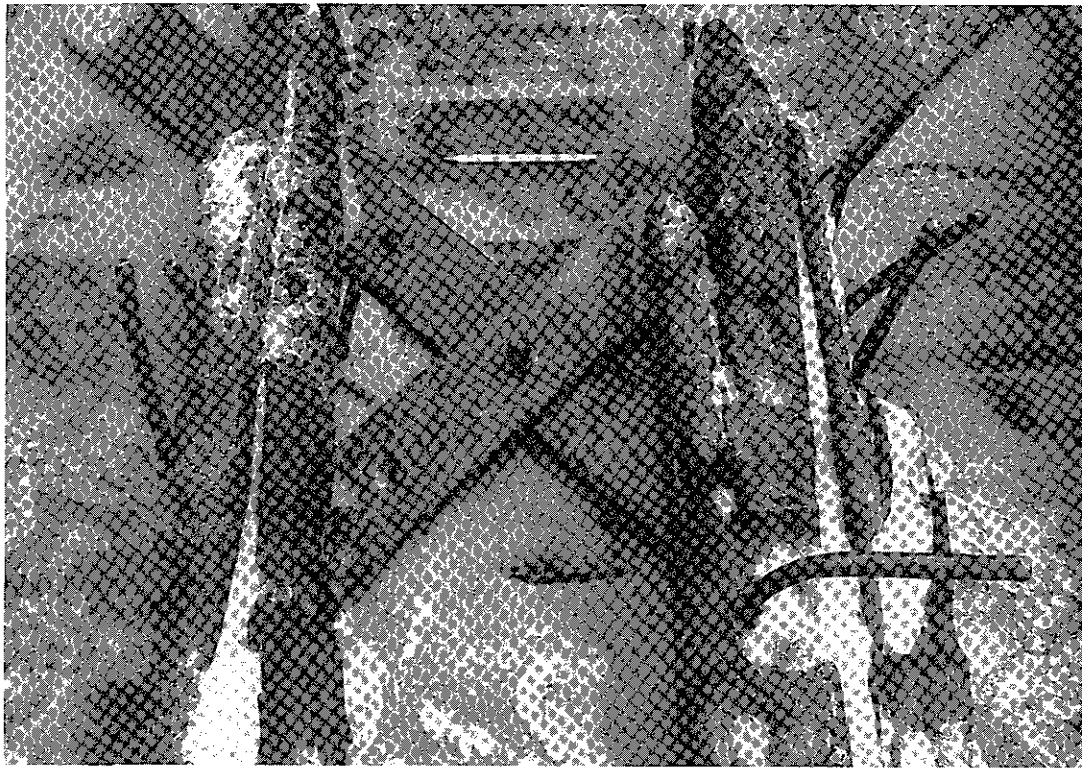


Fig. 4.49. Steel reinforcing straps are fixed diagonally across the SITKA's frames on sides of the ship. Photo by Jim Labadie.

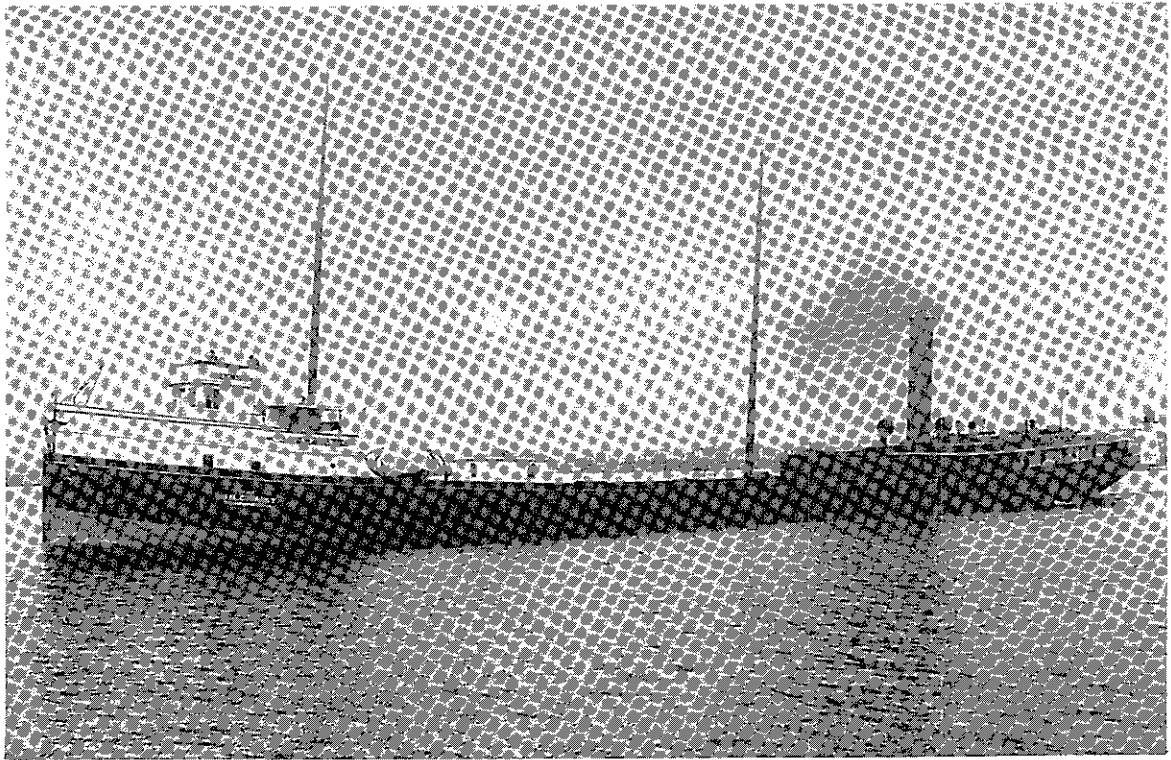


Fig. 4.50. The SITKA was sold to the Gilchrist fleet in 1903. Milwaukee Public Library Collection.

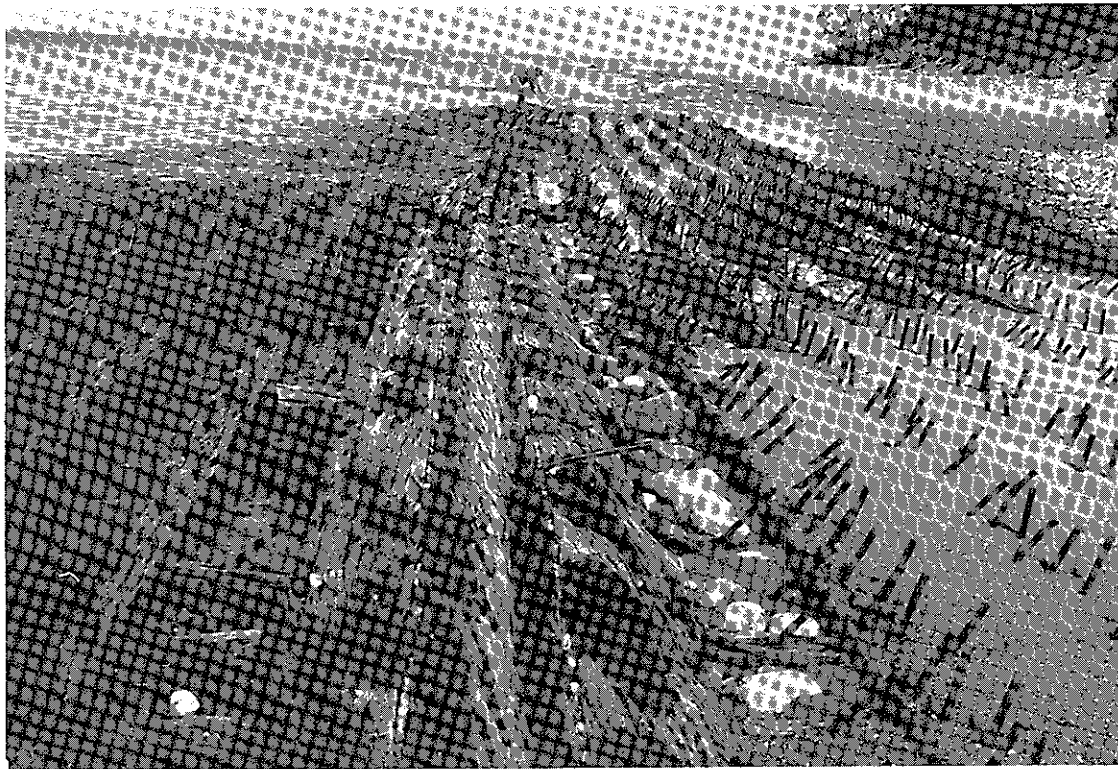
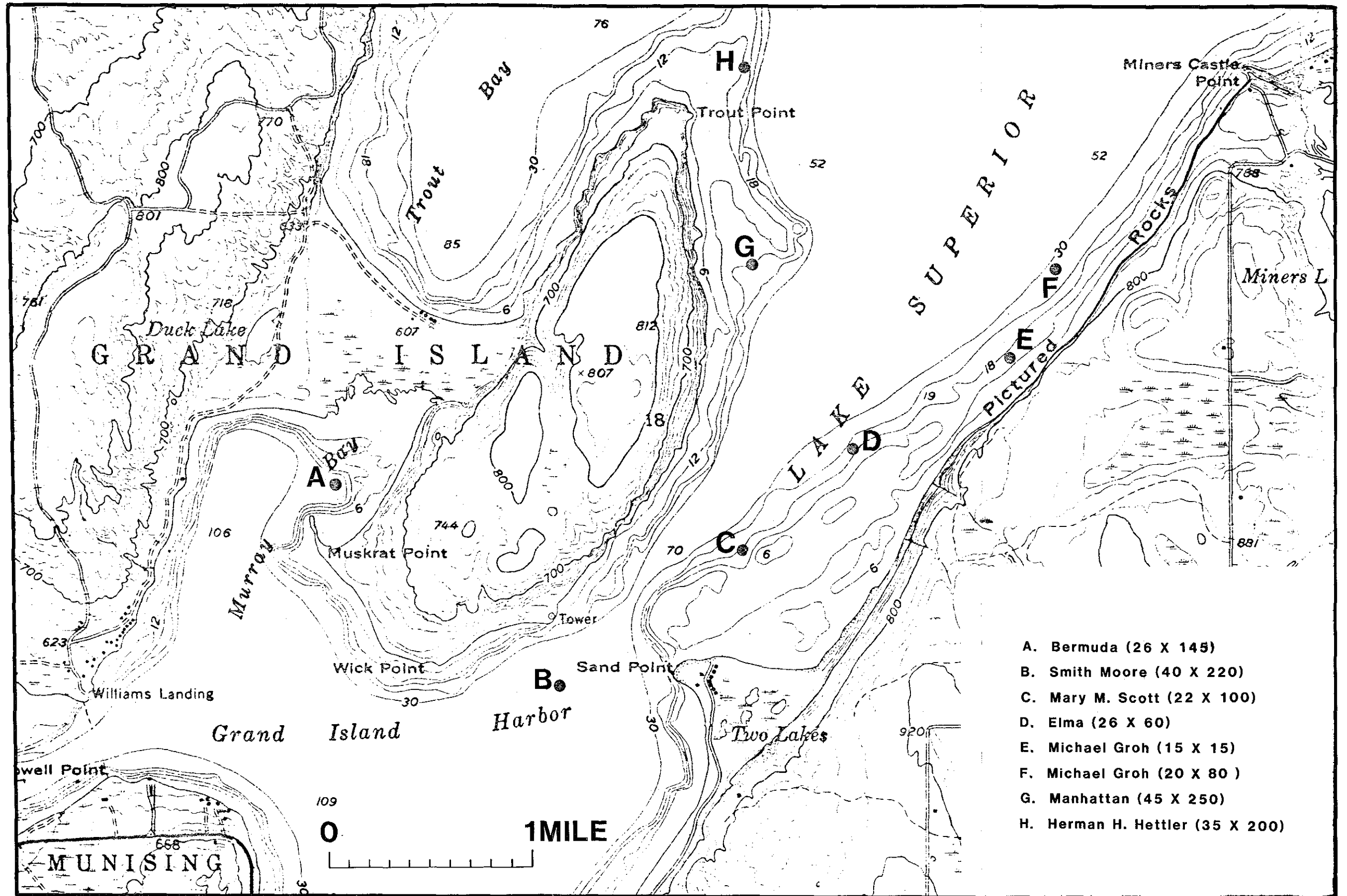


Fig. 4.51. The SITKA's bottom shows parallel longitudinal keelsons, a mark of bulk freighter construction. NPS photo by Toni Carrell.



- A. Bermuda (26 X 145)
- B. Smith Moore (40 X 220)
- C. Mary M. Scott (22 X 100)
- D. Elma (26 X 60)
- E. Michael Groh (15 X 15)
- F. Michael Groh (20 X 80)
- G. Manhattan (45 X 250)
- H. Herman H. Hettler (35 X 200)

Fig. 4.52. Au Sable area wreck site locations.

GALE STAPLES

History

Like the nearby SITKA, GALE STAPLES was a large wooden bulk freighter. It began life as W. B. MORLEY, built by the firm of Morley & Hill on the banks of the St. Clair River in Michigan. The Marquette Daily Mining Journal (August 21, 1888) reported:

The new steamship W.B. MORLEY was successfully launched at Marine City on Saturday. She will be taken to Detroit to receive an engine and boilers. The boat is 295 feet in length, 42 feet beam, 24 feet hold; carrying capacity 2,650 tons. She was built and (is) owned by the man she was named after.

Official documents indicate that William B. Morley owned one-fourth of the ship, and other shareholders were:

Horatio T. Morley of Marine City, Michigan	1/16
John J. Hill of Marine City, Michigan	2/16
Joseph P. Cottrell of Marine City, Michigan	1/16
Charles L. Morley of Cleveland, Ohio	2/16
Georgiana Morley of Rochester, New York	2/16
Mary R. Morley of Rochester, New York	2/16
and Martin H. Morley of Sodus, New York	2/16

The W.B. MORLEY had two decks and four masts. Its official number was US.81191, and the measurements were 277.2 feet length, 42.0 feet beam and 13.9 feet depth of hold (the length figure quoted in the newspapers was an overall measurement, while the official length was measured at the waterline, and it did not include the overhang of the stern). Official depth also differed from that in the newspaper because it was measured from the main (lower) deck rather than the "spar" (upper) deck. The ship's gross tonnage was 1,846.59 and net tonnage 1,468.81 (Permanent enrollment No. 34, issued at the port of Port Huron September 21, 1888). The ship was one of the largest at that time, and it was described by local papers while under construction as a "marine monster" (Post Huron Daily Times, August 13, 1887). Besides being a large craft, it was powerfully-built, with very heavy framing and diagonal steel straps. MORLEY had 7 hatches spaced 24 feet apart, center to center. It was valued at \$130,000 (Inland Lloyds Vessel Register, 1889).

MORLEY's hull was completed and inspected on August 9, 1888, and was launched on the eighteenth. On August 25, it was reported "under the shears" [derricks] at the Detroit Dry Dock Co. shipyards, ready to have the machinery lifted aboard (Detroit Free Press, August 25, 1888). On September 21, it was officially enrolled for merchant service, presumably complete and ready to be fitted out for sea. MORLEY was given a powerful triple-expansion steam engine with cylinders of 19, 30 and 52-inch diameters and a common stroke of 40 inches. It was rated for 1,150 horsepower at 85 revolutions. The engine was built by the Detroit Dry Dock Engine Works, as were the two scotch boilers, each measuring 10x11 feet and rated for 150 pounds of steam (Great Lakes Register, 1899).

The new ship was designed for the ore, coal and grain bulk freight trades and was reported loading the maiden cargo at Chicago on October 20, 1888 (Detroit Free Press, October 23, 1888). MORLEY appears to have been engaged exclusively in the Lake Michigan and Buffalo grain traffic during that first short season. Because Morley & Hill were not primarily vessel-owners, it is probable that the new steamer was built on

speculation, and was only a few months old when it changed hands; the Port Huron Daily Times reported (January 4, 1889) that, "the big steam barge W.B. MORLEY, which was launched at Marine City late in the season, has been sold to Cleveland parties for \$100,000."

The steamer was enrolled in the name of James Corrigan and John Huntington of Cleveland on April 3, 1889, and at the same time the name was changed to CALEDONIA (Permanent enrollment No. 74, issued at the port of Cleveland, Ohio). Corrigan was a successful vessel owner who managed a fleet of vessels from the early 1880s until about 1915. The Corrigan ships carried all manner of cargoes and had regular contracts for whole seasons, so that they traded consistently between specific ports, almost invariably paired with one or two of the large Corrigan barges. In fact, Corrigan owned the largest barges on the Lakes, including the five-masted DAVID DOWS and several of the Lakes first steel-hulled towbarges. During the 1890s the CALEDONIA regularly towed the barges GEORGE W. ADAMS, JAMES COUCH, NORTHWEST, AUSTRALIA and POLYNESIA, all in the Ashland, Wisconsin or Two Harbors, Minnesota iron-ore trades.

In 1900 the CALEDONIA was rebuilt at Duluth, although it was consistently rated "A1" during the preceding years, and there is no record of any accident that would have necessitated a major overhaul. The work seems to have been done during October and November 1890, and the carpenter's certificate was dated November 19, 1890. The ship was subsequently brought down the Lakes to Ashtabula, Ohio, where it was re-measured by the Government inspectors, and a new enrollment was issued at Cleveland (Permanent enrollment No. 36, dated January 25, 1901). The ship was thereafter described as having two decks and one mast, measuring 277.2 feet in length, 42.0 feet beam, 24.7 feet depth, 2,197 gross tons and 1,509 net tons. Insurance underwriters indicate that the CALEDONIA was given new deck beams and decking, a water-ballast system and steam pumps during the face-lift (Inland Lloyds Vessel Register, 1902), following which it was rated "A1-1/2" and valued at \$75,000. The rebuilding may have been undertaken simply to raise the ship's insurance classification, saving the owners large sums of money on premiums, because insurance rates were determined by the classification or "rating" of a vessel. Wooden ships with iron straps were eligible for "A1" ratings for no more than 10 years, according to the rules (Inland Lloyds Vessel Register, 1902), and thorough rebuilding and refastening was required to maintain high classification afterwards. This probably explains the CALEDONIA's costly repairs during 1900.

The ship continued in the strenuous bulk cargo work for the next several years. During this period, the Corrigan fleet underwent some dramatic changes, including the acquisition of a number of modern steamers and barges. In 1902, for instance, the fleet included 10 steamers and nine barges (Great Lakes Red Book). By 1907, they had divested themselves of most of the older wooden craft, keeping only the largest and best; they had three steamers and two steel barges (*ibid.*). Later, in 1907, the owners converted their steel barge POLYNESIA into a steamer, for which purpose they removed the engines from the 18-year-old CALEDONIA and transferred them to the barge; they then sold the CALEDONIA.

The ship was purchased by John J. Boland of Buffalo, New York, who formed the Caledonia Steamship Co. and set to work refitting the ship for service. He purchased the second-hand engines of the steamer KITTIE M. FORBES, which had been destroyed by fire in the spring of 1902, and he refurbished them for CALEDONIA. Although the engines dated from 1883 they proved reliable, so they were installed early in 1908, and the ship was enrolled on April 8 at Buffalo (Permanent enrollment No. 68). The "new" engines were the two-cylinder fore-and-aft variety, with 24- and 44-inch cylinders and

a 42-inch stroke. They were rated at 500 horsepower at 75 revolutions, little more than half the power of the steamer's original triple-expansion engines. The CALEDONIA carried the original boilers for its whole career. With the reduced power, the ship no longer towed barges, but was largely relegated to the coal and salt trades for Boland, although it did carry ore on occasions.

In the fall of 1912, the ship was acquired by the Great Lakes Engineering Works of Ecorse, Michigan (Permanent enrollment No. 12, issued at the port of Detroit September 12, 1912). It was probably taken by the firm to satisfy some indebtedness on the part of Boland toward the shipyard; the "GLEW Works" had built five modern steel ships for Boland within a couple of years of 1912. The shipyard chartered out the CALEDONIA to various operators during 1913, 1914 and 1915. The CALEDONIA was sold again in 1916, this time to the Davidson & Smith Elevator Co. of Port Arthur, Ontario. It was registered in Canada with official number C.134518, and soon afterward (May 19, 1916) it was renamed GALE STAPLES. The ship's official tonnage as a Canadian vessel was 2,167 gross and 1,293 net tons. The American documents were turned in at the Detroit Customs Office on December 20, 1917 with the comment:

Sold foreign. I am informed that this vessel was sold to Canadian parties over a year ago (T.H. Keane, Deputy Collector of Customs, endorsement on Permanent enrollment No. 12 at Detroit).

On October 1, 1918, the STAPLES was upbound on the Lake, laden with coal for Port Arthur. It encountered rough weather above Whitefish Point and labored in the seas for some hours. The STAPLES was blown way off course and blundered onto Au Sable Reef. The old ship ground onto the sandstone shelf right abreast of the Au Sable Point Lighthouse in broad daylight, just after noon. The events of the next few days were noted by some unidentified keeper at the Au Sable Point Lighthouse. From the logbook on October 1:

Steamer GALE STEEPLES [sic] of Port Arthur Canada, coal-laden, grounded on the reef about half or three quarters of mile North west by north in plain sight of the Station. 1st and 2nd assistants went out to see if they could render any assistance.

The ship was also spotted by the lookout at the Grand Marais Coast Guard Station about 8 miles east at 4 p.m., and a power lifeboat was dispatched to the scene. The captain kept his crew aboard the STAPLES, except for two women cooks who were put ashore. He also sent telegrams to the Soo calling for tugs.

The following morning, the Coast Guard took off four seamen, then the remainder of the crew that afternoon as wind and seas began increasing. The lightkeeper noted (October 2, 1918):

Coast Guards from Grand Marais took off the crew of the stranded steamer at 5 PM. One of the yawlboats broke away and washed ashore east of the Station. Keepers had hard time to save it from being pounded to pieces among the rocks.

On October 4, the tug ILLINOIS and the lighter RELIANCE arrived from Sault Ste. Marie and began removing the ship's coal cargo, the weather having moderated somewhat. The lightkeeper noted on the 6th, "Steamers upper cabin gone, appears to have broken in two forward of the Cabin." On the 7th he said, "Tug and lighter abandoned Steamer at 6 PM and proceeded up the Lake."

That same day the Coast Guardsmen had taken marine insurance agent A.C. Hansen out to the stricken steamer and, after having recovered about 1,600 tons of the coal cargo,

he called off further salvage attempts. The GALE STAPLES was a total loss, estimated at \$75,000 (Stonehouse 1983:53; Wolff 1979:115); it broke up soon afterward. The anonymous lightkeeper made a last note about the incident on October 13, "Wind N.W. blowing gale. Seas running over wrecked steamer moving her shore word."

Site Description and Analysis

Today the ship's two boilers lie about five-eighths of a mile from shore in 15 feet of water on a compass bearing of approximately 345 degrees from the lighthouse. The two boilers are about 250 feet apart and can be located at Loran position 31474.0/47421.1. A propeller with stern tube, tail shaft and an anchor lie near the westernmost of the two boilers. A wooden rudder may be seen between the two boilers and somewhat farther out, and masses of engine-room debris lie to shoreward about 200 feet. There is also a single narrow strip out of the side of a wooden ship nearby; it measures about 3 feet wide and 50 or 60 feet long with a 16- to 18-inch steel strap attached. There are, however, no other fragments or sections of hull structure on the reef.

The boilers are cylindrical scotch boilers measuring 10 feet 1 inch in diameter and 11 feet in length, with small (3 foot 3 1/2 inch by 9 foot 1 inch) steam drums attached on top. The faces of the twin boilers have all of the stay-bolts, tubes, furnaces and manholes in place, and they appear to be entirely undamaged by their long exposure to ice and seas. Interestingly, the heavy boilers have worked their way into the soft sandstone over the decades, so that each lies in a hollow about 16 or 18 inches deep where their shape has been carved by their weight and motion. At one location, about 100 feet from either boiler, is the precise pattern of the straps and rivets where one boiler had lain at some previous time. No manufacturer's identification marks could be found on either boiler, which would confirm their origin, although the boilers match the description of those on the W.B. MORLEY (later the GALE STAPLES) in 1888. The SITKA's boilers were 11 feet in diameter and 12 feet long, while the STAPLES were 10 feet in diameter and 11 feet long, the latter coming within an inch of the measurements taken on the two matching boilers on the reef.

The four-bladed cast-iron propeller wheel found near the western boiler was marked with the name of the Sherriffs Manufacturing Co. of Milwaukee. "Sheriffs Wheels" were much advertized for their efficiency and speed. The propeller has been shorn of three of its blades, although all three may still be found about 50 feet north of the propeller itself, where they were broken off against the rocky bottom. The propeller measures 5 feet 8 inches from center to the tip of the blade, so it would have been 11 feet 4 inches in diameter, with the blades 3 feet 4 inches wide. The shaft is 19 feet 1 inch long and 10 inches in diameter.

A Trotman folding-stock anchor was found right alongside the western boiler. This distinctive anchor was used on Lakes craft for about 10 years just before the turn of the century. It was an improvement over the traditional wood stock and the later folding stock types, but was superceded around 1900 by the stockless or "Navy" type, now in universal usage by large vessels. The anchor measured 9 feet 9 inches long with a 6-3/4-inch shank, 6 feet across at the flukes, and weighed approximately 1,500 pounds.

About 100 feet outboard of the two boilers is the rudder, lying among loose rocks and sheltered from ice by a little ridge of sandstone. This heavily constructed piece measures 27 feet overall, with a 17-foot blade and a 10-foot shaft. It is "ironed" or sheathed at the waterline with 3/8-inch iron plating, and fitted at the top of the shaft or stock with a 5-foot 6-inch iron tiller. The rudder stock is made up of 3/8-inch-thick

16-inch diameter iron pipe, while the rudder is all white oak, edge-bolted with 1-inch treenails.

Inside the western boiler 150 to 200 feet is a large field of wreckage, most associated with the engine room of the ship. It also includes some hull features such as fastenings, reinforcing straps and boat davits. Principally, however, there are engine parts, broken castings, copious piping, pumps, valves and hand-tools. A deck capstan, presumably from the ship's stern, was also found lying among the debris. The density of the scatter diminishes toward the inner reaches of the 100-foot field, but there is a trail of fastenings and small artifacts all the way to the beach, about 1,000 feet west of the lighthouse, stretching a full half-mile in distance. At the end of the drift path lie the large sections of hull on the beach.

In addition to the boilers and machinery parts on the reef, there are large sections of ship's bottom on the shore at Au Sable, which are certainly a part of the GALE STAPLES' fabric. These sections of hull lie on both sides of the point. Together, they would account for no more than about 20 percent of the ship's total hull structure. The remainder of the STAPLES is believed to lie east of the reef.

The most distinctive characteristic of the STAPLES' hull is the unusual arrangement of the transverse framing. The ship has oak "floors" (the center portion of the frames) that run all the way across the beam (width) of the ship, from bilge to bilge in a single piece. The frames are made up of multiple "futtocks" or sections, each 6 inches in width and 16 inches in depth. Some frames have 3 futtocks, while others have 4 or even 5; the usual arrangement, such as seen in SITKA, is 2 or 3 futtocks of about 6 or 7 inches in width and 12 to 16 inches in depth.

Because of the unusual pattern of the frames, the various sections were at first referred to as the "five-futtock wreck" and it was thought that they may have come from the much older steamer UNION (1861), which was known to have wrecked at Au Sable. The sections of bottom measure 32 to 34 feet in width, however, while the UNION was only 26 feet wide; that left only the SITKA and the STAPLES as candidates for the "five-futtock wreck." When the Wheeler shipyard drawings surfaced, confirming SITKA's design features, the wreck's identity was established as the GALE STAPLES. This conclusion was strengthened by examination of a near-sister to the STAPLES on Lake Michigan later in 1988 by a colleague. The bulk freighter LOUISIANA was built by Morley & Hill at Marine City in 1889, just a year after the W.B. MORLEY (STAPLES); it was wrecked on Green Bay in November 1913. The LOUISIANA's remains were surveyed during the summer of 1988 by Wisconsin underwater archeologist David Cooper. Cooper reported the unusual arrangement of multiple futtocks on the LOUISIANA, much like those observed in the "five-futtock wreck" at Au Sable Point.

The construction of the STAPLES, as observed at Au Sable Point, indicates deep transverse frames that could be varied in their strength at specific hull locations simply by building up the number of futtocks. In places where strength was not required, frames could be made up of two or three futtocks; where greater stiffness was needed, four or five futtocks could be employed, making a frame of about double the average thickness. Longitudinal keelsons were fixed on top of the frames, running the length of the ship. Fasteners from those keelsons were found in all three sections of the hull so far observed, although the keelsons themselves have not survived in any of them, and their exact arrangement and dimension is unclear as a result. Location and measurement of these keelsons would be very useful in determining the longitudinal strength of the ship. Examination of the bottom sections in their present condition (without the keelsons) leads to the assumption that the hull design was strong

transversely, but very weak longitudinally. A number of photographs of the wreckage taken more than twenty years ago show very heavy longitudinal keelsons firmly fastened on top of the transverse frames. They would have provided the necessary longitudinal strength, as they appear to have been three pieces of about 12 by 16 inches each, nearly the equivalent of the SITKA's backbone. The photographs prove that the heavy timbers have been entirely eroded and torn off the remaining structure in the past 20 years (Dr. Julius F. Wolff Jr., personal interview, May 5, 1989).

Without the heavy keelsons, the ship's bottom lost its longitudinal strength and broke into several short sections, while the SITKA's bottom remains substantially in one piece bound together by the keelsons. It is interesting, too, that the STAPLES' bottom planking is all edge-bolted together. Edge-bolting is ordinarily used only in the thick strakes at the turn of the bilge or in the "clamps," which support a ship's deck beams. Many pieces of 1/2-by-5-inch steel strapping were found in association with the three sections of the STAPLES' wreckage, but none were actually attached to the bottom. They were evidently part of the side structure of the ship, although no intact pieces of the ship's side have yet been found, with or without strapping. Several sources indicate that the STAPLES was fitted with diagonal steel straps (Inland Lloyds Vessel Register, 1984 and 1902; Great Lakes Register, 1899 and 1911). The LOUISIANA wreck showed the distinctive lattice of strapping in its sides, which have survived relatively intact.

Nowhere was any section of the STAPLES' hull found that represents the entire width of the ship's hull, so that the turn of the bilge might be studied. As a result, it is unclear how the ship's sides were fixed to the unconventional frames in the bottom, or how the bilge was formed. The bilge is always a weak point in hull structure, and it would be interesting to see how the builders designed this feature in the STAPLES; perhaps the question can be answered by an examination of the LOUISIANA wreck in Lake Michigan, although it is hoped that other portions of the STAPLES will be found at Au Sable.

On the small point of land about 900 feet west of Au Sable Point Lighthouse are two sections of bottom attributed to the STAPLES, right next to two more sections from the SITKA. The most westerly of the STAPLES' sections lies at right angles to the shoreline, half in the water and half out. It measures 28 feet in length and 32 feet in width, with 8 frames or some 40 futtocks. About 96 feet to the east lies a second piece of bottom from the same ship, lying parallel to the shoreline, but also half in the water and half out. This piece measures 20 feet in length and 32 in width, with six frames and 30 futtocks. A third piece of the ship's bottom lies about 1,000 feet east of the lighthouse (or nearly a half-mile east of the other pieces), about 100 feet from shore in a shallow embayment. It lies on a bed of rocks and gravel in about three feet of water. This section measures 32 feet in width and 51 feet in length, with 14 frames or 70 futtocks. Several pieces of strapping are scattered about the latter site and, because there is no sand at this location, the edge-bolting is easily seen in the bottom planking. Some pieces of coal, fire-brick, boiler grates and castings were found in this third section, suggesting that this portion of the ship was at or near the machinery spaces. No special framing patterns or support members were found that might strengthen that suspicion. As in the other two STAPLES' bottom sections, there were no longitudinal keelsons attached to the transverse frames, but some fasteners could be seen that identified their former locations.

The STAPLES' construction was clearly unconventional, and a great deal more could be learned if other portions of the wreck were to be located. The sides would be of special interest, as would the longitudinal keelsons that rested on the frames. At this point, it would be impossible to reconstruct a complete cross-sectional plan of the vessel, although an attempt has been made based on actual observations and measurements,

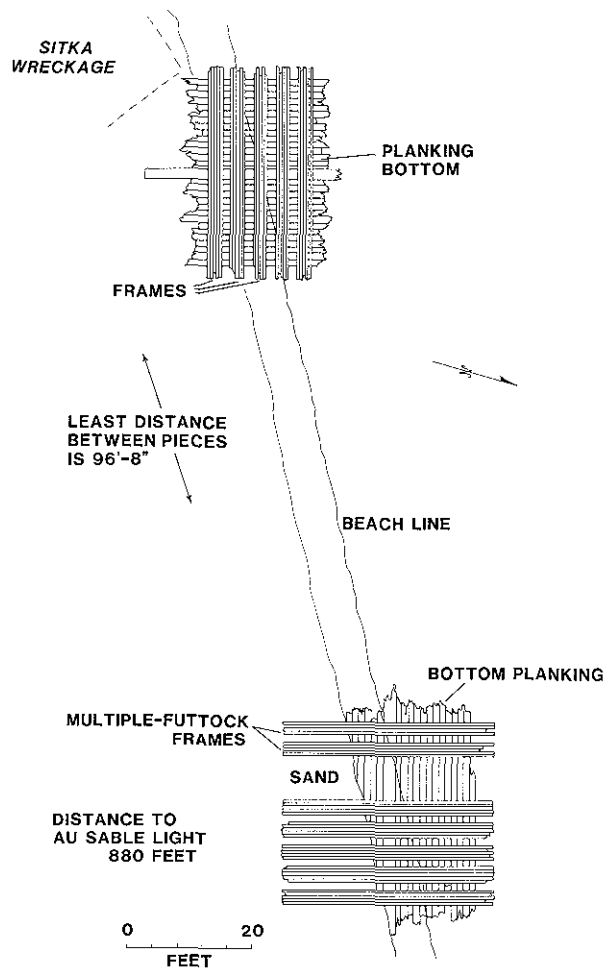


Fig. 4.53. The GALE STAPLES site plan.

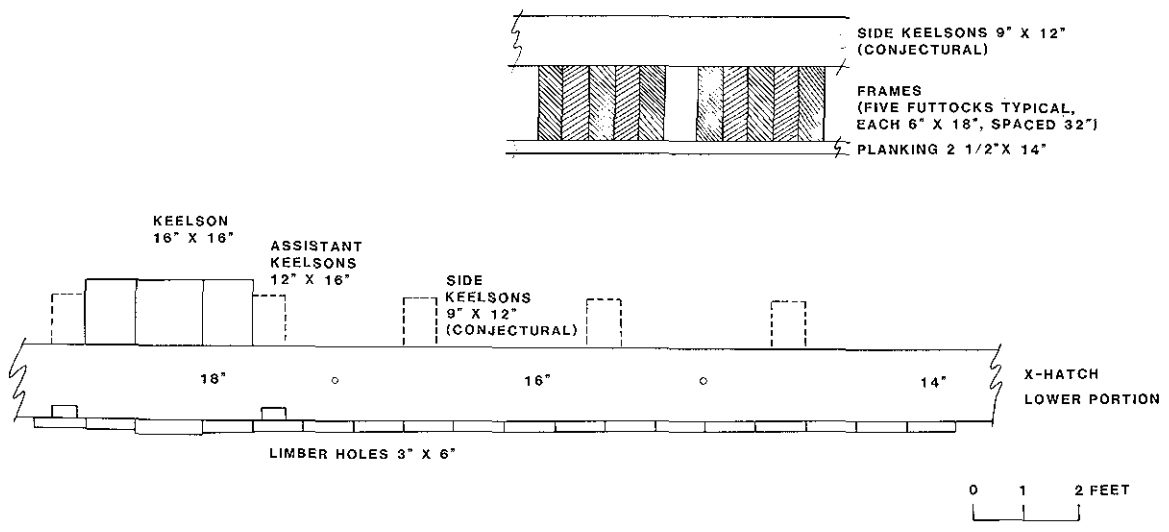


Fig. 4.54. The GALE STAPLES cross-section.

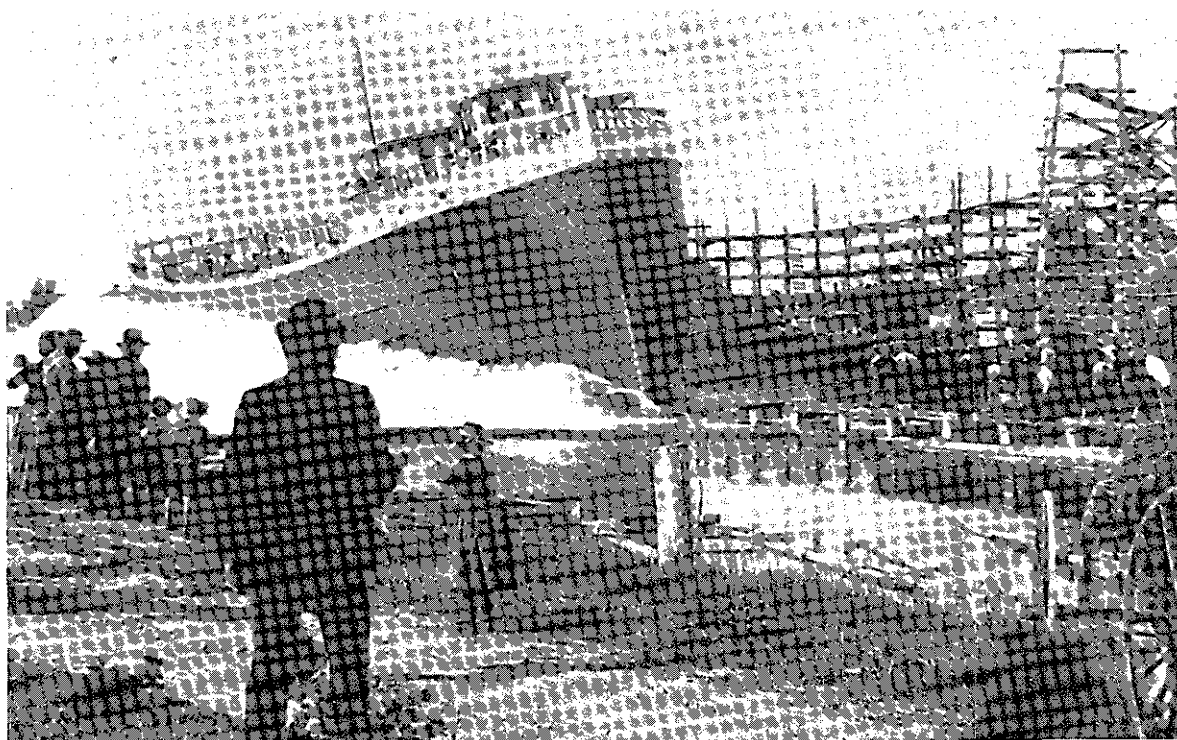


Fig. 4.55. The W.B. MORLEY was among the largest vessels on the Lakes when it was launched in 1888. University of Detroit Marine Collection.

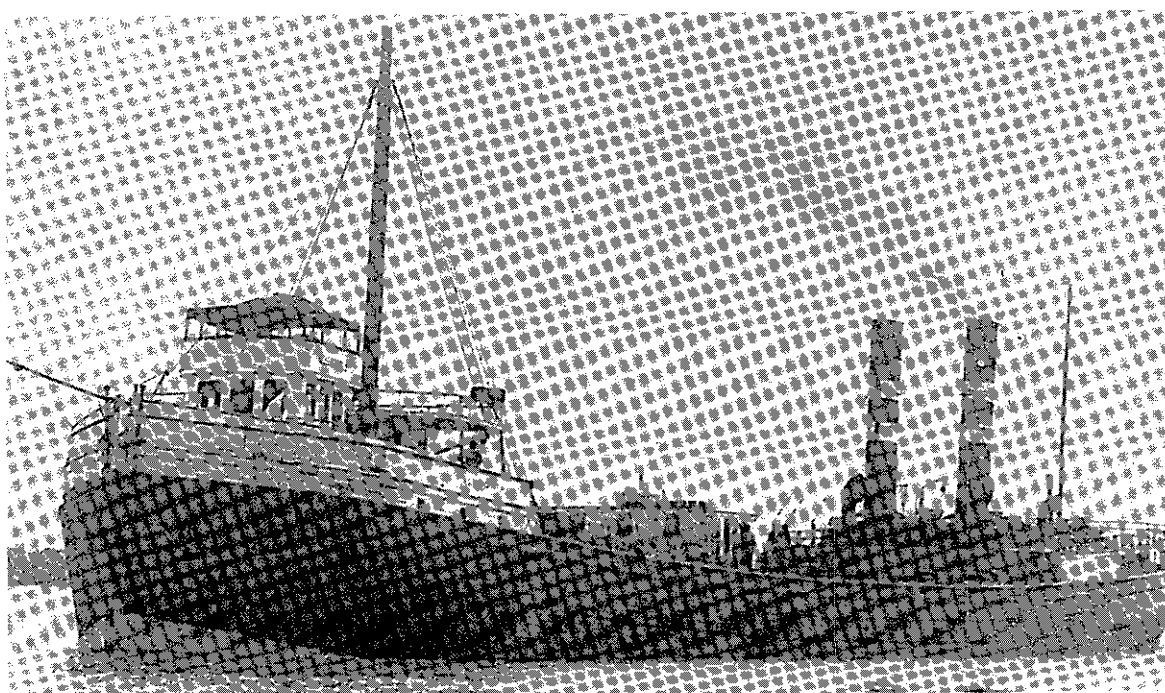


Fig. 4.56. The MORLEY bore the name CALEDONIA from 1889 to 1916. University of Detroit Marine Collection.

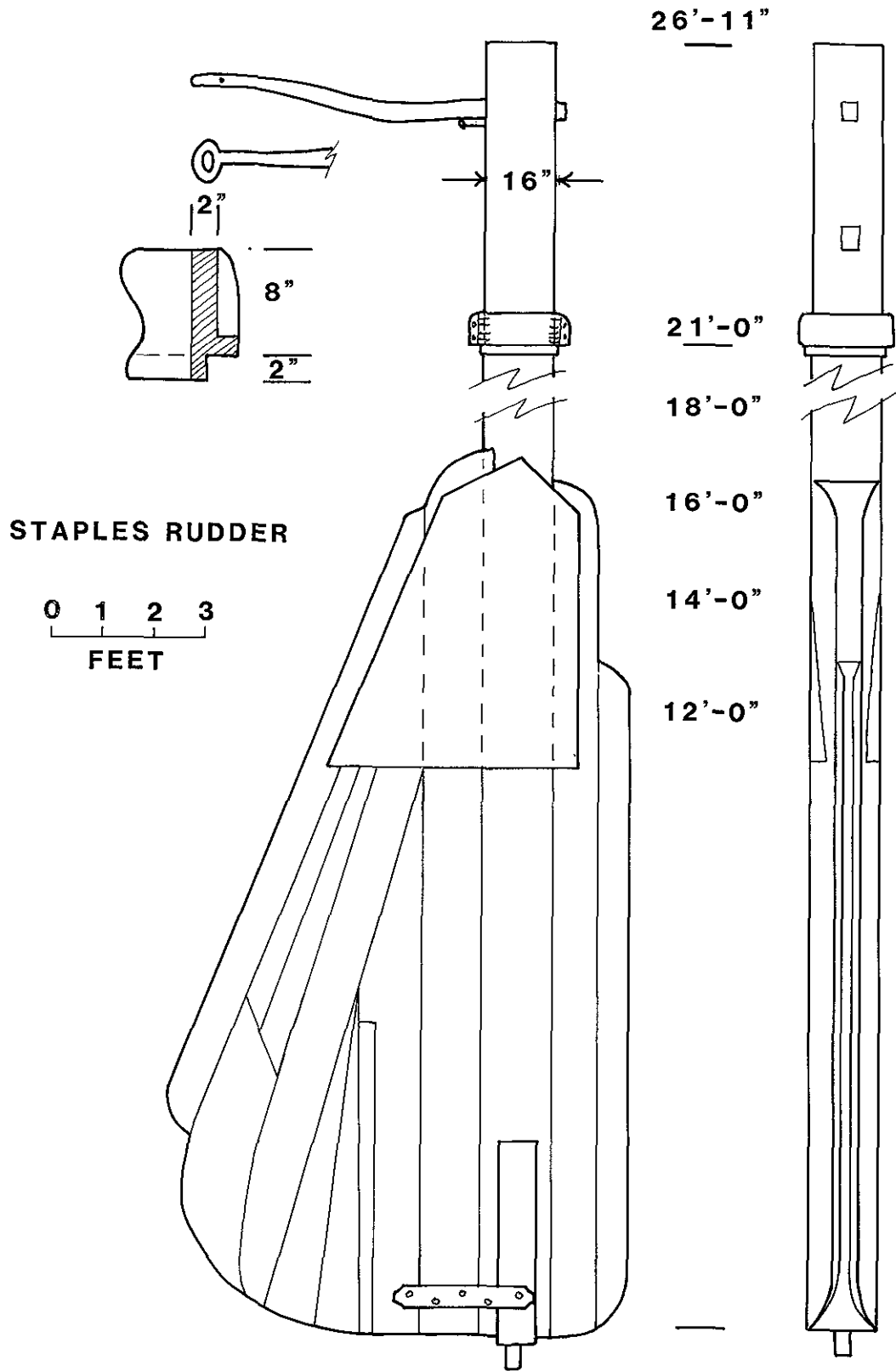


Fig. 4.57. This handsomely-built oak rudder was found in the vicinity of boilers and a propeller; it is believed to be from the GALE STAPLES. The stock is sheathed with a 1/2-inch steel tube, and the blade is ironed with 1/8-inch sheathing at the water level for ice-protection.

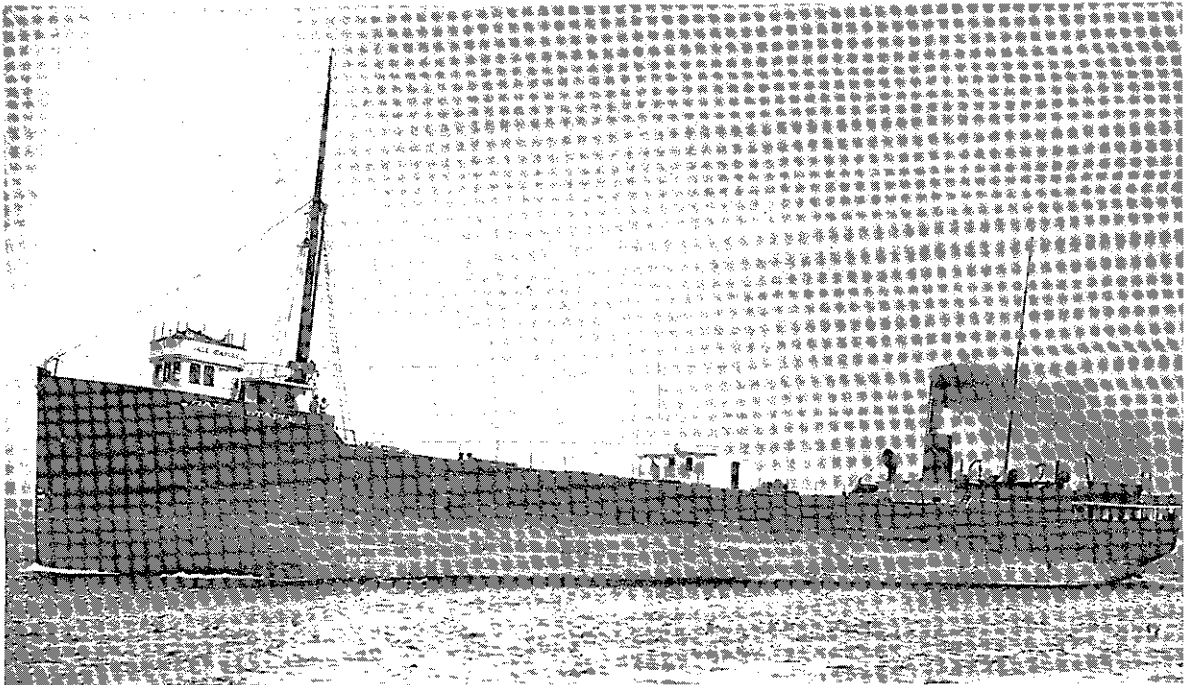


Fig. 4.58. A 1917 view shows the GALE STAPLES in the St. Marys River without a cargo. Milwaukee Public Library Collection.

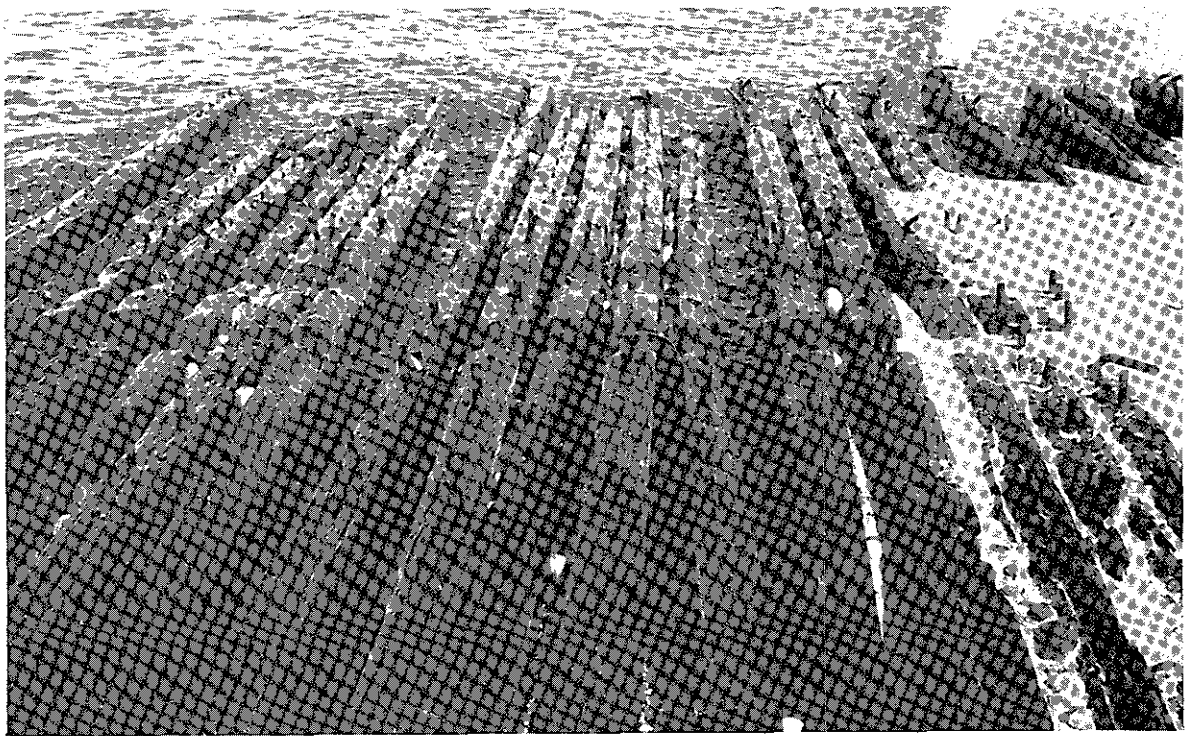


Fig. 4.59. Unusual framing characterizes the GALE STAPLES wreck; five futtocks are easily distinguished. NPS photo by Toni Carrell.



Fig. 4.60. A broken propeller wheel on Au Sable Reef is still attached to the shaft and a portion of the sternpost. Photo by Ken Vrana.

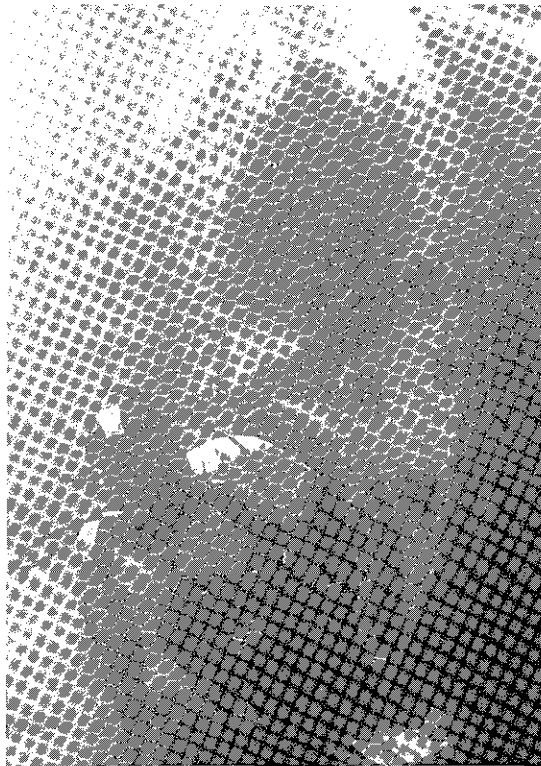


Fig. 4.61. Two boilers, lying on Au Sable Reef, are believed to be from the GALE STAPLES. Photo by Ken Vrana.

coupled with estimates from the 1966 photographs. It is suspected that more of the ship will one day be found east of the reef, and a more complete understanding of the design gained at that time.

At least one witness confirms that shoreline wreckage from both the SITKA and the STAPLES was pulled off the beach in the 1930s and sold for scrap. A retired Duluth Coast Guardsman recalled selling 7 or 8 tons of ironwork from the wrecks in one load in 1939 alone. He was stationed at Au Sable Light, and he and another Coast Guardsman used a tackle on top of the bluff. They rigged a line to a dump truck and ran it through a snatch-block. With this arrangement, they hauled up from the beach iron bollards, straps, hawse-eyes, fittings, machinery parts, and took several truckloads into Munising during 1939 and 1940 (Walter Parker, personal interview, September 9, 1988).

UNION

Another of the ships lost on treacherous Au Sable Reef was the steambarge UNION. Relatively little is recorded regarding the circumstances of the ship's loss or subsequent salvage efforts on the wreck, but the ship had a colorful career. It was built as a fine passenger steamer, and only during the last years was it reduced to a coarse freighter. The location of the UNION wreck is still a mystery.

History

The UNION was built at Manitowoc, Wisconsin in 1861 by William and Stephen Bates for Capt. Albert E. Goodrich of Chicago. William W. Bates is best remembered for a series of scientific papers on ship design published under his name during the exciting era of the first clipper ships. In those days, American shipbuilders developed some of the most efficient sailing craft ever known and Bates was one of the builders' most articulate spokesmen. Some of the unusual features he incorporated into the UNION included an unconventional hull design with sides that flared outward at deck level, like an old-fashioned sidewheeler's, a curiously curved stem (bow), and a system of internal reinforcing that enabled him to dispense with the external trusses or arches that were common in that day. The UNION also sported an unusual five-sided pilothouse.

The UNION's owner was as well known as was its architect. Capt. Goodrich had organized a steamboat service on Lake Michigan in the summer of 1856 with the old paddlewheeler HURON. In 1858, he purchased the propeller OGONTZ for his second boat, and in 1860 he added the sidewheeler COMET and the propeller WABASH VALLEY to accommodate the growing traffic. Many other passenger ships were to follow, and the Goodrich Line ultimately became Lake Michigan's most popular and long-lived; it went out of business in 1934.

The OGONTZ never met Capt. Goodrich's expectations. It was not as dependable, nor as good a sea boat as the Lake Michigan routes required (Elliott 1967:26), so Goodrich had it dismantled in the fall of 1860, and he sold the hull for a barge. The OGONTZ' engine dated to 1848, when the ship was built at Ohio City (now part of Cleveland), but it was still in good working order so Goodrich ordered a new screw passenger steamer built, using the same engine and, presumably, the same boiler. He chose to have William Bates design and construct the new ship at his Manitowoc yard. The UNION was the first of many fine ships built by Bates for the Goodrich fleet.

Local newspapers followed the ship's construction with considerable interest. The Manitowoc Pilot noted (November 30, 1860):

We are pleased to notice that our old-time shipbuilders, Stephen and Wm. W. Bates, have secured the building of a propeller of 450 tons in this place during the present winter. This will be the first steam vessel ever built here. The owner will be A.E. Goodrich, Esq., of Chicago, and the new vessel is intended for the route between that city and Green Bay, in place of the OGONTZ . . . The competition of builders in other places for the construction of this vessel was keen . . .

The same paper reported on December 7:

The propeller OGONTZ has been taken into our river after some hard labor in getting her over the bar at its mouth. Her engine will be placed in the new boat. The OGONTZ has been running on the Lakes about fourteen years, and her career is now ended. Her hull is yet sound, but it is Capt. G's intention to abandon her after taking out her engine (Manitowoc Pilot).

On March 8, 1861:

Owing to the severe and boisterous weather during the winter, the work of constructing the [steamer] has not progressed as rapidly as the builders would wish, but it is now hoped that, with the prospect of fine weather, no delay will occur in rapidly finishing [it]. The propeller is nearly planked inside, and the joiner work of the cabin is in progress. Her boiler has been placed in its position, and she will be in a fair way for launching by the first of May (Manitowoc Pilot).

And on May 3:

The propeller built at this port by Messrs Bates for Capt. Goodrich of Chicago was launched on Saturday afternoon (April 26), and the pleasant fete was witnessed by hundreds of people, many of whom came in from the country for that purpose. She glided gracefully from the stocks and entered her natural element without the slightest injury. As she touched the water, a beautiful flag was displayed from her mast, bearing the word UNION, indicating her future name, a very appropriate one at this time (Manitowoc Pilot).

The Pilot went on on May 17:

The Chicago Times thus notices the arrival of the propeller UNION at that port: - "On Tuesday evening the new propeller UNION, Capt. Wm. Dougall, arrived at this port, just off the stocks, preparatory to going into the Chicago and Port Sarnia trade, in connection with the Great Western Railroad. She was built at Manitowoc, is of great strength, and will compare well with any vessel or propeller ever launched on the Lakes (Manitowoc Pilot).

The ship reportedly cost \$30,000 (Herman G. Runge notes, Milwaukee Public Library).

The UNION was enrolled in Goodrich's name at the port of Chicago on May 14, 1861 (Permanent Enrollment No. 44). It was described as having a "plain head (bow), round stern and one mast," measuring 163 feet 5 inches in length, 26 feet beam and 10 feet 9 inches depth; it was 434 86/95 tons. the UNION was assigned official number US.25048. The ship was a double-decker, with cargo space below and between decks, and a full-length passenger cabin on the promenade deck. (The second deck in a passenger ship is usually referred to as the "promenade," while in freighters it is the "spar" deck. The "roof" over the cabin is the "hurricane" deck).

The Detroit Free Press said (March 12, 1861), "The (UNION) is heavy built, and on examining the heavy timbers and the ingenious plan of construction, one can hardly imagine storms or waves strong enough to sever her timbers." Goodrich chartered the new propeller to run in the Great Western Railway Line between Chicago and Sarnia, Ontario, carrying barrelled flour eastward and passengers and merchandise westward. It operated with three or four other propellers on that route between 1861 and 1865. The ships appear to have had all the freight they could handle, because each succeeding season brought one or two more ships to the Line; there were seven in 1864. The Goderich (Ontario) Signal noted on March 1, 1864 that "The propellers EDITH, NIAGARA, UNION, SCIOTA, ALLEGHANY, and two others, names not known, will form a daily line between Chicago and Sarnia, running in connection with the Great Western Railway of Canada."

For some unexplained reason, Goodrich sold the UNION on August 1, 1862, to James H. Mead and J.F. Kirtland of Sheboygan, Wisconsin for the sum of \$28,000. The new owners kept the charter arrangement with the Great Western Line, and the ship continued on the Chicago and Sarnia run. In the spring of 1866 the UNION changed hands again; there is reason to believe that it was a result of bankruptcy. On May 18, 1866, it was enrolled in the name of the German Bank of Sheboygan (Permanent Enrollment No. 199, issued at the port of Milwaukee) and the bank shifted the steamer's route to Lake Superior. The Chicago Tribune (July 20, 1866) advertised as follows:

The propeller UNION leaves for Superior City, stopping at Mackinac, Sault Ste. Marie, Marquette, Houghton, Hancock, Copper Harbor, Eagle River, Ontonagon, Bayfield, and La Pointe from her dock at Kinzie Street Bridge, Monday, July 23rd at 6 PM. For freight or passage apply Platt & Thorn, agents, 1 West Kinzie Street.

The ship made no fewer than 13 round trips to Lake Superior that year (Annual Report of the Superintendent, St. Mary's Falls Ship Canal, 1866), and the next four years seem to have been similar, although the ship changed hands again during that time. The UNION was sold to Lewis Curtis of Sheboygan (two-thirds interest at \$21,300) and Mary L. Rice of Chicago (one-third interest at \$5,000) in April 1869 (Permanent Enrollment No. 97, issued at the port of Milwaukee on April 27, 1869). In spite of the change in ownership, the ship stayed under the management of Platt & Thorn's Lake Superior Line. In the spring of 1870, the UNION was chartered briefly by the Canadian government at the rate of \$350 per day to carry troops from Sault Ste. Marie to Fort William to put down the Riel Rebellion in western Ontario. In 1871 it was back in the Sarnia trade, but this time running out of Milwaukee in connection with the Grand Trunk Railway.

At the end of the 1871 season, a two-thirds interest in the UNION was sold to Mark English of Green Bay, Wisconsin, while Mrs. Rice of Chicago retained the remaining shares (Permanent Enrollment No. 78, issued at the port of Milwaukee April 27, 1872). English operated a foundry at Green Bay, and he intended to use the steamer to haul iron ore. The Green Bay Daily State Gazette reported on March 14, 1872:

The propeller UNION, lately purchased by Mark English of this city, is being remodelled somewhat at Sheboygan. The cabin has been cut in two and a large piece taken out, leaving the wheelhouse forward and a portion aft for an engine-house and cabin. She will clear for this port to enter the iron ore trade as soon as navigation opens.

A new enrollment issued at the time of transfer to Mr. English showed a reduction in the ship's gross tonnage to 341.84, reflecting the changes made to the superstructure. The work was evidently done at the Stokes and Lochlin shipyard in Sheboygan.

The ship was put in the Marquette ore trade during 1872. Eleven round trips were reported that season, including one that proved costly:

The propeller UNION was on Strawberry Reef in Green Bay a short time ago, and now she is ashore at Laughing Whitefish Reef, 24 miles below Marquette. The schooner CASCADE, being towed by the UNION, also ran on the reef. Both are in the trade between Green Bay and Marquette. They struck at 2 AM on Saturday in dense fog (Detroit Free Press, June 16, 1872).

The UNION made four trips to Marquette in 1873 under Capt. D.L. Stearns before its shipping days came to an end. On September 25, it was running down the Lake from Marquette, carrying 432 tons of ore for the Elk Rapids Iron Co., when it ran into a typical fall storm. Strong northerly winds drove the ship south off course, and it blundered onto Au Sable's dreaded reef. It appears that the UNION did not have a consort barge in tow at the time.

The Chicago Times reported the accident on October 1:

The propeller UNION is ashore on Point Sable (sic), between Grand Island and Whitefish Point; Lake Superior, and unless relief is speedily furnished, will go to pieces. She is owned in Green Gay, valued at \$22,000, and insured for \$17,000.

A Milwaukee article was more detailed:

It is learned from Marquette that the propeller UNION went ashore at Sauble Point Thursday morning at about 4 o'clock. The Captain threw overboard her deck load, but the wind changing drove her further upon the reef. She now lies in nine feet of water, and the probabilities are stated to be that she will go to pieces before assistance can be rendered. . . (Milwaukee Sentinel, October 1, 1873).

The Marquette Mining Journal stated:

The propeller UNION, Capt. D.L. Stearns, was driven ashore in the storm on the morning of Thursday of last week at Point Au Sable, about 30 miles below Grand Island. The steambarge ST. CLAIR left Monday for the scene of the disaster, and the crews will strip the propeller of whatever they can get away. The UNION left here on the 24th inst., with 432 tons of ore consigned to the Elk Rapids Iron Company. She was built at Manitowoc in 1861 and for some years ran between Chicago and Lake Superior ports as a passenger steamer. Latterly she has been used in the transportation of lumber and ore. She was owned by Mark English of Green Gay and valued at \$18,000. Insured in the Inland Union of New York, the Northwestern National of Milwaukee, and Mercantile of Cleveland (October 4, 1873).

A week later the ship had gone to pieces:

TOTAL LOSS OF THE PROPELLER UNION - Frank H. Whipp, Esq. yesterday received the following letter concerning the propeller UNION from Kimball and Libby, agents of the Northwestern National Insurance Co., at Green Bay, under date of Oct. 7 - "Enclosed we forward a certified copy of the master's protest of propeller UNION, also notice of abandonment. The owner, acting, as we understand, under the direction of the agent of the Inland Insurance Union at Marquette, chartered a tug at that place and went to the wreck, but found her in such condition that it was impossible to get her off, as she was already breaking up. When they left, she had gone to pieces, except that part of the hull containing the machinery.

They took off the crew and returned. The UNION had a cargo of iron ore from Marquette to Elk Rapids" (Milwaukee Sentinel, October 9, 1873).

Historian Dr. Julius F. Wolff Jr. of Duluth reported that salvors "picked off some articles of value," but no details of immediate salvage have come to light (Wolff 1979:22). The following summer, however, there was evidently some effort to recover parts of the ship:

Captains Edwards and Spencer of Manitowoc are negotiating with the underwriters for the machinery of the propeller UNION, wrecked last season on Whitefish Point [sic], Lake Superior (Milwaukee Sentinel, August 18, 1874).

A further note appeared fully two years after the accident:

Wreckers have succeeded in recovering the boiler of the propeller UNION, wrecked at Au Sable, Laker Superior, nearly two years ago, and have taken it to Grand Island. The shell is said to be badly dented [sic] and bruised (Toronto (Ontario) Daily Globe, September 21, 1875).

It is not known what other articles, if any, were recovered from the wreck. The ship's documents were turned in at the Customs House in Milwaukee on October 1, 1873, with the simple notation "Total loss."

Site Description and Analysis

The small section of wreckage found east of Hurricane River could be from the UNION, but is more likely from the nearby MARY JARECKI. Little found on the reef or the point suggests a vessel of the UNION's period or type, although a 12-foot length of 2-inch iron rod found near the SITKA and STAPLES remains could be a part of a truss system from a ship of the UNION's description. The rod has a 4-inch pan head on one end and 8 inches of coarse threading on the other. It appears to have been fitted to a turnbuckle and used in a hogging-truss of the type employed between 1850 and about 1880. Since the UNION did not have conventional hogging arches, it may be inferred that it had some internal system of truss-rods. The rod is not typical of strengthening used in craft built as late as the SITKA and the STAPLES, both of which were constructed in the late 1880s. This feature lies on the beach halfway between the lighthouse and the sections of ship bottom, and is curled into a 3-foot circle.

One more piece of wreckage was found in the vicinity of the reef at Au Sable that may be from the UNION. This is a section of ship's side 9 feet wide and 88 feet long, found about a half-mile east of Au Sable Light and about 200 yards offshore. The long section lies among a confusion of sandstone ledges and rocks in about 16 feet of water, partially obscured by sand and gravel. It is surrounded by other smaller pieces of wreckage varying from pipes and machinery parts, to hand tools and artifacts, to wooden timbers and frame members. One length of heavy wooden hatch-coaming was also observed nearby, with iron hatch-clamps attached. A 13-foot length of 10-inch steam pipe lay just inshore from the site, and a 2-foot iron sheave, probably from the steering cables of a large steamer. All of these artifacts suggest the likelihood of more wreckage farther offshore. That area was not searched during the 1988 field investigations, but shows much promise.

The length of ship's side extends from the turn of the bilge to near the main (lower) deck level. The frames measure 9 inches in depth and 11 in width, spaced on 21-inch centers. They are made up of doubled futtocks in the conventional fashion. No iron strapping was found on the piece, and so it is not from either the SITKA nor the GALE

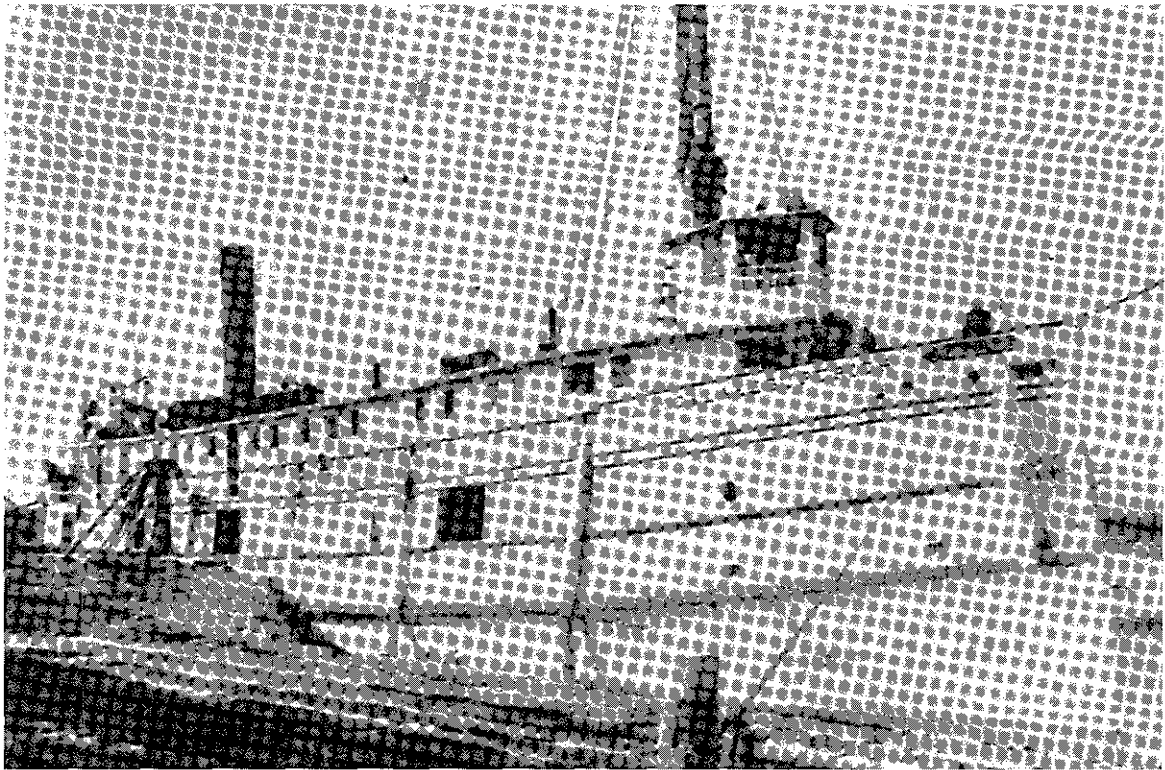


Fig. 4.62. The only surviving view of the UNION shows some of its unique features, circa 1870. Edward N. Middleton Collection.

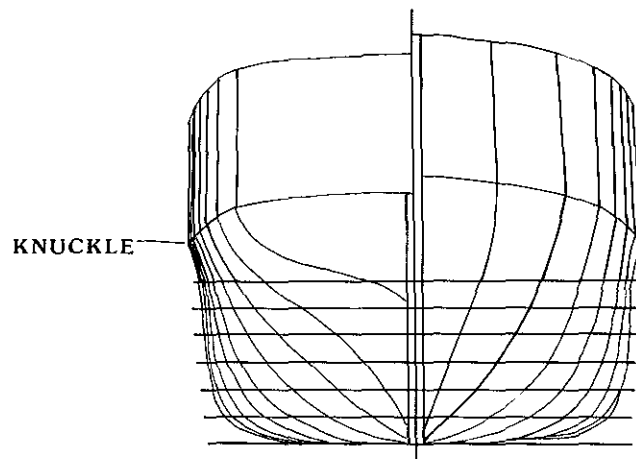


Fig. 4.63. This cross-sectional "body plan" illustrates UNION's unconventional hull-form. Historic American Merchant Marine Survey.

STAPLES, but could be from the UNION or perhaps the mysterious ONEIDA CHIEF. The hatch-coaming lies within 100 feet of the side section and suggests a vessel larger than the ONEIDA CHIEF. Most schooners had very small hatches. If the two features are from the same wreck, then they most probably represent the long-lost UNION, but not enough other pieces of the wreck were observed to make a valid judgment. None of the machinery parts had features sufficiently diagnostic to establish a particular period or to suggest a specific ship. All of the remains found in this area to the east of the point are assumed to have come from the reef, driven by surface currents and ice flows.

The length of ship's side lies inside up, with the turned-up ends of the frames from the turn of the bilge. Both the ceiling and the outside planking are still attached, the ceiling or inner skin being 4-by-8-inch oak, all edge-bolted, and the outer skin 1 1/2-inch plank. Fastenings protruding from the upper edge suggest a 4-inch-thick shelf for the main deck beams, although no remnants of those timbers have survived. Fasteners are 3/4- and 7/8-inch round iron and 1/2-inch square nails.

A cursory examination of the eastern perimeter of the reef failed to reveal any signs of a major wreckage field, although the search was focused farther out and farther west than the features just described, and a sweep in the shallow water to the east promises to be more fruitful. A map sketched by sport diver James G. Becker in 1966 indicates wreckage in the area in 15 to 20 feet of water.

From a technological point of view, the wreckage of the UNION could be the most valuable in the Lakeshore. It may provide a wealth of new information about Wm. W. Bates and his contributions to ship design in an era of very rapid transition. It could prove to be doubly interesting because most of Bates' published works deal strictly with sailing craft and little is known about the application of his design principles to steam-powered ships. The ship's machinery, dating to 1848, would also have great informational value.

SOUTH SHORE

East of Au Sable Point, the density of shipwreck sites thins considerably. Only one wreck is known to lie within the boundaries of the Park between Au Sable and Grand Marais. The small passenger and freight steamer SOUTH SHORE, which was disabled in a 1912 storm, lies off the Sauble Dunes about five miles east of Grand Marais. The ship's boiler is easily found, and the hull has been reported from time to time on the sandy bottom near the Log Slide. Repeated searches during the 1988 field work failed to turn up any sign of the ship's hull, and it is assumed that the shifting sand alternately covers and uncovers whatever remains of the wreckage. The boiler lies in about 10 feet of water, 150 feet off the beach and nearly 2 miles east of the Log Slide or 3 miles west of Grand Marais. The 2-mile distance between the hull and the boiler of the SOUTH SHORE can be explained by heavy seas and drifting ice that scour the near-shore and sweep from west to east.

History

The SOUTH SHORE was built in 1899 as a tug named ROBERT E. BURKE (U.S. No. 111257). Built at Manitowoc, Wisconsin, by H.B. & G.B. Burger for Barry Brothers Independent Tug Line of Chicago, it was a typical single-decked harbor tug, measuring 84.3 feet in length, 20.7 feet beam and 6.3 feet depth, 73 gross tons and 49 net tons (permanent enrollment No. 63, issued at the Port of Chicago December 30, 1899). The

first enrollment shows the original owners to be Margaret Barry and Lillay Lamoreaux of Chicago, with Peter Barry as master.

The BURKE was powered with a high-pressure steam engine from the Vulcan Iron Works of Chicago, with a 10-inch cylinder and a 30-inch stroke. The boiler measured 4 1/2 feet in diameter and 7 feet in length (Beesons Marine Directory, 1907).

The Barrys used the BURKE in the Chicago towing business and in the excursion trade as well. A handful of small steamers ran from the Chicago River to Jackson and Lincoln Parks on the lakefront, or on the Drainage Canal during the summer months, and the Barrys experimented with the business around the turn of the century. The Barry interests owned several passenger steamers in addition to their tugs, and they operated the former principally from Chicago to western Michigan ports. They also owned docks in Milwaukee, Wisconsin, Kenosha, Illinois and Muskegon, Michigan, as well as in Chicago.

The end of its second season found the BURKE wintering at the Barry docks in Muskegon, probably because this is where the company kept its repair crew to work on the ships during the quiet months. Unfortunately, the craft suffered a fire while it was there:

The steamer ROBERT E. BURKE, owned by Barry Bros., which operated last season on the Chicago lake-front passenger trade, was badly damaged by fire at 3 o'clock Sunday afternoon at Muskegon. The boat was laid up for the season, and the origin of the fire is a mystery. The upper works were entirely burned away and the hull also suffered severely (Port Huron Daily Times, December 23, 1901).

Although the ship was relatively new and Barrys' experienced ship carpenters were near at hand, no immediate efforts were made to repair it. The 1902 Directory of the International Shipmasters Association lists the tug as "burned," and late in the 1902 season it was still idle at the docks in Muskegon. Instead of repairing the craft, the Barrys sold it. In the fall, the BURKE appeared in a short article in the Chicago papers:

Graham & Morton are to start service to Lincoln Park. They have arranged with the owners of the LENA KNOBLOCH to run her in connection with the former tug ROBERT E. BURKE, which is now being made a passenger steamer. The LENA KNOBLOCH is already in service from the G & M dock. The ROBERT R. BURKE was purchased from the Barry interests a month ago by J.H. Graham (Chicago Inter-Ocean, September 7, 1902).

Subsequent documents show no change in tonnage or description for the steamer that would substantiate reconstruction or corroborate a new silhouette. The BURKE was given two decks for day excursion passengers, both open all around, with a small central cabin on the lower deck and a pilothouse on the upper one. It must have carried about 150 passengers.

The ROBERT E. BURKE changed hands again less than six months later, when it was sold to H.J. Howard, managing owner of the Howard Transportation Co. of Chicago, in February 1903. Howard continued the little ship in the Lincoln Park business for all of the 1903 season, but in 1904 he chartered it to the Joliet and Suburban Express Co. to run between Chicago and Lockport, Illinois on the canals. It carried freight to 10 destinations along the way (Chicago Inter-Ocean, May 20, 1904), and served the route for the next four years. In May 1908, Howard changed the steamer's name to the SOUTH SHORE.

In the spring of 1909, the SOUTH SHORE became the property of fisherman Emil G. Endress of Sault Ste. Marie, Michigan (permanent enrollment No. 21, issued at the port of Marquette April 23, 1909). Endress had operated commercial fishing craft and small freighters out of Sault Ste. Marie from the 1880s through the first decades of the present century. The SOUTH SHORE was employed carrying passengers and supplies out of the Sault to various small ports at the eastern end of the Lake and picking up fresh fish for transportation back to the Sault for wholesale distribution. Two or three photographs illustrate the SOUTH SHORE while it was under Endress' ownership, and it is presumed that it was somewhat altered when brought to Lake Superior, where it would run on the open Lake, often in the late fall storms. The steamer's lower deck was enclosed from stem to stern, or "housed in," giving it a protected freight deck of considerable capacity. The SOUTH SHORE was also given a cozy passenger cabin on the promenade deck, with a rounded pilothouse, a short stack and a boat deck, which overhung the pilothouse forward, presenting a sturdy and somewhat rakish profile.

The ship served south shore communities all the way to Marquette. It soon became not only a favorite with the travelling public, but also a key player in the economy of the region where commercial fishing played a very significant role. The SOUTH SHORE's trips became as regular as clockwork.

The SOUTH SHORE was nearing the end of its fourth successful season on Lake Superior when it sailed from Sault Ste. Marie on November 22, 1912. It was steaming westward between Deer Park and Grand Marais on November 23rd, when the weather began worsening. By the time it reached the piers at Grand Marais a very heavy sea was running, with strong northwest winds and intermittent snow squalls. In command was Capt. Ora Endress, one of the region's most experienced navigators. Prudently, Endress elected to wait out the storm on the open Lake rather than risk the narrow entry at Grand Marais with its renowned cross current; he turned back into the wind.

Throughout the night the storm continued to worsen, and Endress crept westward, keeping the little ship's bow to the enormous seas. The nighttime hours took a terrible toll on the ship and its passengers and crew. The seas wrecked the steamer's lifeboats, dashed in the rails, smashed the pilothouse windows, coated the vessel with ice, and mercilessly mauled everyone on board. Worse yet, the strain of the incessant rolling and pitching opened leaks in the wooden ship's hull, and it began taking on water (Wolff 1979:105).

As daylight approached on the morning of November 24, there was so much water in the ship's hold that the firemen could no longer keep the fires going in the boiler. The steam pressure dropped until the engine could no longer be worked at all, and the SOUTH SHORE began rolling helplessly in the trough of the seas. Passengers and crewmen worked feverishly at the pumps to control the water in the hold so that the ship didn't swamp (Chicago Inter-Ocean, November 28, 1912; Marquette Mining Journal, November 26, 27, 29 and December 2, 1912). At daybreak the ship's white flag was spotted by the Life Saving station at Grand Marais. The ship was drifting before the northwest wind at the time, about 4 miles from shore and nearly 10 miles west of the station. Capt. Ben Truedell led the Life Saving crew out to the sinking vessel in the power lifeboat. When they boarded, it was nearly awash, and the Life Savers worked with the exhausted passengers and crewmen to jettison cargo and speed up the pumping process. It became clear immediately that the ship could not be saved, so they took off the 10 sufferers, abandoned the ship not far from Au Sable Reef and returned to the Station. Miraculously, there were no lives lost in the incident (Stonehouse 1983:49).

The SOUTH SHORE filled with water, but it remained afloat until it was caught in the surf about 2 miles east of Au Sable Point. Here the ship struck bottom and began breaking up as the waves swept over it. The house, bulwarks and everything above the main deck were quickly swept off and strewn across the sandy beaches for about 2 miles east of the site. In the succeeding days the hull, too, broke up and nothing remained above water to mark the SOUTH SHORE's grave, although there was only 13 feet of water where it came to rest.

The newspapers carried stories of the ship's loss for several days, including hair-raising accounts by the survivors. They also decried the impact of the tragedy:

MUCH FREIGHT DESTINED FOR GRAND MARAIS WAS ON SOUTH SHORE - Seney, Mich., Dec 3 - The recent wrecking of the SOUTH SHORE on Lake Superior was a serious blow to Grand Marais, connected in winter only by a wagon road that at times is impassible. The SOUTH SHORE carried a mixed cargo of freight of seventy-five tons, included in which were the winter's supplies for merchants and for many a family living between the Soo and Grand Marais and at the latter place. In order to keep the vessel afloat, it was necessary to dump every pound of that freight overboard. There was no insurance on the cargo, which consisted in part of fifty barrels of flour consigned to Hargraves & Hill of Grand Marais. The loss, therefore, at this time, when no further trips will be made by any boat, is unfortunate and will entail much additional expense and hardship (Duluth Herald, December 3, 1912).

Site Description and Analysis

The SOUTH SHORE's boiler is easily seen from the surface or from the top of the Sauble Dunes. It lies about half buried in sand and gravel, but looking fresh and undamaged. Several fittings and flanges are attached. The heavy steel shell-plating is kept free of rust by the abrasive action of wave-driven sand. Sport divers and park visitors frequently report sighting wreckage in shallow water on both sides of the Log Slide and, as a result, the area was examined using a spotter on top of the Dunes. Several large crescent-shaped accumulations of rocks were found, but there was no wreckage at all. Considering the known facts of the SOUTH SHORE's loss and the frequency of reports about wreckage, there is every likelihood that the ship's remains lie very near the Log Slide. A further search of the area is encouraged.

In the area between Au Sable Reef and the SOUTH SHORE's boiler, about 4 miles to the east, divers have reported seeing "large steel tubes" or "pipes" that were thought to be part of the SOUTH SHORE's remains. Similar pipes were noted in and around Grand Marais (James Becker, personal interview, March 15, 1989). The tubes are standard 20-foot lengths of suction-dredge discharge pipe and are not associated with the SOUTH SHORE at all.

On October 11, 1933, a big dredging outfit from Duluth was running down the Lake when it ran into foul weather off Pictured Rocks. The tug GLADIATOR had in tow DERRICK BARGE No. 8 and a string of 35 pontoons with sections of dredge-pipe; not a heavy tow, but one that was slow and very susceptible to weather damage. Far from shelter, the tug headed for Munising, but the towline broke. The whole tow drifted onto Au Sable Reef. DERRICK BARGE No. 8 grounded on the reef, but the pontoons drifted farther east, some breaking up on the rocky shore and others being carried high onto the sandy beaches. The pontoons with their awkward burdens were strung all the way from Au Sable Point to grand Marais when the storm abated. DERRICK BARGE No. 8 and many of the pontoons were recovered, but nearly a third of the pontoons were lost.

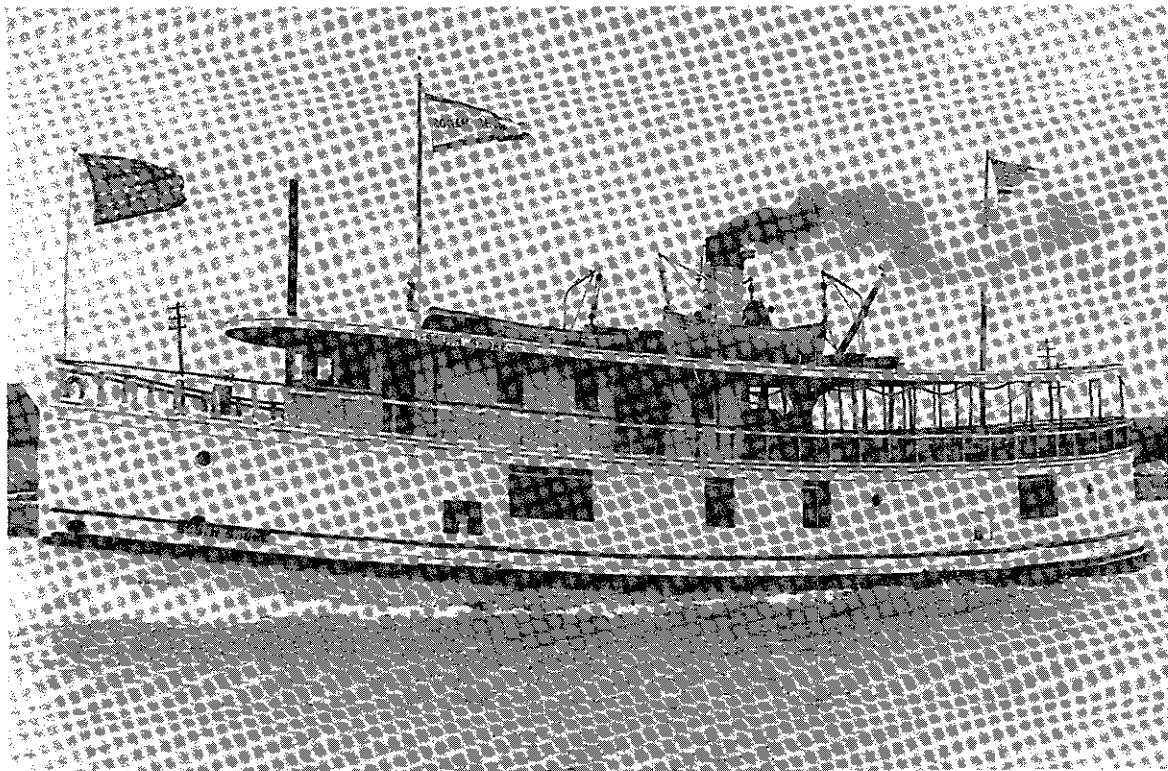


Fig. 4.64. The tough little steamer SOUTH SHORE served as Grand Marais' link with civilization. Dossin Great Lakes Museum Collection.

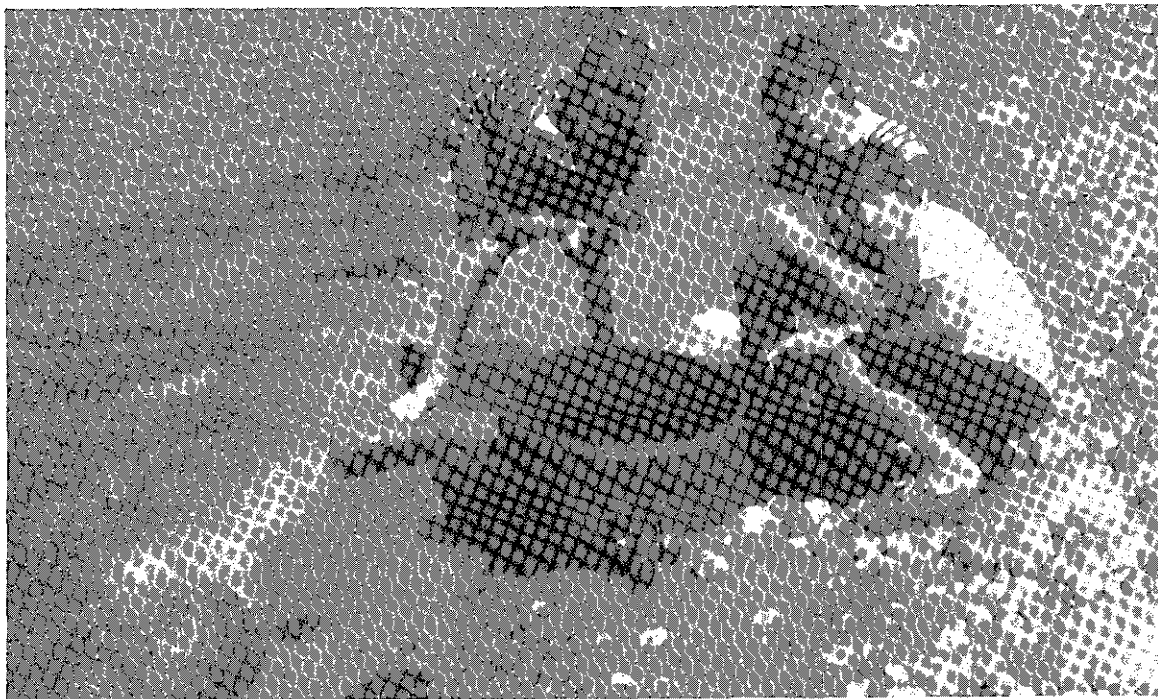


Fig. 4.65. Coupling from a dredging discharge-pipe is a remnant of a 1933 accident. Photo by Julius F. Wolff Jr.

Sections of the pipe and occasional pontoons may still be found at several locations along the Sauble Dunes today (James Becker, personal interview, March 15, 1989).

Grand Marais

There are no other known shipwrecks within the boundaries of Pictured Rocks National Lakeshore, although several small craft have been lost at various locations (see shipwreck chronology, pages 160-172). In addition, many partial losses have undoubtedly resulted in debris, jettisoned cargo, or salvage equipment left at the sites, and flotsam from more distant incidents must also lie at diverse shoreline locations within the Park.

Just beyond the park boundaries to the east there were four more ships lost adjacent to Pictured Rocks National Lakeshore that are worthy of some mention, although no attempt was made to locate or examine their remains for the purpose of this report. The proximity of these wrecks to the Coast Guard Station at Grand Marais and the recovery of artifacts attributed to at least one of these wrecks offers valid argument for their inclusion in this assessment.

GALATEA and NIRVANA

History

The GALATEA and the NIRVANA are two wooden barges lost just west of the piers at Grand Marais in the fall of 1905. Both were bound up the Lake in tow of a steambarge when they ran into foul weather, broke loose and went ashore just outside the entry.

The GALATEA (U.S. No. 85709) was built in 1882 at West Bay City, Michigan by F.W. Wheeler & Co.. It was built as a barge, fitted with three masts and schooner rig, but with short topmasts and no jibboom. It was meant to be towed, although the barge carried enough sail to work itself offshore if it was cut loose, and to manage respectably under sail if necessary. The GALATEA measured 180.0 feet in length, 33.6 feet beam and 12.0 feet depth; 606.51 gross tons and 576.18 net tons. The completion of the barge was greeted with little fanfare:

The barge GALATEA, built at Detroit [sic] for James McBrier & Co., was successfully launched this week. She is 182 feet overall, 175 feet keel, 36 feet beam, and 12 feet hold. She can carry 700,000 feet of lumber, and cost \$35,000. She will run in the lumber trade in tow of the [steamer] FRED MCBRIER (Chicago Inter-Ocean, April 14, 1882).

The barge was rebuilt (double-decked) in the spring of 1887, at which time the depth was changed to 20.9 feet, the tonnage to 825.12 gross and 783.87 net, in an effort to better suit it for the iron ore trade. For the next several seasons the GALATEA ran to Marquette and Duluth as consort to the bulk freighter KATE BUTTERONI.

Between 1890 and 1900, the ship went through several changes of ownership, but the principal owner was W.F. Jennison of Bay City, Michigan, who employed it in the lumber trade. The GALATEA was rebuilt again (cut down) in 1893 for lumber cargoes, and the tonnage reduced to 610.58 gross and 590.06 net; the yardwork resulted in changing it back to a single-decker. The carriage of lumber products did not demand a vessel of great depth of hold because the cargo was more easily stowed on deck rather than below, and because it was relatively light it did not sink the hull as deeply as did more dense cargoes.

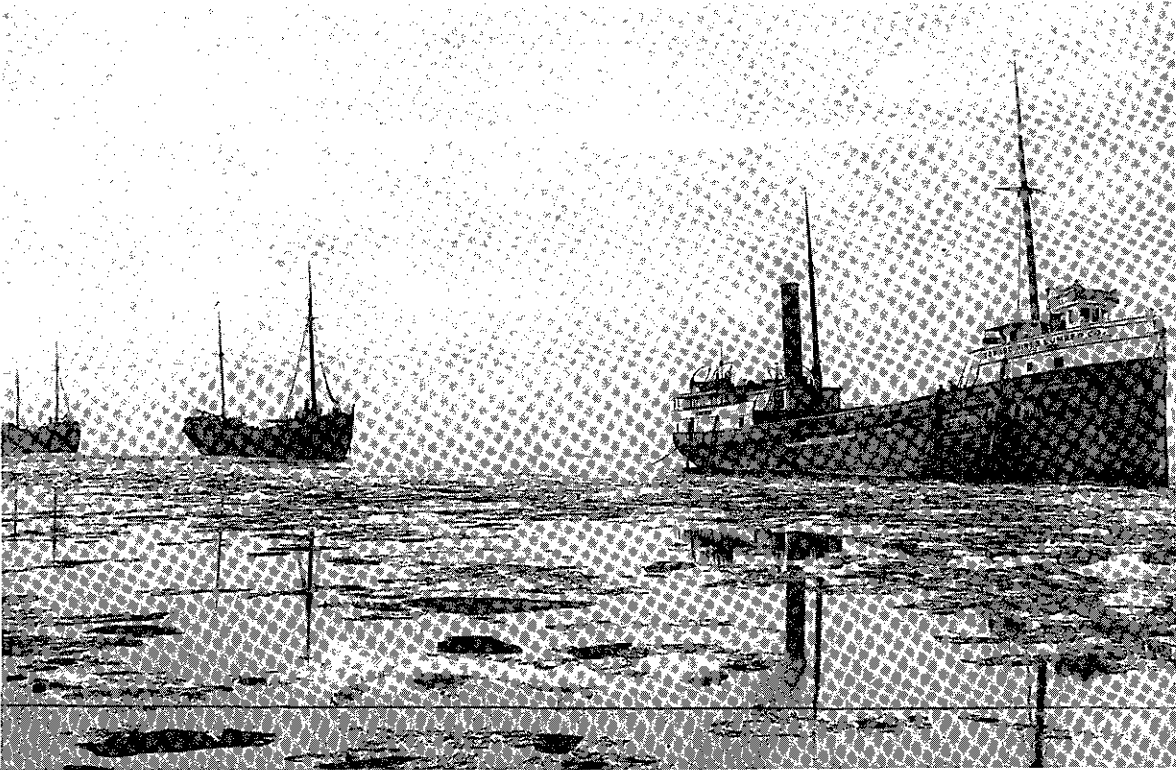


Fig. 4.66. The barges GALATEA and NIRVANA served as consorts for the steamer L.L. BARTH. Milwaukee Public Library Collection.

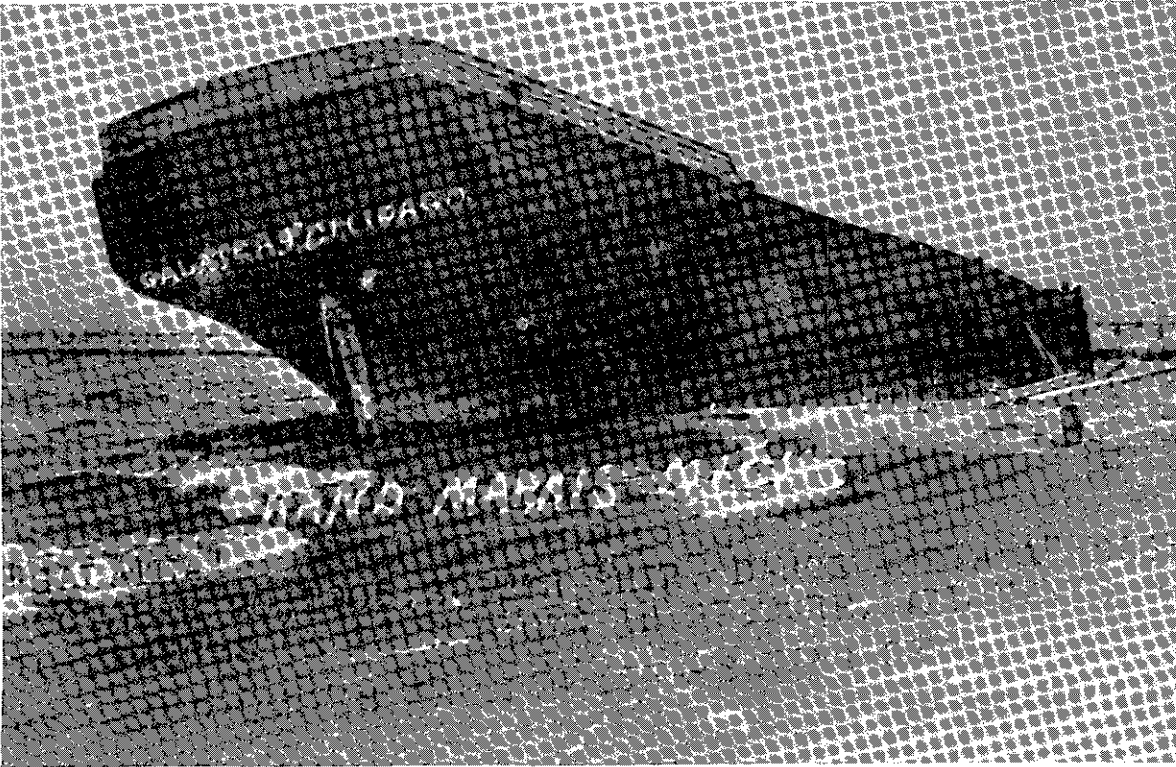


Fig. 4.67. The GALATEA remained on Grand Marais beach for years before it was burned. A.F. Glaza photo, Ralph K. Roberts Collection.

On February 7, 1900, a new enrollment issued at Chicago showed the sale of the GALATEA to the Edward Hines Lumber Co., at the time reputed to be the largest lumber firm in the world. The Company operated a fleet of five steam barges (lumber steamers) and ten barges, all freighting lumber products down the Lakes to their sprawling mills on the North Branch of the Chicago River. During the next three years, the GALATEA and the similar NIRVANA were towed by steam barges S.S. WILHELM and L.L. BARTH, each hauling an average of nearly a million board feet (750 tons) of lumber.

The NIRVANA was also built as a barge and also at West Bay City, but was a product of the James Davidson shipyards. It was built for Charles Eastman and others of Saginaw, Michigan, and was very similar to the older GALATEA, measuring 169.5 feet in length, 34.0 feet beam, 13.2 feet depth, 611.12 gross tons and 580.57 net tons. The NIRVANA had three masts, and the hull was strengthened with steel arches built into the sides (Inland Lloyds Vessel Directory, 1894). The GALATEA appears to have been given similar reinforcing when it was rebuilt in 1893, although it was not part of the original fabric. Like the GALATEA, the NIRVANA was acquired by the Edward Hines Lumber Co. in the spring of 1900, and was thereafter towed by the WILHELM or the BARTH in the Lake Superior lumber trade.

A 65-mile-an-hour gale caught the L.L. BARTH on the open Lake with the two barges in tow on October 20, 1905. The steamer and its consorts were bound up the Lake for Duluth to load lumber; and the BARTH had cargo aboard. The two barges became unmanageable when the powerful nor'wester struck, and the towline broke as they pitched in mounting seas some miles off Grand Marais. The ships were far from any shelter, but the two barges made sail and maneuvered toward the harbor at Grand Marais. Without the assistance of steamers or tugs, both craft missed the narrow entry and fetched up on the beach to the west of the piers. The entry at Grand Marais is notoriously dangerous in northerly storms because of a powerful current that sweeps across the piers and because the configuration of the sandy bottom causes waves to steepen and "trip" as they sweep in from the deeper water.

In its attempt to make the entry, the NIRVANA struck the outside of the west pier, then veered off into the shallow water and sank, breaking in half amidships in the process. The GALATEA's master saw that he could not get into the piers, so he drove for the beach west of the piers. The helpless ship swung broadside to the shore, fetching up about 300 feet from the west pier with the bow in 10 feet of water and the stern in no more than 4 feet; the crew waded ashore. The NIRVANA's seven-man crew was in grave danger because the ship was literally breaking up under their feet, with the entire forward half shattered and the after end in immediate danger of going to pieces in the big coamers. Capt. "Ben" Truedell and the Grand Marais Life Savers bravely put out into the huge seas with their pulling-boat and took off the men; fortunately, there were no casualties (Wolff 1979:79-80).

The NIRVANA was irretrievably shattered, although some tackle was salvaged from the wreck; it was a \$15,000 loss (Inland Lloyds Marine Directory, 1904). There were reportedly several attempts to salvage the GALATEA during the next two years, but in the end, it too was left where it stranded. The GALATEA eventually went to pieces on the spot, but not before local residents stripped the barge of everything that was usable. It too, was valued at \$15,000 (Wolff). The GALATEA's wreck was a Grand Marais tourist attraction for several years after 1905. Extensive remains of the two large ships are presumed to have survived at the site of their loss, although they are buried in the deep sand. It would not be surprising if portions of the craft were occasionally exposed.

H.E. RUNNELS

One more ship lost west of the piers at Grand Marais is the steambarge H.E. RUNNELS, victim of a 1919 storm.

History

The RUNNELS was a "lumber hooker" or steambarge built in 1893 at Port Huron, Michigan, by the Jenks Shipbuilding Co. for their own account. It was a big 185-footer and among the last of that type constructed for the dying Lakes lumber industry. The ship was launched June 8, 1893, enrolled on June 28 (permanent enrollment No. 184) and given official number U.S.96230. It was 862.09 gross tons, 694 net tons, measured 182.0 feet in length, 35.0 feet beam and 13.2 feet depth of hold, with a capacity reported at 750,000 feet of lumber. It had a wooden hull with diagonal steel strapping, one deck, two masts and a steel-lined boiler house. It was powered with a two-cylinder fore-and-aft compound steam engine built by the Phoenix Iron Works of Port Huron, with 20- and 40-inch cylinders and a 30-inch stroke. The machinery was rated for 375 horsepower at 90 revolutions. The boiler was a 9-foot 6-inch by 12-foot firebox from Weeks Brothers of Saginaw, rated for 125 pounds of steam. The ship cost \$60,000 (Record of the American Bureau of Shipping, 1899).

The RUNNELS suffered a serious fire on Lake Erie on May 29, 1895, when an oil lamp exploded in the hold, igniting the ship and its coal cargo. Seriously damaged, it was towed into Ashtabula (Ohio) harbor, where it subsequently sank (Detroit Free Press, May 30, 1895). The ship was raised in July and towed to Port Huron, where it was rebuilt and returned to service (Port Huron Daily Times, July 4 and August 15, 1895). In the fall of 1897 it sustained slight damage when it ran on the beach at Point Abbaye, Lake Superior, during a snowstorm on November 25 carrying a load of coal. The ship was freed by several local tugs on November 30 (Port Huron Daily Times, November 29 and December 1, 1897).

In October 1898, the RUNNELS was chartered by the Atlantic Transportation Co., along with a whole flotilla of other Lakes craft, to go to the seaboard for the coastal trades in order to satisfy shortages created by the Spanish-American War. It arrived at Philadelphia on November 12 and was joined by about 40 other Lakes steamers and schooner-barges. The RUNNELS was rebuilt at New York City as a double-decked package freighter during the ensuing winter, changing the gross tonnage from 862 to 1,162 and net tonnage from 694 to 925 (permanent enrollment No. 167, issued at the port of New York March 3, 1899). For a few months, the RUNNELS sailed out of Eastport, Maine, however, in the spring of 1899, it was brought back into the Lakes (permanent enrollment No. 12, issued at Port Huron, Michigan June 29, 1899):

The steamer RUNNELS, which went to the sea coast in the fall of 1898 as an open-decked steamer, and was later converted into a double-decked package freighter, and then brought back to the Lakes by the Jenks Shipbuilding Company and sold to Spence Brothers of Cleveland, has been remodeled into a single decker again for the lumber trade (Port Huron Daily Times, May 16, 1900).

The ship was enrolled in the name of the Spence interests on May 14, 1900 (permanent enrollment No. 174, issued at the port of Cleveland). At that time, the tonnage was reduced to 889 gross and 629 net. The steambarge sailed under the Spence management for the next 11 years.

In the spring of 1912, the RUNNELS was purchased by the White Transportation Co. of Buffalo, New York and was paired with the barge SCOTIA (permanent enrollment No. 37, issued at Buffalo April 11, 1912). On February 26, 1918, it was sold to John J. O'Hagan of Buffalo (permanent enrollment No. 58), and a few weeks later was given a new enrollment in the name of the "Runnels Steamship Corporation of Buffalo," John J. O'Hagan, president.

The RUNNELS, veteran of 26 years on the Lakes and a short stint on the coast, came to grief in the fall of 1919 at Grand Marais. Like so many other ships, it was the victim of a November storm. The ship was bringing a load of coal up to Lake Linden on the Keweenaw Waterway on November 13 when the weather turned sour. Capt. Hugh O'Hagan knew about November weather on Lake Superior and he brought the ship into Grand Marais to sit out the impending storm (Wolff 1979:117).

After midnight, the weather moderated and early on the morning of November 14, O'Hagan cast off his lines and crept out the narrow piers to set a course for Keweenaw. Hardly an hour from Grand Marais, the RUNNELS rounded Au Sable Point. The captain found that on the open Lake the storm was far worse than he had suspected, and so he turned the steamer and headed back for the harbor again. Getting the ship inside, however, was not nearly so easy as getting it out. With the wind on the stern and a wicked cross-sea running at the entry, making the Grand Marais piers would prove to be the RUNNELS' undoing.

It was 5:30 a.m. and as the ship approached the entry cautiously from upwind, O'Hagan estimated the leeway (sideways drift) as he got closer to the end of the piers. He then rang up for the speed necessary to make a dash for the safety of the harbor. He misjudged the wind and the resultant current and began to drift down on the east pier, so he quickly backed the ship to make another approach. As the RUNNELS backed into the great waves, the steering gear failed under the strain and the ship was rendered helpless. The crew hastily rigged a tackle on the ship's tiller, but that was torn loose by the violent jerking of the rudder even before it could be brought into use. The ship, now a tossing derelict, was swept into the shallow water about 200 feet west of the west pier and slammed aground, broadside to the towering waves.

From the time that the steamer approached the harbor, the plight of the ship had been followed by the men at the Grand Marais Life Saving Station. By the time the RUNNELS grounded, the Life Saving crew was already mobilized. It was exactly the sort of emergency for which they had so often drilled and not unlike rescues the same crew had performed successfully on several earlier occasions. The wind was blowing at gale force out of the northwest, the temperature was 18 degrees and it was snowing hard. The keeper of the Life Saving Station was away on leave at the time but, by a happy twist of fate, Capt. John Anderson of Chicago Life Saving Station was in the harbor travelling as a guest on a small Coast Guard cutter. Anderson quickly assumed command and swung into action.

The Life Savers brought rescue equipment to the beach and rigged up a Lyle gun. They shot a line to the wreck, which was obscured by the driving snow and swept by enormous seas. The light line sagged into the water and it was immediately coated with ice making it useless for the breeches buoy for which it was intended. The Life Savers launched a surfboat and used the line, which had been made fast to the pedestal of the ship's steering wheel, to guide it out through the rolling surf to the wreck. The ship's crew came down on the icy line to the tossing boat and they were brought ashore safely. First four crewmen came ashore, then six more, then five, and finally the Captain and the Chief Engineer, both very large men. Several of the Life Savers

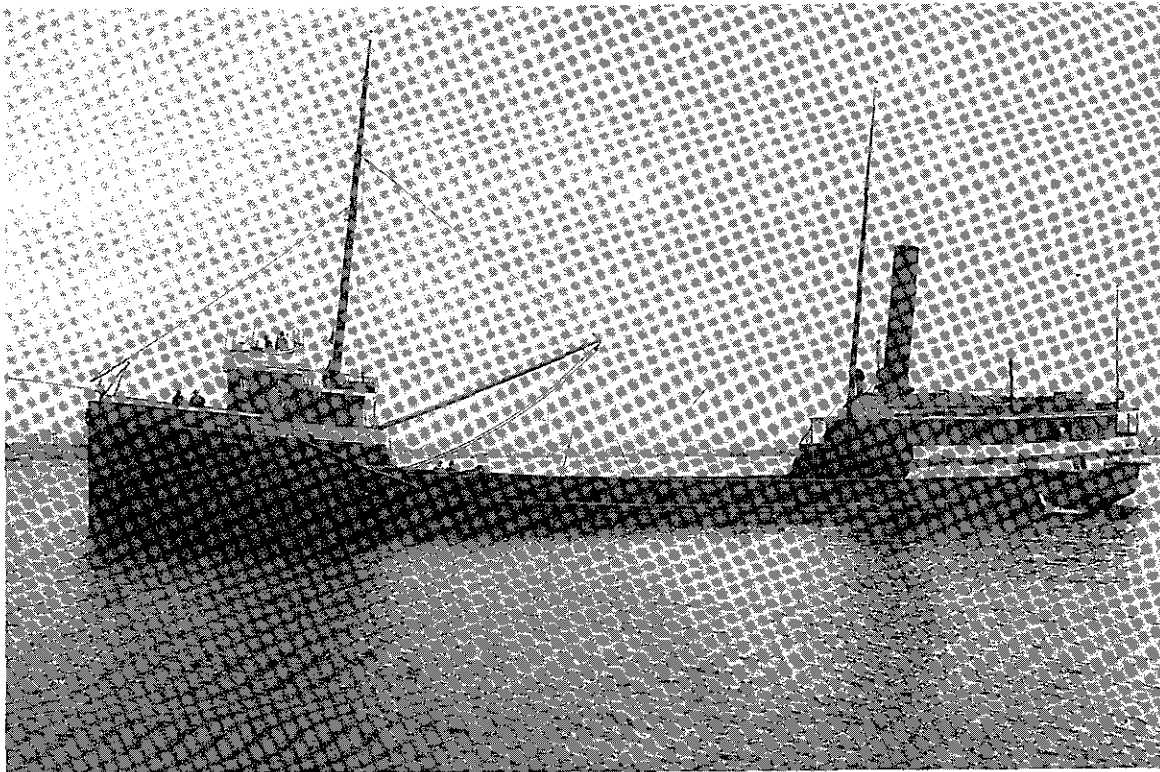


Fig. 4.68. The H.E. RUNNELS was among the last Lakes steamers built for the lumber trade. Milwaukee Public Library Collection.

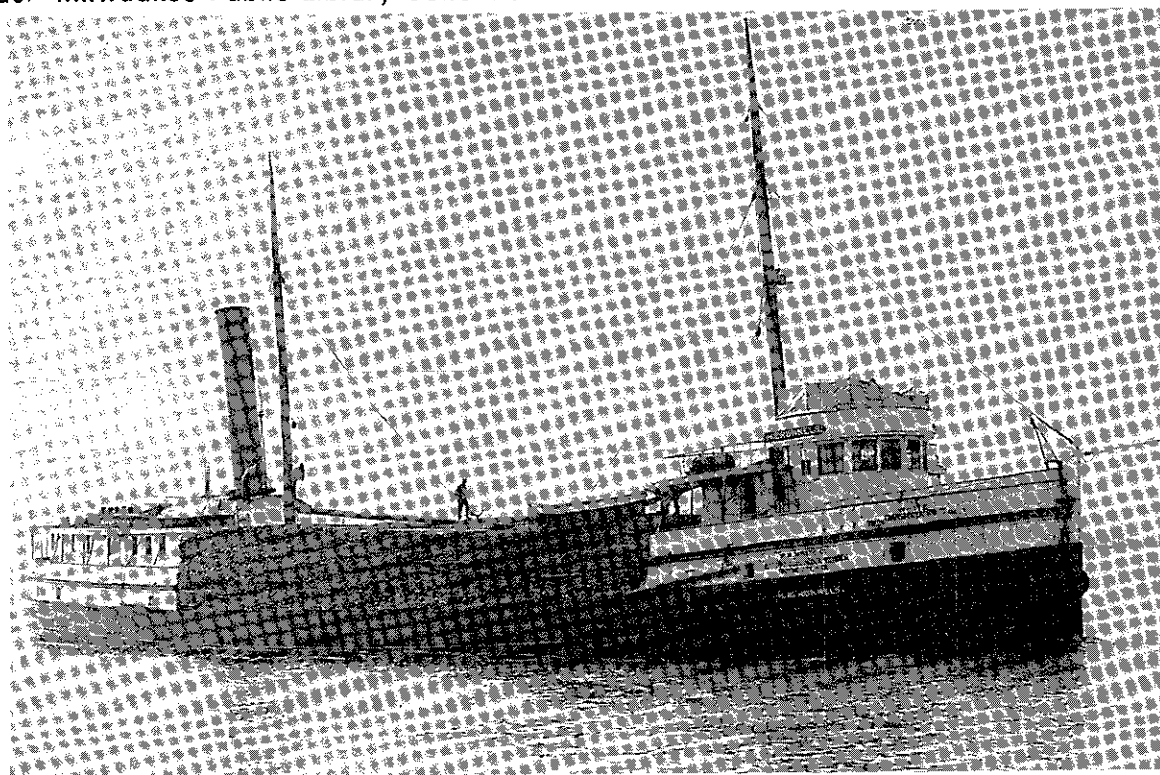


Fig. 4.69. After several rebuildings, the RUNNELS was still a good-looking craft. Milwaukee Public Library Collection.

collapsed from the exertion and exposure during the terrible rescue effort and they had to be replaced by others, including civilian volunteers. During the rescue, three surfmen were washed over the side of the tiny rescue craft and Capt. Anderson was washed overboard three times (J.A. Anderson interview in Wisconsin Marine Historical Society Soundings, 24.3:6). Incredibly, the 17 crewmen were saved without any loss of life. Gold Congressional medals were subsequently awarded to Anderson, seven Life Savers, one Coast Guardsman, and the four Grand Marais civilians who risked so much to save the sailors. The RUNNELS began breaking up under the tremendous pounding of the storm even before it was abandoned by the crew. It was reported that the steambarge went entirely to pieces that same afternoon. Along with the cargo, it was a total loss amounting to \$60,000 (Wells 1938:No. 830).

The RUNNELS wreck has yielded a variety of artifacts over the years, some of which may be seen at the Museum in the old Coast Guard Station in Grand Marais. The wreck is broken and scattered and it lies buried deep in the sand most of the time, although it has uncovered many times exposing broken timbers and machinery parts. The boiler, engine and auxiliaries appear to have been salvaged, though no record has been found of any such salvage work to date. Local divers describe the site as 100 to 200 yards west of the piers and abreast of the innermost steel cell of the west pier, about 300 feet offshore. It is ordinarily buried under about ten feet of sand. Some photos taken in the mid-1960s show grates and nondescript machinery parts (Jim Becker interview, March 15, 1989). The wreck is not likely to become a prime attraction to divers, but the story of the H.E. RUNNELS rescue is one of the most thrilling of the region's shipping tales and it is well-known to mariners the length of the Great Lakes.

SAVELAND

The last wreck along the lake side of the shore, although well beyond the park boundaries, is the schooner SAVELAND, which lies near the eastern extremity of the harbor at Grand Marais. It is just outside the old pile dike and in line with Cemetary Road. The ship was driven ashore there in a 1903 storm.

History

The SAVELAND was built as a fine three-masted schooner by the firm of Wolf & Davidson at Milwaukee in 1873. It was built for the Lake Michigan grain trade and, like the GEORGE MURRAY (later GEORGE) at Pictured Rocks, it was one of the really large schooners built after improvement of the Lakes' channels around 1870. This class of some 200 vessels is considered by many students of sailing ships to be the ultimate development of sail craft on the Great Lakes.

The SAVELAND (U.S. No. 115227) was owned by Zacharias Saveland and others of Milwaukee, who ran several crack sailing craft in the Lake Michigan trades (Hirthe 1986:105). It was enrolled in their name at the Milwaukee Customs House on August 6, 1873 (*permanent enrollment* No. 18) and was 194.9 feet in length, 33.2 feet beam, 13.6 feet deep, 689.44 gross tons and 654.97 net tons. The craft was fitted with main and gaff-topsails on all three masts and a large square topsail, a "runner" and a "raffee" on the foremast. Most of the larger schooners carried the triangular raffee at the fore, and some had the huge runner below it as well. Relatively few schooners also had square fore-topsails so the SAVELAND must have been a fast vessel as a result. The ship cost \$35,000.

In 1890, the schooner was sold to A.A. and B.W. Parker of Detroit, who employed it principally as a towbarge in the coal and ore business (permanent enrollment No. 55, issued at Detroit March 27, 1890). It was most frequently towed by Parker's steamer JOHN OADES. In 1901, SAVELAND was sold to Adam Hartman of Tonawanda, New York and John Boland of Buffalo (temporary enrollment No. 53, issued at Detroit May 4, 1901), and was thereafter used to carry lumber. It was valued at \$12,000 and rated for deckloads stacked to a height of 13 1/2 feet (Inland Lloyds Vessel Register, 1902); this would have given the schooner a lumber capacity of 800,000 board feet, or about 1,200 tons. The SAVELAND and the barge BUFFALO were towed by the lumber steamer GETTYSBURG on a fairly consistent basis, although the three were owned by entirely different parties.

An early fall snowstorm in October 1903 caught the GETTYSBURG and the two consorts on Lake Superior. All were headed down the Lake with full loads of pine lumber from the Alger Smith docks in Duluth. Heavily laden lumber carriers were not known for their stability, and so they made a run for the refuge of Grand Marais harbor when they ran into squalls and heavy snow on the morning of October 22. The steamer and the BUFFALO made it safely into the piers but the SAVELAND, at the end of the long string, broke its towline. The big, clumsily loaded ship might have made sail if it had been offshore, but it was too near the beach. The SAVELAND's master dropped both anchors, but they dragged, and the helpless craft was blown against the dike that enclosed the harbor a few hundred yards east of the piers (Wolff 1979:73).

The old barge pounded heavily on the dike, and the storm-driven seas beat against the hull until it filled and sank in the shallow water. Although the SAVELAND was hardly below the normal loaded draft, the position of the crew was still perilous because the cabin had been demolished and they were suffering terribly from exposure. The Grand Marais Life Savers braved the cold and the fury of the storm once more to bring a boat alongside the SAVELAND and take off the seven crewmen. The reports are somewhat ambiguous, but it appears that the surfboat was able to reach the men from the inside of the dike, so that they were not forced to take the surfboat on the open Lake to affect the rescue.

When the storm subsided, the SAVELAND was found to have a broken back and almost all of the deckload was gone. Salvagers attempted to save the ship, but it was useless, and it was abandoned on the spot where it eventually broke up. Virtually nothing of value was recovered; the ship was a \$10,000 loss and the \$6,000 lumber cargo was a total loss as well (Beesons Marine Directory, 1904).

Site Description

Portions of the SAVELAND and the old wooden pile dike may still be found three-quarters of a mile east of the Grand Marais piers, just a few feet below the surface. Both are almost entirely buried in the sand, but because of the high-energy wave action and the exposed position, the sand cover is constantly changing. The wreck was not examined for the purpose of this report, but local residents say that its remains are frequently exposed and are easily viewed from the surface. The configuration and condition of the wreck are unknown, but it is a safe assumption that the ship is fragmented from long exposure in the shallow water.

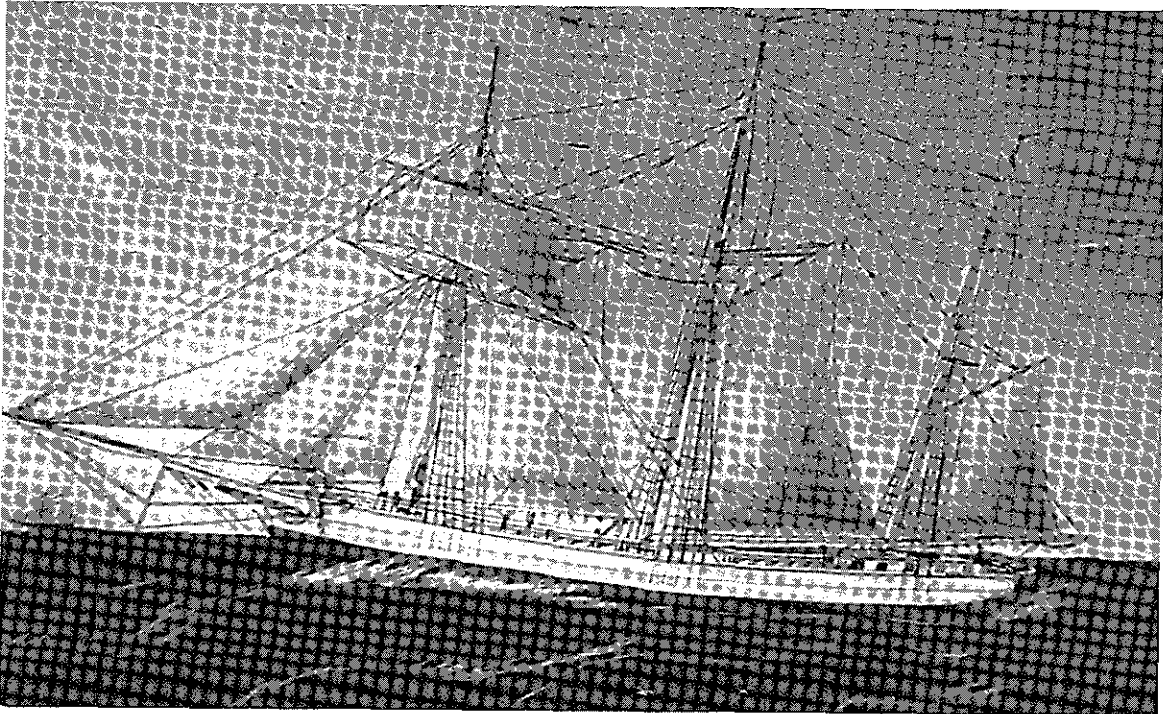


Fig. 4.70. A contemporary pastel drawing showed the SVELAND with its original rig; the masts were cut down around 1890. Robert Saveland Collection.

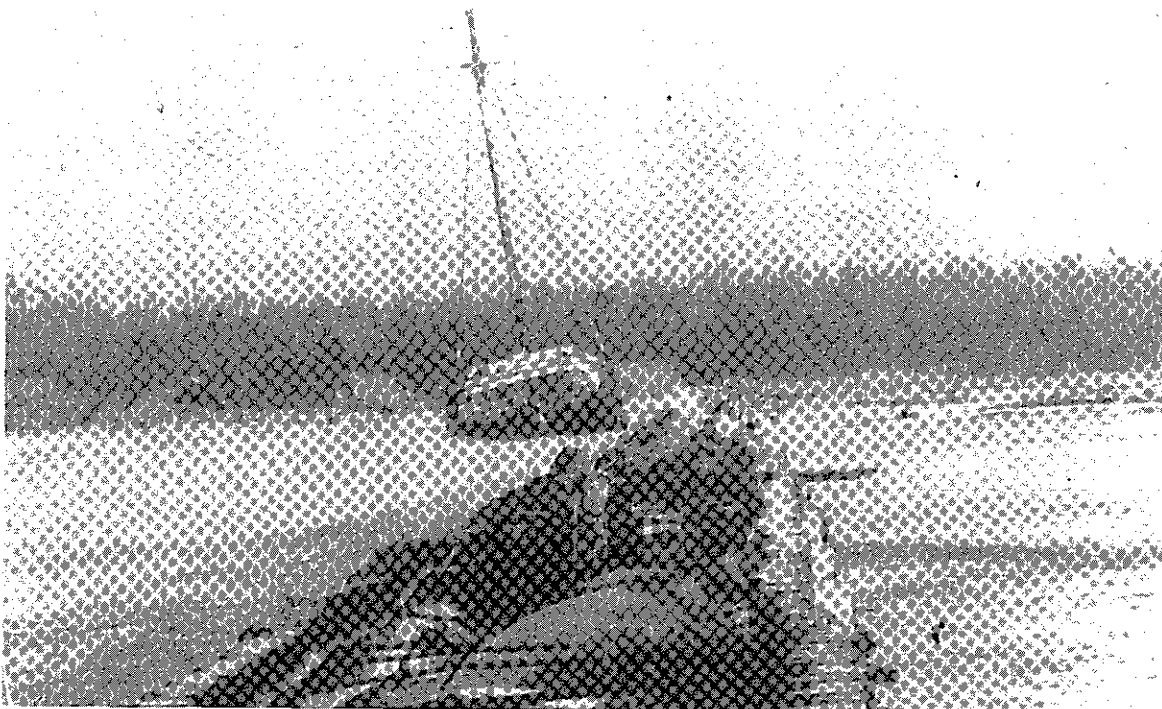


Fig. 4.71. The SVELAND fetched up in shallow water about a mile east of the harbor entry. U.S. Army Corps of Engineers photo.

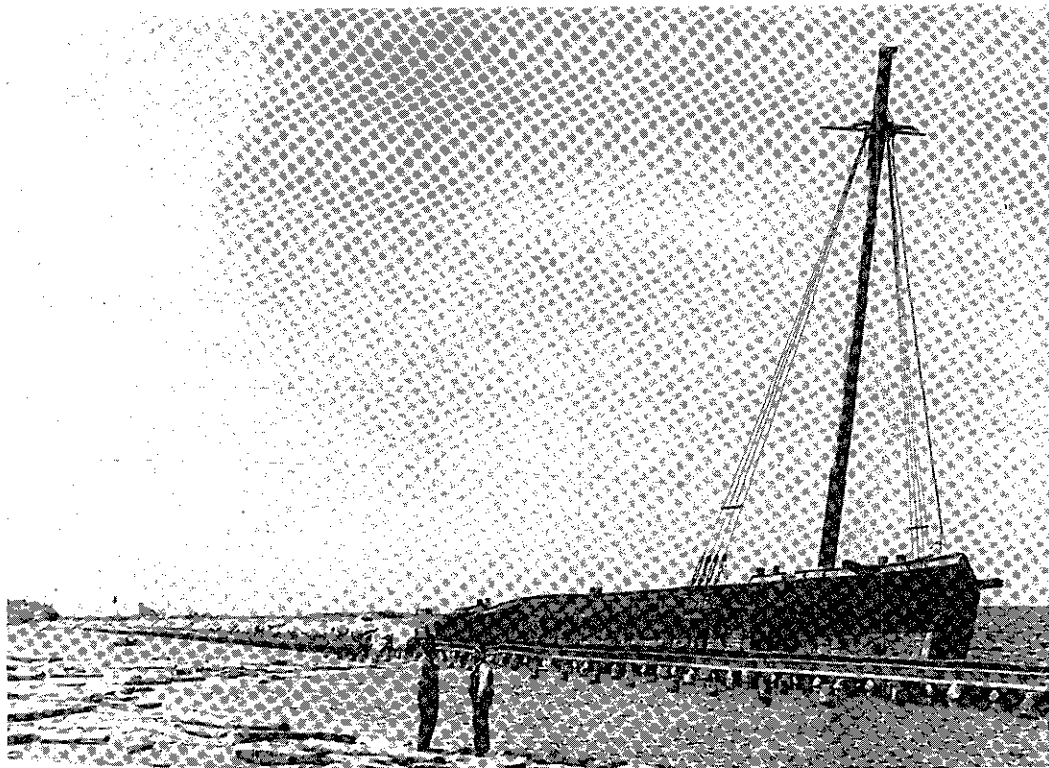


Fig. 4.72. The SAVELAND slowly disintegrated over a period of years at Grand Marais. U.S. Army Corps of Engineers photo.

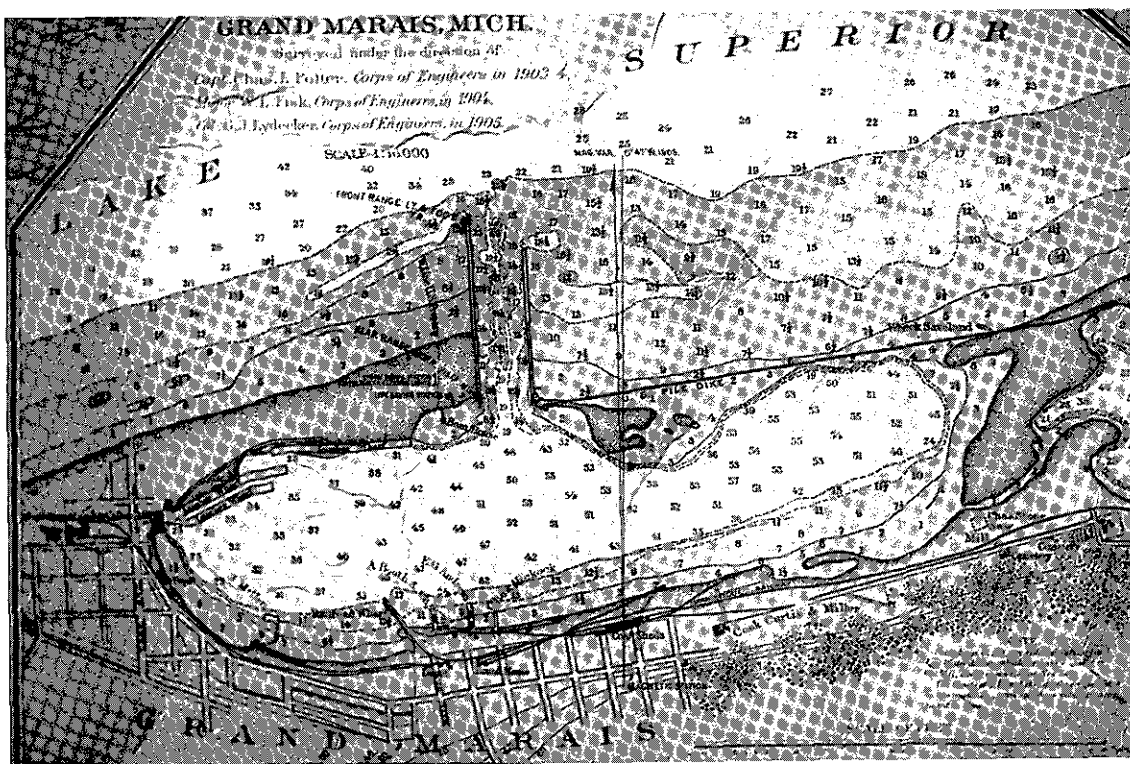


Fig. 4.73. A 1905 Corps of Engineers bathymetric chart of Grand Marais Harbor, Michigan.

MANHATTAN

The early "propeller" or screw steamer MANHATTAN, a passenger steamer that lies inside the harbor at Grand Marais should not be confused with the later bulk freighter of the same name wrecked at Sand Point. The MANHATTAN was among the first passenger craft operated on Lake Superior, and it ended up on the bottom right in the old channel at Grand Marais on September 1, 1859.

History

The MANHATTAN was built by Samuel and Alvin A. Turner (father and son) at Cleveland in 1847 for their own account. It was a double-decked passenger and freight propeller measuring 140 feet in length, 25 feet 2 1/2 inches beam and 9 feet and 11 1/2 inches depth, and 319-68/95 tons (permanent enrollment No. 2, issued at Cleveland on March 13, 1847). The steamer was said to have cost \$26,000. Nothing is known of the ship's machinery except that it was a twin-screw vessel; most, if not all of the first propellers were this type. At the time of the MANHATTAN's construction, screw steamers were still an innovation and only about 50 of the type had been previously built, more than half of them just the preceding year. Propeller-driven ships came to dominate the freight trades within 20 years of their introduction, and by the 1870s they took over most of the passenger business.

The ship had a fascinating and colorful career, running between Buffalo and Chicago until 1850, and on Lake Superior for the remainder of its operation.

A summary of the MANHATTAN's career speaks volumes about the state of steamboat navigation and the condition of the Lakes' channels and harbors in that pioneering era:

The MANHATTAN - This elegant new propeller, under the command of Captain Turner, starts for Detroit in a few days. Her cabins are fitted up in splendid style and we are sure that the "old sea dog" will spare no pains to make passengers as happy and comfortable as possible. This is the captain's first trial with steam (Cleveland True Democrat, March 26, 1847).

The ship was put into the Chicago grain business as soon as it was fitted out, and met with its first accident within only 90 days:

We learn by Captain Turner of the propeller MANHATTAN that on this trip down, his vessel ran on the Mackinac reef on Thursday last [June 3] in a fog. The revenue cutter ERIE came promptly to his relief and extricated him from his perilous position. Captain Turner speaks in the highest terms of the conduct of Captain Dobbins, 1st Lt. Berryman, and Lt. Hyatt and 3rd Lt. Thompson (Buffalo Morning Express, June 8, 1847).

Two weeks later, Turner was back in the news, "The new brig SALTILLO, with 10,000 bushels of wheat, was run into by the propeller MANHATTAN on the St. Clair Flats and sunk" (Buffalo Morning Express, June 19, 1847).

The Detroit Advertiser went on [June 31, 1847]:

The propeller MANHATTAN arrived at Detroit from Chicago on Saturday [June 24] and was stopped for damages done by coming into collision with and sinking the brig SALTILLO with a cargo of wheat some two weeks since, on the St. Clair Flats. We understand that the damages are laid at some \$10,000 or \$20,000.

The 1848 advertisements show that the steamer was commanded by a Capt. McFayden that season. He didn't have much better luck than his predecessor:

Racine - About 10 p.m. yesterday the propeller MANHATTAN came in from Chicago and left here at 11 p.m. for Milwaukee, where she arrived at 2 this morning. The wind was blowing very fresh all of the time after she left here and was quite a gale when she was at Milwaukee, which place she left, as it was considered unsafe for her to remain at the pier and impossible to get into the River on account of the bar. From the time she left Milwaukee, the gale increased in violence until about 12:30, when the after bulwarks were burst in, the boat on the upper deck driven into the ladies' cabin, and the fires put out by the water. Capt. Palmer [sic] immediately headed for shore, as the water was filling in rapidly. When about three quarters of a mile offshore he shifted his helm and came up for Knapp, Murphy & Dutton's pier at this place. Just before he came up to the pier he threw over an anchor and held her off so that she came down to the pier most beautifully. The passengers and crew all got off safely and the furniture, etc. was taken off immediately. Her upper works were torn off by the sea, and the whole larboard side is smashed above the lower deck. The hull seems to be whole and sound. She has on board 7,000 bushels of wheat from Chicago, the property of H. H. Brown of Detroit, a small lot of flour, and 1,000 hides. The bulk of the wheat is supposed to be wet. The MANHATTAN is two-thirds insured. She is the property of S. Lewis, John Dunn and Mr. Tomlinson of Detroit (Buffalo Morning Express, April 19, 1848).

The ship's cargo was a total loss, valued at \$7,000, and the vessel was badly injured. The MANHATTAN was raised, repaired and returned to shuttle down the Lakes; it sailed the remainder of 1848 and 1849 without incident. The ship was chartered by various insurance companies in November 1849, to salvage the propeller GLOBE, sunk in 16 feet of water at Point Abino, Lake Erie (Buffalo Morning Express, October 22, 19 and November 2, 1849).

The MANHATTAN inaugurated the 1850 season about 60 days before most of its running mates, sailing from Buffalo to Cleveland and Detroit as soon as the ice cleared Lake Erie on January 28 (Buffalo Morning Express, January 28 and 30, 1850), but its owners had still more ambitious plans for the ship that year. The Detroit Free Press reported (April 15, 1850) that, "She is to be placed on Lake Superior as soon as she can reach the Soo."

In those days the Soo Locks didn't exist, only a mile-long rapid separating Lake Superior from the St. Mary's River. With no more than two steamers and three or four schooners on all of Lake Superior, there was a strong incentive to bring other ships to the Lake, but there were also real impediments. Ships from the lower Lakes had to be hauled a mile overland on rollers to bypass the rapids, and then launched into Lake Superior's waters, which was no easy task.

The ship was hauled out on May 12, 1850; a correspondent reported from Sault Ste. Marie on May 29th:

Propeller MANHATTAN - Capts. Turner and Caldwell have had most extraordinary success in taking this splendid steamer across the Portage. It is only two weeks since she was fairly out on dry land at the foot of the rapids, and tomorrow evening [May 30] she will be at the water's edge on the Lake Superior side. For several days they have moved this immense vessel at the rate of 400 feet per day, and it is by far the fastest sailing on dry land ever made on this route. Ways for launching her will be laid immediately and by the first of next week she will undoubtedly be afloat above the St. Marie Rapids (Buffalo Morning Express, June 10, 1850).

The ship was a welcome addition to the Lake's tiny merchant marine:

The facilities for travel on Lake Superior have been much improved this season. The propellers NAPOLEON and INDEPENDENCE run regularly. One leaves the Sault every Friday, making the trip through the Lake, touching at Carp River, Ontonagon, and Isle Royale. The fine Cleveland propeller MANHATTAN, launched from Lake Erie [sic] into Lake Superior this Spring, also making regular trips, and we learn, very profitable ones (Buffalo Morning Express, July 12, 1850).

On May 12, 1851, the ship ran on a reef on Lake Superior and was forced to throw overboard part of the cargo to free itself. The location of the incident was not recorded. A more serious accident befell the ship later in the season:

COLLISION ON LAKE SUPERIOR (Detroit, August 6) - About midnight, July 31st, the propeller MONTICELLO, bound down, and the MANHATTAN, bound up, came in collision off Whitefish Point. The MANHATTAN was struck on her starboard side, forward of the smokepipe. She sank to her upper deck in a few minutes (Buffalo Morning Express, August 7, 1851).

The accident occurred at midnight about 5 miles this side of Whitefish Point and 35 miles above the Sault, the MANHATTAN being bound up and the MONTICELLO bound down. There was a large pleasure party on board the MONTICELLO, and many of the passengers were up at the time and were out on deck to see the other boat pass, but by some unaccountable mistake or misapprehension on the part of one or both, they came in collision, the MONTICELLO striking the MANHATTAN on the starboard side about amidships, and cutting through the narrow guard into the hull so far that she filled and sank to her upper deck in less than 10 minutes.

The passengers on the MANHATTAN were generally asleep, but by most wonderful good fortune they all succeeded in getting on board the MONTICELLO, and it is not known that a single person was lost or seriously injured. The MANHATTAN had just left port on an upward trip and had a large quantity of wood and pine lumber in her hold and on her lower deck, which prevented her from sinking altogether. In this condition she was towed back to a small bay at the mouth of the (St. Mary's) River, where she now lies. The most of the passengers left their luggage on the lower deck, which with much valuable property, was lost or is buried for the present, several feet beneath the water (Buffalo Morning Express, August 8, 1851).

The MANHATTAN was raised later that same month and repaired at the cost of some \$9,000; most of the cargo and personal loss suffered by the passengers was reported covered by the insurance companies (Underwriters Report for 1851 in Buffalo Morning Express, August 22, 1851; (Wolff 1979:12).

For the next several seasons the MANHATTAN enjoyed great popularity on the Lake Superior route, sharing the copper-mining trade with three other steamers and a few schooners. Each season brought two or three more ships to the Lake. In 1855 the St. Mary's Falls Ship Canal was completed and the big Lake was opened to whole flotillas of ships from the lower Lakes. From that time, many of the steamers began running all the way from Cleveland and Detroit to Lake Superior ports, and the MANHATTAN extended its trips accordingly. The opening of the "soo" Locks brought dramatic changes to Lake Superior and quickened the whole pace of the region's development.

On November 29, 1856, the MANHATTAN struck the west pier at Cleveland during a storm and holed the hull. The ship sank for the third time, but was raised again and repaired (Superior Chronicle, January 6 and February 3, 1857). On May 17, however, it was on the bottom again after striking rocks in the St. Mary's River, and most of a very valuable cargo was lost. Damages were said to have totalled \$17,300 (Underwriters Report for 1857). the MANHATTAN was advertised for the 1857 and 1858 seasons in the Cleveland, Detroit and Lake Superior Line along with the propellers IRON CITY, GENERAL TAYLOR and MINERAL ROCK and the sidewheel steamer NORTH STAR.

In the spring of 1859, Charles T. Harvey of Marquette bought two-thirds interest in the MANHATTAN, and he announced plans to run the ship between Cleveland, Detroit and Marquette in connection with the Pioneer Iron Co. of Negaunee, Michigan, hauling iron ore (Detroit Advertiser, February 8, 1859). Harvey was a Marquette entrepreneur and was largely responsible for managing construction of the Soo Canal a few years before. The 1859 season would be Manhattan's last:

She started from the Sault Wednesday morning, August 31. After discharging some freight at Waiska Bay, she lay there windbound until sundown, then started for Whitefish Point. She arrived and discharged her freight at 11 o'clock, then pushed on. At 7 o'clock the wind blew fresh and soon became fresher. The MANHATTAN kept her course until 10 o'clock. She was then about 15 miles from Grand Island, and the oldest inhabitant does not remember having seen a bigger sea. The MANHATTAN was making no headway, and all hope of reaching Grand Island was given up and the boat turned around. She was always credited with being able to roll the nearest over without capsizing of any craft on the Lakes. One or the other of the wheels was almost constantly out of the water. There was not enough fuel to get back to Whitefish Point, 75 miles, so Capt. Ripley decided to attempt to make Grand Marais. He almost made the harbor when he became grounded in 5 feet of water. The bottom was sandy and she rested nearly under her boiler. This was about 11 AM Friday [September 2]. She hung and swung until midnight, when she settled down and seemed easier (Detroit Free Press, September 13, 1859).

A report from Sault Ste. Marie dated September 6 said, "The propeller MANHATTAN will probably be a total loss. She lies in three feet of water and is broken in two" (Detroit Free Press, September 9, 1859).

The scow NEPTUNE was sent from Marquette to take off the ship's cargo on September 7, and a salvager named Everett was at work a few days later removing the ship's engines, boiler, anchors, chains, rigging and furniture (Lake Superior Journal, September 14, 1859). The MANHATTAN was listed as a \$10,000 loss although only insured for \$7,500 (Wolff 1979:14).

Site Description

The wreck of the steamer MANHATTAN lay right in the old channel entering Grand Marais harbor, and it was a well-known and much despised obstruction:

There were several channels boats could use to enter the Bay, but travellers reported the largest and deepest entrance was blocked by the wreck of the propeller-ship MANHATTAN, which was wrecked at the entrance during a gale in 1858. The 330-ton ship . . . foundered in the channel, partially blocking it for 20 years (Hall 1872:15).

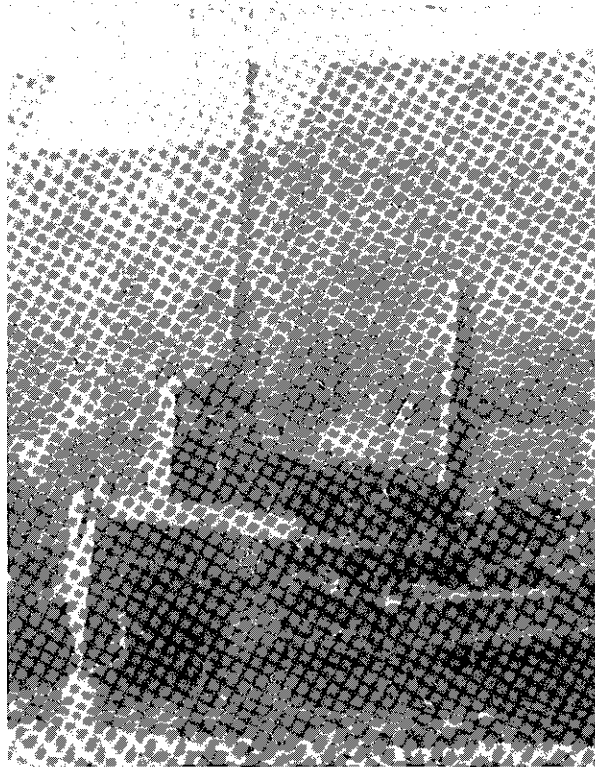



Fig. 4.74. There are virtually no photographs of screw steamers before 1860, but this old Buffalo view shows one of the MANHATTAN's class. University of Detroit Marine Collection.


 Manifest of the **CARGO** taken on board the Schooner *Manhattan*
 to the Port of *San Francisco* Master, *James* sons, bound from the Port of *San Francisco*
 to the Port of *San Francisco* in the District of *California* in the
 of *September 3* 1852

MARKS AND NUMBERS.	PACKAGES AND CONTENTS.	SHIPPERS.	RESIDENCE.	CONSIGNEES.	RESIDENCE.
22 A. B. Goods		Shallding & Child	San Francisco	Peter White	Manzanita
5 "		do	do	J. Muddell & Co	San Francisco
25 1/2 cgs Powder		do	do	L. P. Morrison & Co	San Francisco
91 A. B. Goods		do	do	H. H. Sperry	San Francisco
84 "		do	do		San Francisco
92 "		do	do	Anna Brown & Co	San Francisco
22 Pak. Hay		do	do	H. S. Cook & Co	"
125 A. B. Goods		do	do		"

Down Freight

"North Hill Mine" 21 ¹⁸⁵² Donkoffus L. P. Morrison & Co Capt. Harbor Shallding & Child San Francisco

Fig. 4.75. An 1852 cargo manifest shows nature of freight carried by the MANHATTAN to mining districts, including powder, barrelled goods, and hay. Bayliss Public Library Collection.

A new channel was cut by the federal government in 1883, and the old entry was abandoned to fill in with drifting sand, so that the old MANHATTAN wreck is now sheltered from Lake storms by a long sandbar and a protective wooden dike. Modern divers describe significant portions of the ship still at the site, although they are usually obscured by the shifting sand. All of the ship's bottom is reportedly still there, along with bits and pieces of machinery and piping. The ship's sides seem to have been carried away by wave action before the dike was built. One diver recalls his first visit to the ship's grave:

In 1980 some friends who were divers said that they had found a wreck east of the harbor entrance in about 15 to 20 feet of water. I had a chance to investigate this vessel, which was pointed toward the south and lying in the approximate area of the old harbor entry, east of what was called "the Island." It had brazed copper pipes with huge, well-formed leaded joints . . . Alongside the bottom on the port side laid the propeller shaft, just as my neighbor, Charlie Mattson had described back in 1946 or '47. His fishnets had hung up on a "drive shaft sticking up" from the bottom. The ship's engine and boiler must have been salvaged (James Becker, personal interview, March 15, 1989).

The remains of this hallowed old ship would be worthy of a careful and complete examination, and might be an appropriate candidate for National Register nomination.

HUNTER

The second significant wreck within the harbor at Grand Marais is the passenger and freight packet HUNTER, burned there in the fall of 1904.

History

The HUNTER (U.S. No. 95571) was ocean-built as a fishing tug, at Philadelphia, Pennsylvania, by Neafie & Levy for the menhaden (salt-water herring) fishing trade in 1877. It measured 109.3 feet in length, 18.0 feet beam, 9.0 feet depth, 89.63 gross tons and 44.81 net tons. The menhaden steamers were distinctive single-decked craft with a low pilothouse forward, a small cabin aft, and an open waist. According to various articles, the HUNTER worked out of Portland, Maine in its early years, then out of Baltimore, Maryland.

In the spring of 1888, A. Booth and Co. of Chicago brought the steamer to the Lakes. Booth ran a whole flotilla of fishing craft on Lake Michigan and Lake Superior, and had extensive deep-sea fishing operations at Baltimore, Maryland and Astoria, Oregon. Considering the fact that the HUNTER was registered at Baltimore, it is likely that Booth owned it from the time it was built. At any rate, the ship arrived at Buffalo from Portland on July 22, 1888, and two weeks later it was being rebuilt at Chicago to suit it for hauling passengers and fish for Booth on the Lakes:

A new route has been established between Cheboygan and Manistique (Michigan). The steamer HUNTER, which has been purchased by AM Booth of Chicago, and came here from Maine, will be placed on this route as soon as she can be got into shape for the passenger trade by the addition of new cabins. She averages nearly twelve miles an hour, and is almost exactly like the DIXON, owned here by the same firm (Duluth Evening Herald, August 8, 1888).

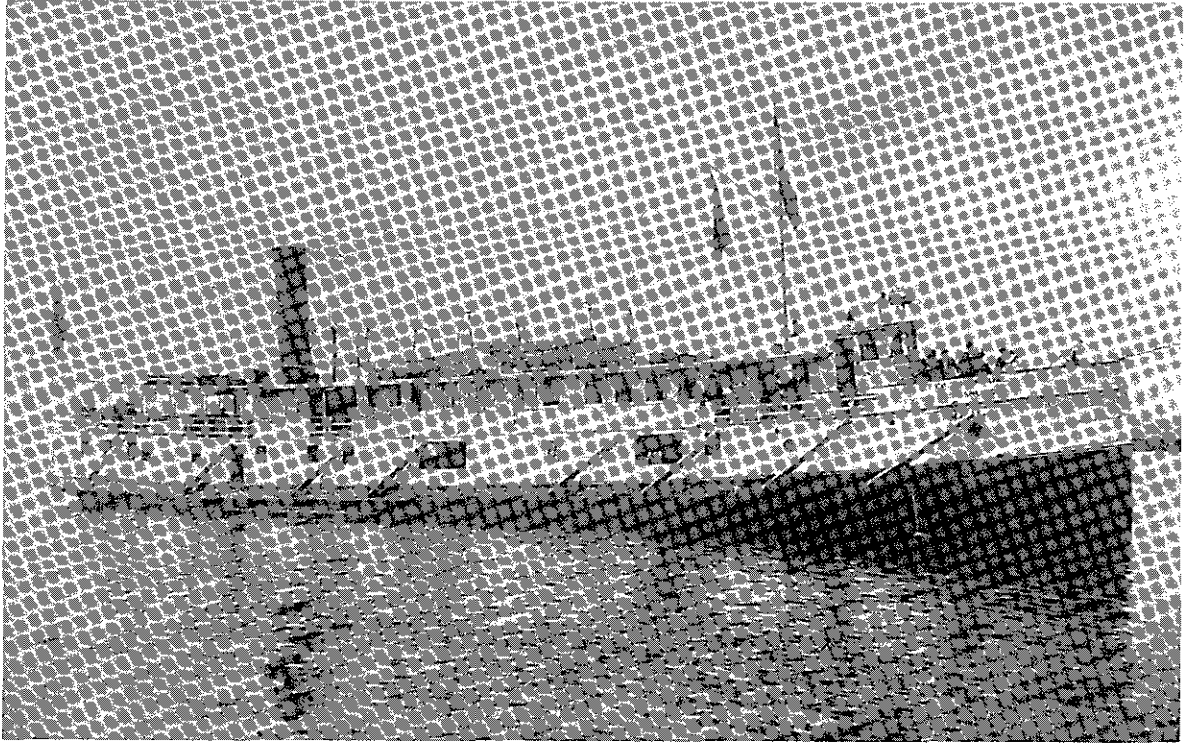


Fig. 4.76. Following its 1888 rebuilding, the HUNTER was a respectable passenger steamer. Canal Park Museum Collection.

The steamer was rebuilt at Chicago in the fall of 1888. It was "housed-in," made a double-decker with passenger cabins on the upper deck and enclosed freight deck below, almost exactly like the Booth steamer HIRAM R. DIXON, which served Lake Superior's North Shore out of Duluth. Following the face-life, the HUNTER was measured at 155.59 gross tons and 112.49 net tons (List of Merchant Vessels of the United States, 1890). It was listed in Inland Lloyds Vessel Register (1890) as a passenger and fish vessel, valued at \$12,000. In spite of the 1888 newspaper articles' reference to a Lake Michigan route, the HUNTER seems to have been taken to Lake Superior after the first few months on the Lakes, and employed by Booth's U.S. & Dominion Transportation Co. out of Duluth. The ship ran from Duluth to Ashland, Wisconsin and Houghton, Michigan, serving as a collection steamer. It delivered salt, barrels, ice and supplies to fishermen scattered all along the South Shore, and then picked up freshly-salted fish for the return trip. Booth shipped the fresh fish by rail from Duluth to Chicago, Kansas City and St. Louis.

In 1891 the HUNTER was rebuilt again. This time it was lengthened 25 feet in the Burger shipyard at Manitowoc, and given new engines. The South Shore business was evidently more than the ship could handle. Following the visit to the shipyard, the steamer was re-enrolled with a 133.6-foot length, 19.6-foot beam and 7.3 foot depth, measuring 224.83 gross tons and 181.10 net tons, three times its original tonnage. The HUNTER was given a new Montague Iron Works steeple compound engine with 15- and 28-inch cylinders, and a new firebox boiler measuring 8 feet in diameter and 12 feet 6 inches in length (H. G. Runge ship files, Milwaukee Public Library).

the HUNTER returned to the Lake Superior run after the second reconstruction, and earned a reputation as a steady, reliable vessel in spite of the spring and fall storms so common on Lake Superior; it was a good "sea boat." In the fall of 1898, it had a close brush with disaster:

Bayfield - The steamer HUNTER, with many passengers aboard, had a *perilous night of it in the northerly gale off Raspberry Point, but escaped with no great loss.*

The HUNTER was bound for Duluth, and at the top of the gale ran into a raft of logs which had broken adrift in the Bay. All the buckets were broken off her propeller by the logs, rendering her helpless to pass through the raft. She was being carried on the beach at Wilson's Island *when her anchors finally held.*

This morning a tug brought the HUNTER to this point. She will be taken to Duluth for repairs . . . The passengers were badly scared, but the coolness of the captain avoided a serious panic . . . (Detroit Free Press, September 9, 1898).

In 1902, Booth brought the large steel steamers ARGO and AMERICA to Duluth, and as a result, the smaller HUNTER and HIRAM R. DIXON were shifted to Sault Ste. Marie. The HUNTER began regular trips from the Sault to South Shore ports at the eastern end of the Lake, including Whitefish Point, Grand Marais, Munising and Marquette; the similar DIXON ran on the North Shore to Canadian ports. Booth had about a dozen steamers on Lake Superior at that time.

The HUNTER's wandering ended on the evening of October 4, 1904:

While lying at the dock at Grand Marais last night, the steamer HUNTER of the Booth Line was burned to the water's edge. The boat is a total loss,

but no particulars regarding the fire had been learned here shortly before noon.

The HUNTER was in command of Capt. Benjamin Lewis and was well known here, having been on the Grand Marais run several years. The boat was originally designed for salt water service, and after running on the ocean for a considerable length of time, was brought to the Great Lakes. As a result of the salt water service, the hull was well preserved. The estimated value of the steamer was between \$8,000 and \$10,000. She was insured . . . (Soo Evening News, October 5, 1904).

Site Description

A sizeable wreck is known to lie near the present marina docks in Grand Marais harbor, but it is not known whether or not it is the HUNTER. Because of the shallow water where the ship burned, it is probable that the machinery and tackle were recovered, but no records have been found that would substantiate that theory. As far as is known, the wreck was not removed from the harbor.

Local traditions suggest that there are two or three old fishtugs abandoned and sunk in the harbor along the southeast shore, and there are numerous old dock structures from extensive lumbering and fishing industry sites all around the harbor. Although few of the docks date before the mid-1880s, some may be traced to the 1840s (Carter 1967:14). The deep natural harbor was well-known in the fur-trade era, and a thorough search of its protected waters could prove very fruitful. A survey of the MANHATTAN wreck alone would have a great deal of value, but the possibility of fur- or lumber-trade cultural material makes the prospect a most tantalizing one.

Chronology of Shipping Accidents Located in the Vicinity of Pictured Rocks National Lakeshore, Michigan

- | | |
|------------------|---|
| 1829 (No date) | The North West Company's wooden sloop OTTER (1793), a vessel of 75 tons, was reportedly lost with all hands off the Sauble Banks. In fact, it appears doubtful that the craft was in existence after 1810. |
| 1847, June 11 | The two-masted schooner MERCHANT (1834) disappeared in the vicinity of Grand Island during a storm, taking 14 men to the bottom. It was laden with supplies and bound from Sault Ste. Marie to Keweenaw. |
| 1856, October 29 | The 191-foot sidewheel steamer SUPERIOR (1845) was disabled during a storm, drifted ashore at Spray Falls and wrecked. About 35 died and 16 survived. |
| 1858, July | The sidewheel steamer LADY ELGIN (1851), an elegant 200-footer, grounded on Au Sable Reef and spent two days stranded there. It was lightered and pulled free by the steamer ILLINOIS, suffering only minor damage. |
| 1858 (No date) | The barkentine AMERICAN REPUBLIC (1854) was disabled on the open Lake during a gale and limped into Grand Island harbor with \$700 in damage to the rigging and sails. |

- 1858, June 2 A mackinaw fishing boat was capsized during a squall off Grand Island North Light, drowning three of the pioneer Williams family. Only some debris was found on the nearby shore.
- 1859, September 1 The wooden propeller MANHATTAN (1847) was wrecked on a bar in the entry to Grand Marais harbor, laden with supplies. No lives were lost, but the ship broke up and was a total loss.
- 1862, August 9 The two-masted schooner ORIOLE (1857) was sunk in a collision with a sidewheeler ILLINOIS about 8 miles north of the Pictured Rocks, carrying iron ore. Twelve crewmen were lost, one survived.
- 1868, May The two-masted schooner ONEIDA CHIEF (1847) was stranded on Au Sable Point with a load of pig iron. There was apparently no loss of lives as a result.
- 1869, November 10 The two-masted schooner EVALINE BATES (1859) was torn loose from its moorings at the Bay Furnace dock near present-day Christmas, and blown onto the beach. Salvagers failed to free the schooner until May 1870, despite its slight damage.
- 1870, August 22 The two-masted schooner GEORGE W. HOLT (1857), a 265-ton craft, sprang a leak and sank in 15 feet of water in Grand Island Harbor, but was raised and repaired soon afterward. Little is known of the incident.
- 1870, October 15 The two-masted canal schooner BERMUDA (1860), loaded with ore, was wrecked in South Bay after running behind the Island for shelter. It was raised 13 years later and towed to Murray Bay, where it slipped from the salvors and defied any further rescue efforts.
- 1870, October 28 The three-masted schooner DREADNAUGHT (1856) with a load of ore ran on the northwest corner of Grand Island during stormy weather. It was pulled off the beach three days later.
- 1870, November 2 The schooners ATHENIAN and MARY M. SCOTT attempted to make Grand Island harbor in a storm; both grounded near Sand Point. The ATHENIAN was released, but the SCOTT suffered hull damage and became a total loss.
- 1872, November 13 The barkentine MARQUETTE (1869), laden with ore, was driven ashore near Au Train Point during a gale. Salvage was unsuccessful, and winter storms broke it up. Only the rigging and tackle were salvaged.
- 1873, November 10 The three-masted schooner PELICAN (1872), loaded with grain, was in tow of the steamer EGYPTIAN when it

- grounded on Sand Point; no serious damage was reported. The 200-foot ship was only a year old at the time of the accident.
- 1873, September 15 The wooden steam barge UNION (1861) was blown onto Au Sable Reef with a load of ore, and broken up by the seas. Within a few days of the accident it was a worthless wreck. The engine and boiler appear to have been recovered.
- 1874, November 13 The schooner F. MORRELL (1866) stranded on the northwest shore of Grand Island with 617 tons of ore. The crew got ashore safely, but the ship broke up, a total loss. Some tackle and cargo were recovered the following spring.
- 1875, October 10 The two-masted schooner BAHAMA (1863) was blown onto Powell Point during a storm. It was pulled off by the steambarge IRA CHAFFEE with little damage.
- 1875, November 20 The barkentine CHENANGO (1862) ran onto Wood Island Reef during a snow squall while attempting to get into Bay Furnace with a load of ore. The crew was rescued the next day, but the ice-covered ship broke up within a week.
- 1877, September 28 The 75-foot iron sidewheeler J.K. WHITE (1868) stranded on Grand Island while rafting logs, reportedly remaining hard aground until November 1878 when it was pulled off and repaired. It was badly vandalized in the interim.
- 1879, July 19 A small schooner, ANNIE COLEMAN, was supposedly wrecked in the vicinity of Au Sable Point in a fog, and the crew walked all the way to Marquette. The vessel was reportedly a total loss. The story has not been confirmed.
- 1881, September 7 The Canadian three-master MARY MERRITT (1865) was blown ashore at Sullivan's Landing while loading timber off the beach. A sudden squall was blamed. First attempts to salvage the ship failed, and it was abandoned at the site. It was freed in the spring of 1882.
- 1882 (No date) The three-masted schooner GEN FRANZ SIEGEL (1862) sustained hull damage when it grounded at Au Sable Point, although it was soon freed by tugs.
- 1882 (No date) The two-masted schooner ECLIPSE (1852) ran ashore on Au Sable Reef, also suffering damage to the bottom in the process.
- 1882 (No date) The three-masted SOUTHWEST (1866) sprang a leak while downbound loaded with ore and was run into shallow water near Grand Island. It was recovered, but the repairs were costly.
- 1883, October 10 The three-masted schooner GEORGE SHERMAN (1862), loaded with ore, went ashore on the east side of Grand

Island and sank in shallow water. It was pumped out and repaired a few days later.

- 1883, July 4 The wooden bulk freighter MARY JARECKI (1871), laden with ore, ran ashore at Hurricane River in a fog, laden with ore. Salvage tugs were unable to refloat the ship, and it broke up in September storms. The machinery was later removed.
- 1883, August 25 The schooner DOT (1865), loaded with ore, sprang a leak while bound down the Lake in tow of the M.M. DRAKE; it foundered 3 miles off Grand Marais. The crew was saved. The DOT was formerly the MARY MERRITT that wrecked at Sullivan's Landing in 1881.
- 1883, November 18 The schooner-barge WABASH (1873) was wrecked east of Grand Portal in the Pictured Rocks when it broke from the tug SAMSON during a storm. It drifted ashore with a load of coal. Two other schooners in the tow survived.
- 1884, May 10 The three-masted barge EMMA A. MAYES (1871) was holed by floating ice and foundered off the north end of Grand Island. It had been in tow of the tug MUSIC, along with three other barges at the time, all bound for Port Arthur with coal. The crew was saved.
- 1884, August 4 The 65-foot schooner MYSTIC (1879) ran on Au Sable Reef, but sustained negligible damage; it was freed two days later.
- 1884, August The wooden steambarge GLASGOW (1871) ran in behind Grand Island during a squall, but grounded on South Point. It was pulled off by the tug JOE D. DUDLEY after dumping some of the coal cargo.
- 1884, November 20 The wooden freighter MORLEY (1879) was wrecked at Lonesome Point near Grand Marais during a northwest storm. The ship was badly damaged, but was salvaged the following May and reconstructed at Detroit. The wheat cargo was a total loss.
- 1885, September 29 While being towed down the Lake behind the steamer KITTIE M. FORBES, the barge F.W. WHEELER (1883) began leaking; it filled and sank 6 or 7 miles off Grand Marais with a cargo of ore. No lives were lost.
- 1886, September 30 The three-masted schooner SOPHIA MINCH (1873) was caught in a snowstorm on the Lake and ran in behind Grand Island after battling the seas for three days. It stranded on the sand shoal at the southwest corner of the Island, but was freed three days later by Marquette tugs.
- 1886, November 26 The tug NIAGARA was coming down the Lake with several barges in tow when a typical fall storm struck. The towline parted, and the barge REPUBLIC (1854) was left to take care of itself. The barge made sail and ran for the West Channel,

- but was driven onto Williams Island. It was abandoned there and salvaged in the spring of 1887.
- 1887, October 17 A large sailboat disappeared on the Lake while bound westward from Grand Island. It was sighted by the Grand Island North light keeper, but was never seen again. It is not clear how many were aboard at the time.
- 1887, November 19 The Canadian three-masted RICHARD MORWOOD (1856) was wrecked on the northwest corner of Grand Island during a snowstorm while upbound with barreled oil. The crew was trapped on board for two days while the storm raged. Much of the cargo was removed that fall, however the ship could not be moved. It was finally pulled off the rocks in July 1889 and taken to Port Huron for complete rebuilding.
- 1888, October 20 Loaded with sandstone blocks, the Canadian schooner KEEWATIN (1877) was damaged during a northerly storm and ran for Grand Island. While trying to enter Grand Island harbor, it stranded on a sand bar near Williams Island. Four days later the tug F.W. GILLETT dredged away the sand and freed the schooner.
- 1889, June 19 A collision with the package freighter NORTH STAR claimed the steel freighter CHARLES J. SHEFFIELD (1887) about 30 miles northwest of Grand Marais. All 18 crewmen were rescued. The accident was blamed on fog.
- 1889, July 13 The wooden bulk freighter SMITH MOORE (1880) was struck by the JAMES PICKANDS in a fog and was towed into the East Channel before plunging to the bottom in 90 feet of water east of Sand Point; no lives were lost.
- 1890, August 21 A small sailing yacht named CRUISER, carrying a party of sightseers, was swamped by waves and went to the bottom while lying off Chapel Rock. All on board were got ashore safely.
- 1891, July 17 The passenger propeller EMPIRE STATE (1862) ran onto Au Sable Reef in thick fog. Twenty-four passengers and 40 crewmen went ashore the next morning when a northwest sea came up; later they were put aboard another downbound steamer. The 220-foot ship pulled free on July 22 after 100 tons of copper ingots were lightered off the ship.
- 1892, August 30 The iron bulk freighter WESTERN RESERVE (1890) was heading into a westerly wind when without warning the hull broke in two forward of the boiler house, and it sank in deep water about 20 miles off the Sauble Banks. Of 27 on board, only one survived. The ship was upbound without cargo at the time.
- 1893, September 22 The 265-foot barge MICHIGAN, a former sidewheel railroad car ferry, foundered on the Lake about 25 miles above Au

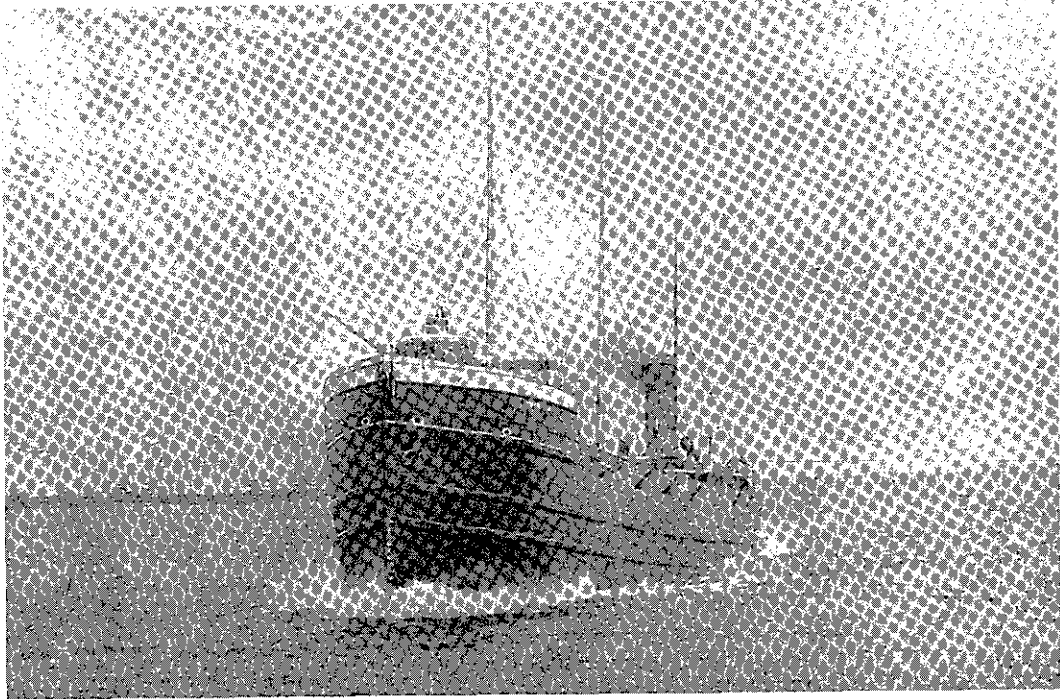


Fig. 4.77. The new steel steamer WESTERN RESERVE broke its back and foundered mysteriously in August 1892. University of Detroit Marine Collection.

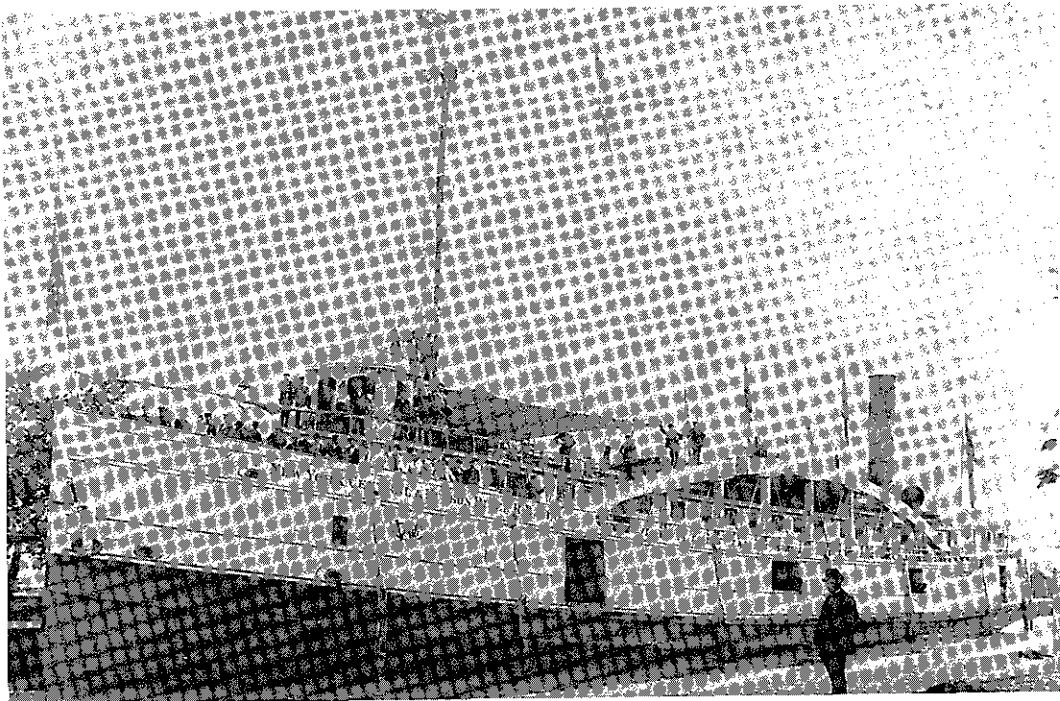


Fig. 4.78. The passenger steamer EMPIRE STATE remained stranded on treacherous Au Sable Reef for five days in 1891. Canal Park Museum Collection.

- Sable Point in 180 feet of water. It was ore-laden and being towed by the steamer CITY OF NAPLES, which rescued the crew.
- 1893, October 24 Running for shelter behind Grand Island, the three-masted schooner GEORGE (1873) had its foresail blown out and then lost the mizzen mast during a northwest gale. Drifting and helpless, it was blown onto the bluffs of the Pictured Rocks west of Mosquito Beach. Eight men and a woman got ashore safely, but the ship broke up. Rigging and tackle were recovered.
- 1895, September 29 The three-masted schooner-barge ELMA (1873) broke away from the steambarge P.H. BIRCKHEAD off Grand Marais during a storm. Setting sail for Grand Island, the ELMA's steering gear broke and then it was dismasted as it rolled in the seas. It drifted ashore west of Miner's Castle where the crew scaled the sandstone bluff to a small ledge. One man drowned, but the others were saved two days later.
- 1895, October 1 Entering the West Channel in tow of the A. FOLSOM, the schooner NELSON (1866) was cast off to go to anchor. Instead it drifted into shallow water west of Powell Point and stranded. The NELSON remained aground until the October 17, when it was pulled into deep water again.
- 1895, November 22 Downbound with pine lumber, the old steambarge MICHAEL GROH (1867) broke its main steam pipe and drifted ashore between Miner's Castle and Sand Point. It filled and sank to the deck while the crew got off in a yawlboat. The ship broke up during a storm on November 30. The machinery and part of the cargo were recovered.
- 1896, July 15 A schooner named VOLUNTEER was reportedly wrecked 4 miles west of Au Sable during a northwest gale. No records of any such schooner have so far come to light.
- 1896, November 29 The lumber barge HATTIE (1873) broke from the steambarge DESMOND and drifted ashore near Grand Marais. It was not seriously damaged.
- 1898, November 26 The wooden bulk freighter ESCANABA (1881) ran ashore west of Munising in a fog, but was released undamaged after part of the salt cargo was removed.
- 1900, November 14 The barge COMMODORE (1880), carrying coal, broke loose from the steamer ELIZA H. STRONG during a gale and was quickly disabled. The COMMODORE lost its sails and the rudder and began leaking. Although the crew abandoned the barge, it was found afloat near the Pictured Rocks a day later and towed into Munising for repairs, after having suffered considerable damage.

- 1901, August 31 A summer storm damaged the steamer ELIZA STRONG (1874) off Stanard Rock, causing it to begin sinking on the open Lake. The steamer was sighted by the steambarge MUELLER and towed to Munising, where it sank in the harbor. It was pumped out a few days later and taken for repairs.
- 1901, November 8 The three-masted schooner-barge KEWEENAW (1866), formerly a sidewheeler of the same name, developed a leak and sank in the harbor at Grand Marais while loading lumber. It was later patched up and refloated.
- 1901, November 10 A southerly gale caused the steambarge TEMPEST (1872) to drift out of the channel into shallow water in Grand Marais harbor, where it remained fast aground for two days.
- 1901, November 12 While lying at anchor sheltering from a storm, the 210-foot barge CONNELLY BROTHERS (1896) dragged anchors, causing it to ground on Sand Point. A steamer and a small tug failed to free the barge, but a larger tug pulled it off undamaged the next day.
- 1902, April 9 The 400-foot steel steamer CRESCENT CITY (1896) ran on Au Sable Reef in a fog while towing the whaleback barge number 130. Both were loaded with ore. After much of the cargo was thrown overboard, the steamer was pulled off on April 10, and the barge was freed the next day. The barge sustained some hull damage.
- 1903, May 9 The four-masted schooner LIZZIE A. LAW (1875) broke free from the steamer MONOHANSETT in a storm and began leaking. The schooner anchored 3 miles off Au Sable Point with 7 feet of water in the hold. The Grand Marais Life Savers rowed out to the ship despite the storm and removed the exhausted crew; the next day they helped repair the ship's pumps. The LAW was later taken in tow by a passing steamer and towed to Grand Island.
- 1903, September 19 The ore-laden wooden freighter A.A. PARKER (1884) developed a bad leak while downbound during a storm. The captain headed for the harbor at Grand Marais, however, the ship sank 4 miles off the harbor. Life Savers were able to rescue the entire crew.
- 1903, October 26 The wooden freighter MANHATTAN (1887) caught fire and burned to the water's edge just off Sand Point in the Grand Island East Channel. Much of the machinery was pulled out, and it was later dynamited.
- 1903, October 31 Caught in a blinding snowstorm, the steamer GETTYSBURG and schooners BUFFALO and SAVELAND ran for shelter at Grand Marais. The first two got inside, but the SAVELAND (1873) broke loose and drifted ashore a mile east of the piers. It was a total loss, although the crew was saved by the Life Savers.

- 1904, October 4 The wooden freighter SITKA (1887) blundered onto Au Sable Reef during a rainstorm and stuck fast while loaded with iron ore. When the weather turned bad on October 5, the crew abandoned the ship. The freighter broke in half the next day. Some salvageable items were removed, but the ship was a shattered hulk.
- 1904, October 5 The small passenger steamer HUNTER (1877) caught fire at the Booth Line dock in Grand Marais harbor and burned to the waterline.
- 1905, September 18 A stranding on a Grand Island reef caused \$15,000 in bottom damage to the 340-foot steel freighter MARITANA (1892). Nothing is known of the circumstances of the accident.
- 1905, October 20 The lumber barges ALTA (1884) and OLGA were torn from the steamer F.A. MEYER when their towlines parted during a blizzard off Grand Marais. The barges sailed for Grand Island, but both were badly damaged enroute, losing their deckloads and spars. The OLGA dropped anchor off the Pictured Rocks and sat out the gale, but the ALTA went ashore near Trout Bay on Grand Island, where its back was broken, and it was a total loss.
- 1905, October 20 A second tow got into trouble during the same blizzard described above. L.L. BARTH was towing the barges GALATEA (1882) and NIRVANA (1890) when the barges broke away off Grand Marais. The two sailed for the harbor in hopes of getting inside, but both missed the entry and fetched up just to the west. The NIRVANA broke up in about 10 feet of water and the GALATEA ran high up the beach. Neither could be saved.
- 1905, November 20 The wooden package freighter PORTAGE (1875), loaded with rock salt, ran onto Au Sable Reef in the same storm. Laborers and Life Savers lightered the freighter for two days before it could be worked free. The men dumped 500 tons of cargo and saved the ship.
- 1906, November 27 The steel ocean steamer TURRET CROWN (1895) was driven ashore about 100 yards west of the piers at Grand Marais during a northwest gale. It was later pulled free with negligible damage.
- 1907, September 21 Driven to shelter by a northerly gale, the steel whaleback steamer JAMES B. COLGATE and its tow barge, No. 133, ran afoul of each other as they jockeyed to safe anchorage behind Grand Island. The barge overran the COLGATE, crushing its stern. Both vessels required extensive repairs.
- 1908, June 7 A small schooner, employed as a workboat by the lighthouse keeper at Grand Island North Light Station, was found on the beach 9 miles west of Au Sable Point; its lone occupant was

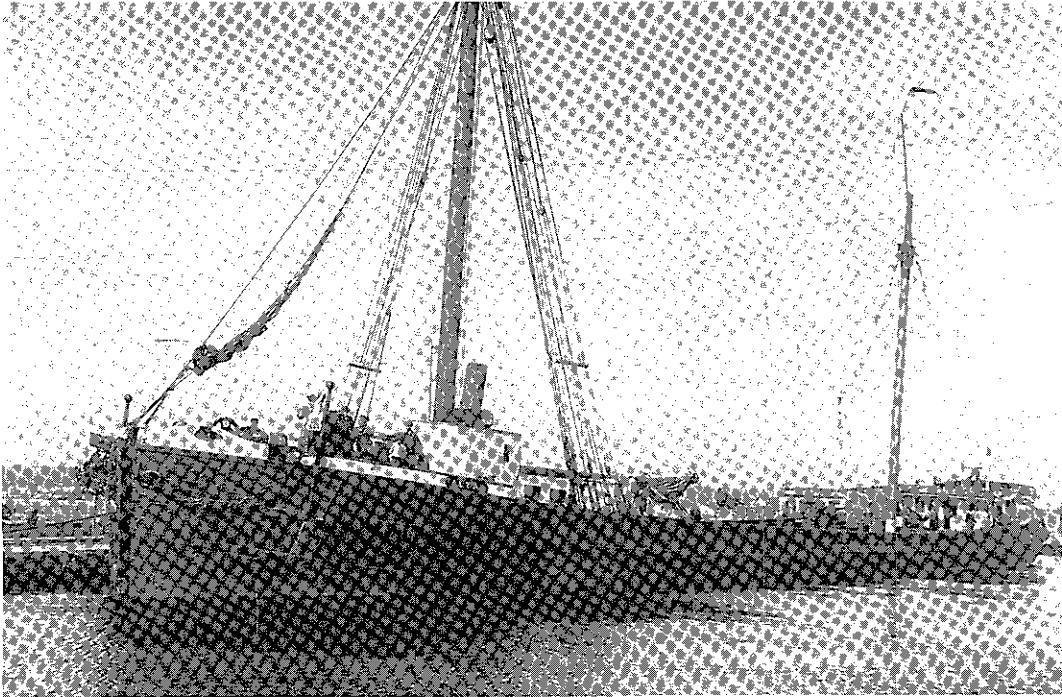


Fig. 4.79. The barge ALTA piled up near Trout Bay in the fall of 1905. Milwaukee Public Library Collection.

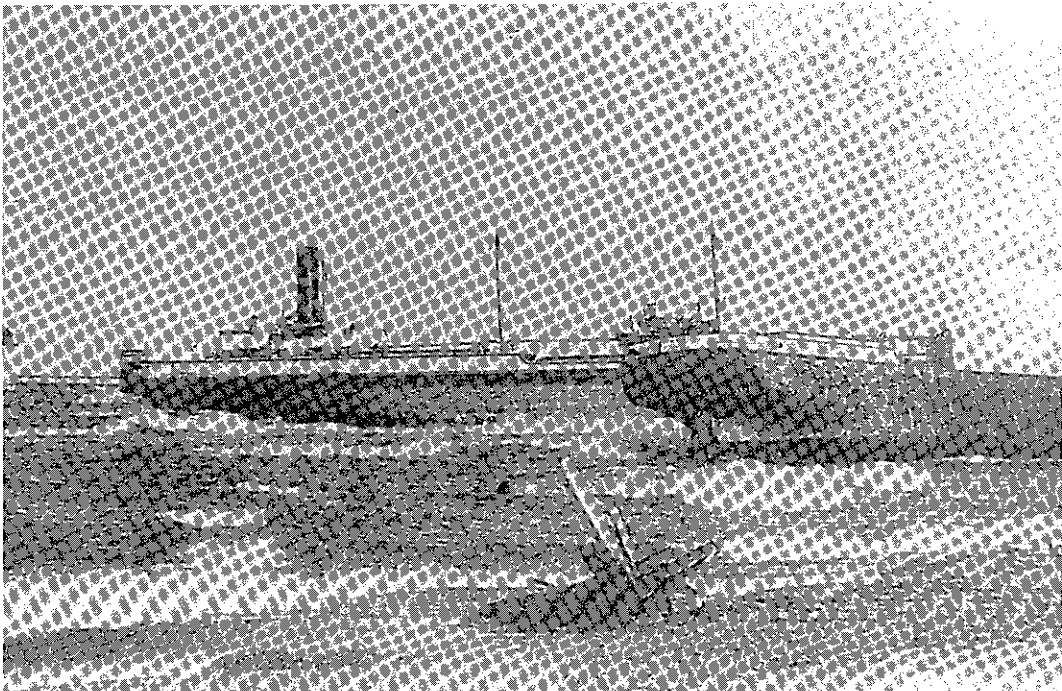


Fig. 4.80. The steamer TURRET CROWN missed piers at Grand Marais in 1906 and stranded next to the 1905 GALATEA wreck. Pictured Rocks National Lakeshore Collection.

- dead of exposure. One of the two masts had been blown down, and the boat had apparently become disabled in a squall.
- 1909, May 1 A violent spring snowstorm claimed the wooden lumber steamer ADELLA SHORES (1894) on the open Lake somewhere in the vicinity of Grand Island. Fourteen men perished when the steamer disappeared with a load of salt. Wreckage was found all the way from Grand Island to Grand Marais.
- 1909, May 29 The small gasoline yacht GLORIANA (1900) was destroyed by fire at Grand Marais. It was owned by Emil Endress of Sault Ste. Marie.
- 1910, April 25 The wooden package freighter LYCOMING went ashore at Grand Marais, but was pulled off without injury. There was no explanation for the accident.
- 1910, July 26 A fog-related accident resulted in \$10,000 in hull damage when the big steel freighter ZENITH CITY (1898) plowed into Au Sable Reef. It was released easily, but required several new bottom plates. The freighter was downbound with a heavy cargo of ore when it struck the reef.
- 1910, December 9 The little fishtug ETHEL J (1884) was damaged by ice; it subsequently filled and sank in Grand Marais harbor. It was later pumped out and repaired.
- 1912, September 27 Laden with 2,100 tons of ore, the wooden bulk freighter CULLIGAN (1883) developed a leak about four hours out of Marquette. It finally swamped and went to the bottom northwest of Grand Island. The crew was rescued by the fishtug COLUMBIA and returned to Marquette.
- 1912, November 24 Running into a northwest gale, the steam packet SOUTH SHORE (1899) took a serious beating and began taking on water as it steamed west from Whitefish Point toward Grand Marais. It was finally disabled by the rising water and had to be abandoned after running ashore about 7 miles west of Grand Marais and sinking in 15 feet of water. The crew was taken off by the Life Savers.
- 1913, October 6 The 42-foot gasoline launch MONARCH was burned at Lipe's dock in Grand Marais harbor and was a total loss.
- 1913 (No date) The small Canadian lumber-hooker D.R. VAN ALLEN (1874) suffered storm damage and lost 60 bales of hay from the deckload. The ship required several days for repairs in the harbor at Munising.
- 1914, October 11 The wooden package freighter WYOMING (1887) was roughed up during a northwesterly gale off Au Sable Point. The steering gear was damaged and, as it swung broadside

to the seas, the reinforcing straps broke, opening the seams in the deck and topsides. Repairs cost \$5,000.

- 1914 (No date) In heavy weather the big barge ED MCWILLIAMS (1893) broke from the steambarge M.T. GREENE east of Grand Island, but managed to anchor safely off Grand Portal. Damage was minimal.
- 1918, October 1 The wooden bulk freighter GALE STAPLES (1888) ran onto Au Sable Reef in a storm. The crew was taken off the next day by the Grand Marais Life Savers, while tugs were sent from the Soo. On October 7, the lighter RELIANCE began removing some of the coal cargo, but the ship was abandoned when it began to break up on the spot.
- 1919, November 14 The steambarge H.E. RUNNELS (1893) had the steering gear disabled while attempting to enter Grand Marais in a gale. The steambarge was driven aground outside the west pier, where it broke up. The 17-man crew was rescued with great difficulty by the Life Savers, several of whom nearly lost their lives in the attempt.
- 1921, November 24 The fishtug ARBUTUS (1888) foundered several miles north of Grand Marais during a storm.
- 1922, September 9 The gasoline ferry WOOD ISLAND (1907) was destroyed by an explosion a mile and a half off Five Mile Point, sinking in 60 feet of water. The crew was rescued by the tug GRAND ISLAND.
- 1926, November 23 The steambarge HERMAN H. HETTLER (1890) was wrecked south of Trout Point after cutting the corner too short while entering the East Channel during a snow squall. The ship ran on the rocky reef where waves caused it to break in two on November 25. The ship and its cargo of salt quickly became a total loss.
- 1928, June 27 The wooden steambarge M.H. STUART (1921) reportedly grounded west of Grand Marais. Damage appears to have been slight.
- 1929, August 30 The gasoline fishtug ALICE L (1911) foundered east of Au Sable Point in a storm, with the loss of one life.
- 1929, October 22 The fishtug ARVILLA CW (1907) stranded in heavy weather and went to pieces on the beach at Powell's Point in Munising.
- 1929, October 22 The steel barge LAKE FRUGALITY (1919), formerly an ocean-going freighter, broke from the tug BARRALLTON and went ashore 4 miles west of Au Sable Point. It was undamaged and easily pulled off three days later.

- 1929, November 30 The flax cargo in the ocean steamer KIOWA (1920) shifted during stormy weather. The ship was unmanageable as it drifted ashore at Twelve Mile Beach during a blinding snowstorm. Five crewmembers died when they abandoned the ship in a lifeboat before the grounding and capsized on the Lake; 16 were saved. The ship was a total loss.
- 1932, November 25 The 26-ton gasoline fishtug LYDIA (1913) grounded on a sandbar at the entry to Grand Marais during a gale; it subsequently capsized and sank, drowning five men.
- 1932, November 28 The Canadian package freighter GEORGIAN (1921) ran onto a rock reef at Trout Point while trying to find shelter from a storm. After spending the winter aground, it was freed on May 29, 1933, by the wrecking steamer MAPLECOURT. Damage was modest.
- 1933, October 11 A tug and a derrick-barge, along with a string of pontoons carrying discharge pipe from a suction dredge, all became imperiled off Au Sable Point during an unexpected storm. The tow broke up and the pontoons scattered for miles along the beach, all the way from Au Sable Point to Grand Marais. The tug and barge got into the harbor, but many of the 35 pontoons were lost; Scow No. 8 was stranded at Au Sable Point.
- 1940, November 5 The 400-foot steel steamer SPARTA (1902) was blown ashore at Mosquito Beach by a powerful northerly gale where it remained throughout the winter in spite of attempts to free it. The big ship was finally taken off the beach in June 1941. Its back was broken and the ship never sailed again. The 27-man crew was taken to the Munising Coast Guard Station on the second day following the stranding.
- 1941, August 31 The fishtug OTTER was beached about 20 miles east of Munising during a 50-mile windstorm; the four or five men on board were uninjured in the incident.
- 1941, August 31 The same storm sank the fishtug MINER's CASTLE somewhere in the vicinity of Grand Portal with a crew of four men. The boat simply disappeared in the storm.
- 1943 (No date) The small boat MARYMAID reportedly foundered off Munising, although no details are available.
- 1945, May 22 The 45-foot fishtug EDDIE S was wrecked at the entry to Grand Marais harbor during a northwest gale, capsizing in the cross-seas. Two men were drowned in the accident.
- 1949, July 3 The 30-foot charter fishing boat ROAMER was swamped during a sudden squall east of Wood Island, throwing nine men into the stormy waters. One died from an apparent heart attack, but the others were picked up about two hours later by a search party from Munising.

CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS

Overview

It is easy to reflect on the events of the past year and to identify all of the highlights that were associated with preparation of this document. The work has been rewarding in many ways. The setting is magnificent, both above water and below. The shipwrecks are the rich treasure bequeathed by generations of our forebearers, often at the cost of their very lives. The privilege to thoroughly study their remains is a heady one not accorded to many people, and it has proven to be enormously gratifying. It has resulted in a rich store of valuable new information. We hope it has also generated ideas and conclusions that can reinforce the preservation of the sites and enhance the enjoyment of other visitors who come for the same reason the author has come -- to learn.

Retrospective

In the process of bringing to a conclusion any large undertaking, we are led to ask ourselves "Is it good; is it complete?" This study is a good one by most standards because it has accomplished what was intended. It synthesizes most of what is known about the underwater cultural resources of the Pictured Rocks area, brings a good deal of fresh information, illustrates the appearance of most of the sites in an easily understood format, and offers some suggestions from the perspective of an interested party outside of the Park Service. On the other hand, it is hardly complete.

The historical research led its circuitous way to solutions for many of the questions posed at the earliest stages of the project. Most of what we sought about the locations, identities, descriptions and circumstances of the shipwrecks proved to be available in the historical record. Some of it turned up in surprising places, far from where it was expected, like the identity of the GALE STAPLES, which was established only because a colleague on Lake Michigan coincidentally shared his findings about a sister ship. Some of it was so close and so obvious that it was nearly overlooked; an old salt in 1901 remembered the schooner BERMUDA as the "GRANADA" and started 80 years of confusion.

The literature search did not provide answers to some of our most persistent questions. It was not possible to establish whether or not schooners named ANNIE COLEMAN and VOLUNTEER ever existed, although they were reported to have wrecked near Au Sable in 1888, and 1886 respectively, or under what circumstances the schooner ONEIDA CHIEF was lost in 1868, although iron pigs were found near Hurricane River that probably came from its cargo. A portion of the frame of a wooden ship was found in the hull of the KIOWA at Twelve Mile Beach, but we have no records of another wreck within miles of the KIOWA, particularly on the "upwind" side to the west. More diligent historical research may one day clarify these mysteries.

The field documentation technique employed during the project proved to be adequate and sufficiently flexible for most of the tasks we faced in the Lakeshore, in spite of a wide range of environmental conditions and site descriptions. The nondestructive approach was certainly appropriate, although there were sites where some excavation

would have been very useful. Removal of some of the sand from the unidentified schooner east of Sand Point might have made identification possible; it would at least have established the full extent of the wreckage and perhaps, the nature of the vessel's cargo. The probability of more wreckage and rich artifact scatter is very high at the ELMA, WABASH, GEORGE and SUPERIOR sites, but exposure is certain to compromise the preservation of the material, so its excavation was not attempted. The simple technique of drawing and measuring the sites, coupled with the modest depths (none of the wrecks surveyed lies in water more than 45 feet deep), allowed for quick, efficient and relatively risk-free work. Three or even four one-hour dives per day were possible for participants.

Some search work was undertaken with volunteer divers on sleds towed behind powerboats. The technique was only employed in high-probability areas near Au Sable Reef, and it was used only briefly. Gridded swim-searches were also undertaken in shallower areas. Both survey methods yielded modest returns. They proved useful only in areas where there was very high probability of targets, and did not appear to be a cost-effective way of using divers to their greatest advantage. Location of sites is an essential function of surveys, but that role should probably be left to experts such as the Submerged Cultural Resources Unit or some other professional archeologists.

The choice of boats and boat operators for projects like Pictured Rocks is a critical one. During the course of the 1988 investigations, the team visited no fewer than 18 sites in an area of approximately 45 square miles. Access was possible only from the two ends of the Lakeshore, at Munising and Grand Marais. Most of the sites were accessible only by water, so the project was totally dependent on reliable boat transportation. We were fortunate to have a charter operator who was intimately familiar with the dive sites and wasted no time finding them, and his LORAN (satellite) navigating instruments took all the doubt out of locating positions. He was equipped with a fast, safe boat that was also large enough to accommodate four divers, their equipment and at least 12 tanks of air, so that travel time and inconvenience were absolutely minimized. This was important because it was not unusual to run 35 miles down the shore before reaching our work site, or 35 miles back when it started to grow dark; in the middle of the Lakeshore, storm refuge was about 20 miles in either direction.

Management Recommendations

Management of the shipwreck resources at Pictured Rocks National Lakeshore is the purview of the state of Michigan. The Michigan Department of Natural Resources, the Division of History (Department of State) and the Alger Underwater Preserve Committee all share the responsibility of managing the patrimony underwater and even on the beaches (below the ordinary high-water mark) at Pictured Rocks. Michigan's Public Act 184 of 1980 describes the goals of the bottomlands preserve program as "providing special protection of abandoned property of historical value, or ecological, educational, geological, or scientific value." Objectives extrapolated from that goal are:

1. To provide an area for recreational activities centered around the preserve's resource base.
2. To provide educational opportunities in a recreational setting to divers and nondivers.
3. To provide for the scientific study and the protection of the resources within the preserve (Holecek and Smiley, 1982:8).

Because these goals and objectives coincide with those expressed in management documents of Pictured Rocks National Lakeshore, it is incumbent on the Park Service to strengthen the cooperation with the state that has already been clearly demonstrated. While the proprietary right to the resource is Michigan's, the wrecks are also an enormously significant cultural and recreational resource to the Lakeshore. By taking an active role in supporting the State's management aegis, the Park Service can do much to enhance the educational and recreational opportunities for visitors within and without the Park. Obviously, as primary caretaker, there is much that Michigan should do as well, although none of the entities involved with the Alger Underwater Preserve have the financial resources to contribute much.

The Park Service has not only a vested interest in the shipwrecks, but it also enjoys several advantages over the State that make it appropriate to involve itself. The most important factor is the Park Service's year-round presence on the site, which brings a team of resource management specialists in almost daily contact with the sites and their primary users. The State has no such presence. Park Service personnel are intimately familiar with the resource, and they enjoy the hard-earned reputation of caretakers of the nation's patrimony. They are certainly appropriate candidates to share in the management role, and NPS' willingness to accept that responsibility is reflected in numerous parts of the 1981 General Management Plan quoted in the introduction to this work.

Law Enforcement

"Concurrent surface jurisdiction" implies limited control, but the National Park Service has several effective tools to assist with management of the underwater sites in spite of it. NPS' greatest assets are its manpower, its collective expertise and its proximity. No other entity is nearly so capable of monitoring the sites or exercising any control at all. Park Service personnel can provide surveillance during the course of their regular duties on a fairly constant basis, and they can supervise most of the shipwreck sites in the Lakeshore at least on an occasional basis. Inasmuch as they are uniformed government employees with some enforcement authority, they should be made as visible as possible to let sport divers, like any other park users, know that they are in a national park and will be expected to treat the sites as public property. Marked buoys at various sites can be used to reinforce that concept. NPS field personnel should be encouraged to observe, note and report diver activity on a routine basis. They will quickly learn to recognize what is suspicious.

The most threatened wreck sites are all outside the Lakeshore boundaries. The BERMUDA and SMITH MOORE wrecks are certainly the most visited in the whole area, and the very heavy load factor (averaging some 6,000 divers yearly) poses a serious threat to their preservation. The BERMUDA's wooden sides are covered with graffiti literally from stem to stern. A long section of the port rail is torn loose and lying on deck. A sheet of plywood lies along the port side near the cabin trunk. There is hardly a bolt, pad-eye or a nail protruding on deck after decades of divers have come and gone with their shark-knives and hand tools. The SMITH MOORE is not so obviously damaged due to its greater depth and the more limited diving time, but the impact is only a matter of time and degree.

A submerged sand bank has crept over the SMITH MOORE several times during the past few years, obscuring major portions of the ship's stern. Charter operators quickly recognized the threat posed by burial of the popular wreck, and much of the intruding sand has been airlifted away as a result. The same charter operators have succeeded in stopping divers from removing artifacts from the wreck, and in encouraging a

preservation ethic among the divers. They will have to redouble their efforts to educate divers not only about theft of artifacts, but also about the more subtle and innocuous activity that eventually affects the ship's fragile wooden structure, such as careless mooring, scratching graffiti into the soft surfaces, picking up objects on deck, or scraping against hatch coamings or hull openings with scuba tanks. Moorings on the BERMUDA are attached to the ship, and should be relocated alongside it to minimize damage; the broken rail is undoubtedly a result of some boat having made fast its mooring line there.

Diver education is certainly the most effective way to stop damage to the ships. Most divers would be pleased to cooperate if they understood the long-term effects of carelessness or petty vandalism, and the less cooperative would succumb to peer pressure. Harsher measures could be used to insure compliance under the terms of Public Act 184 of 1980, which specifies stiff penalties for "removal or destruction." A brief video orientation could be prepared by the Preserve Committee to communicate the issue to divers before every charter. *If the message was coupled with some historical information about the wrecks, it could be made an appealing introduction to the Preserve.* Park Service interpretive staff might be called upon to assist in the preparation of such a tape.

Many of the wrecks within the Lakeshore are also subjected to recreational diver stress, although not to the extent of the BERMUDA and the SMITH MOORE. Although the number of divers is much smaller, the same factors threaten all of the wrecks to varying degrees. Pilferage of small artifacts is more of a problem on some of the wrecks in the Lakeshore, inasmuch as most of the wrecks are broken down by decades of natural processes, and the structures are no longer so easily damaged as are the more intact ones. The MARY M. SCOTT, MICHAEL GROH, GEORGE, SUPERIOR, KIOWA, GALE STAPLES and UNION wrecks all have numerous portable artifacts associated with them that should be scrupulously monitored. The SCOTT, like the BERMUDA, has copious amounts of glittering, crystalline iron ore in the hold, much of it small enough to make handy souvenirs. The GROH's short stern section is filled with hand tools, threaded bolts, nuts, spikes and treenails that may be easily removed. The GEORGE wreck still has deadeyes, chain links and rigging parts nearby in the sand. The SUPERIOR site is littered with cabin and machinery parts of great antiquity and considerable collector value. KIOWA's torn hull is full of machinery parts, tools, piping and nondescript fittings, many of them brass. GALE STAPLES remains include a propeller wheel, a very handsome Trotman anchor, a deck capstan and a variety of machinery parts. Most of the UNION wreck has not yet been found, but engine-room debris east of Au Sable Point indicates a field of tools and machinery parts in that area, too. There is no effective way to prevent removal of artifacts from these sites, but the pilferage can be minimized by documenting the amount and type of scatter, by monitoring diving activity at the sites, by educating divers about the ethics (and the penalties) of theft from the Preserve, and by showing a strong Park Service presence at the sites whenever possible. NPS personnel should be encouraged to dive the wrecks themselves.

Park Service personnel should be sensitized to keep an eye on diving activity and to be alert for suspicious activity at known wreck sites. Divers with artifacts on the beach, boats with heavy lifting equipment visible, or nighttime diving can all signal illegal looting. Enforcement of preserve regulations or applicable NPS regulations should be aggressive and consistent. When the open and positive approach to preservation fails, the more negative, restrictive approach is perfectly appropriate. The Park Service's first obligation is to protect and preserve, and where federal penalties do not apply, state ones do; both were intended to be intimidating as well as punitive. A well-publicized arrest in the Preserve would be lastingly constructive.

Most of the dive sites are known to the charter boat operators, but mooring buoys should be placed on most, if not all, of the wrecks to assist in locating them and to minimize damage to the wrecks caused by anchors or mooring lines. Commercially available 18-by-30-inch mooring buoys can be attached to 1,700-pound cast concrete anchors near the wrecks using 3/4-inch polypropylene line (Lenihan 1987:493, 521). This mooring system has proven successful at Isle Royale National Park and at Fathom Five Park in Ontario. The buoys are visible for about a mile. They can also be used to convey important information to the divers, using waterproof signs with regulatory or safety information. At some wreck sites, such as the KIOWA, the buoy may be attached directly to solid portions of the steel hull, where there is no possibility of damage to the ship.

Buoying the KIOWA wreck is a major concern from the Park Service perspective because of the difficulties inherent in managing a site so remote from NPS staff and because of the danger of people swimming out to the site from the nearby bathing beach. The wreck lies a half mile from shore, so the buoy would be visible from the beach under most conditions. The risk of swimming so far is exacerbated by moderately strong surface currents that sometimes reach a velocity of 1 1/2 miles per hour and could sweep most swimmers far down the shore. Considering the range of recreational activities available to visitors in national parks, it does not seem inappropriate to allow the visible buoy over this wreck, although some sort of warning might be posted ashore to warn swimmers of the currents and to advise them against attempts to reach the wreck site. A comment in Submerged Cultural Resources Study: Isle Royale National Park (Lenihan 1987:530) says:

Visitors should be allowed to take risks and push the bounds of personal safety in national parks, if it is without peril to others and reasonable care has been taken to advise them of the hazards involved.

Signs might be located in the parking areas or at stairs leading to the beach, rather than standing on the beach itself.

A second objection to marking the KIOWA site relates to the removable artifacts in the ship and the inability to monitor the wreck because of its relatively remote location. *There is no doubt that the artifacts are at risk, but buoying the wreck is not likely to make a significant difference in the number of divers visiting it.* In fact, one charter operator advertises weekly all-day trips to the KIOWA now, and the location is almost certainly known to most of the other charterers as well. Under any circumstances, the decision to buoy or not to buoy should be made jointly between the Park Service and the Preserve Committee if NPS is to share in the monitoring and enforcement responsibilities.

Interpretation

Interpretation is one of the most valuable tools for resource management. It brings to resource users an appreciation for the real value of the resource, communicates to them a sense of personal ownership, and frequently brings them into direct contact with the resource itself. It should also acquaint the user with the threats to long-term preservation. It is in the interpretive role that the Park Service can make one of its most meaningful contributions to the preservation and proper use of the Pictured Rocks shipwrecks.

Interpretation of shipwreck sites can be as appealing as it is educational. The American public has traditionally shown a strong interest in the subject, and the insatiability of

their appetite for it puts the obligation squarely on the shoulders of the interpreter to take every advantage of it. A first priority of cultural resource interpretation should be communication of the preservation ethic. It is absolutely critical that resource users, and sport divers first among them, understand the value of the resource. They need to understand that shipwrecks should be treated as they would comparable historic sites on land. A second priority is accurate historical information, and a third might be to relate the resource to the user, preferably by experiential involvement, but perhaps only in a vicarious sense. Anecdotal history brings inanimate objects down to a human scale and enables an audience to relate to the object or site. This report attempts to incorporate a variety of anecdotes and stories along with the descriptive data on each of the shipwrecks in Chapter IV. It is hoped that interpretive staff will find ways to bring the ships back to life for their audiences.

Interpretive materials should be developed specifically for diver audiences. Lectures, slide talks, or video programs might be offered for groups of divers for evening programs or immediately preceding charter trips. Such programs could offer some rules and safety tips, a brief geographical orientation, and a discussion of selected wreck sites. The sites could be grouped according to the more popular trips, such as a Murray Bay-East Channel-Sand Point group, a Pictured Rocks group, or an Au Sable group, each dealing with three or four sites. "Before and after" illustrations of the wrecks would help the divers to understand the ships and prepare them for what they will see. A great majority of divers do not understand what they are looking at when they visit a fragmented shipwreck, and some preparation would be extremely helpful. They might also be taught some basic structural terminology with a few simple, keyed drawings of component parts of a ship.

Divers who have been taught the basic structure of wooden shipbuilding have shown an enormous increase in their interest in wrecks, even after having dismissed specific sites following a first visit. When they learn to understand the sites, they are stimulated to examine them closely, to identify the parts and features, and to ask questions. More important, they begin to value the resource, and to make repeated visits. The phenomenon has been demonstrated many times over in documentation projects using volunteers at Isle Royale, Apostle Islands, Sleeping Bear Dunes and numerous other locations where knowledgeable people are teaching other divers or where there is interpretation. It may be useful to note that most diver-groups appear to seek out entertainment in the evenings, and educational entertainment could prove useful and even profitable.

Printed media should also be used for interpretation of dive sites, such as site maps, fact sheets about specific sites, fact sheets about shipbuilding in general, booklets and pamphlets that describe or bring to life the wrecks -- all can be used to help sport divers to understand and enjoy the resource. The printed material may be published in various forms and distributed to charter operators in limited numbers or done in a less expensive format and made available to large numbers of divers themselves. It can also be fixed at the site, on anchor buoys, on plaques right on the wreck, or in the form of a marked trail at the site. Fact sheets reproduced inexpensively and distributed widely would probably be the most effective medium, supplemented with large-scale site maps carried on each charter boat. The mooring buoys could have the identity of the site, the depth of water, and a few basic rules or tips -- nothing more.

Some of the interpretive materials produced for the diving audience might prove suitable for nondivers, too, including both programs and printed materials. The printed materials could be used to supplement beach walks or orientations, and the programs to form the basis for independent programming at the various lakeshore interpretive

facilities. Combined, two or three of the wreck-group videos could make a reasonably comprehensive program on the Lakeshore's shipwreck population.

The obverse side of providing interpretive materials for sport divers would be to have the sport divers or the Preserve Committee get involved in NPS interpretive programming. The divers or charter operators can be a useful resource to bring first-hand experiences to park/lakeshore visitors. Use of volunteers would encourage their interest in the preservation ethic by using them as spokespersons on preservation's behalf, and it would add a dimension to the experience of the nondiving public. It would also strengthen the ongoing relationship between the Lakeshore and the divers or charter people. By rotating the responsibility, they would probably be willing to address NPS audiences on a regular basis.

The NPS beach walks seem to be appealing and informative, and their focus is well planned. Orientation packets might be made up from the contents of this report for the appropriate walks, for the use of the interpreters, but it is in the interaction with the visitors that the programming might be strengthened. Visuals such as "flash cards" or some other form of enlarged graphics would be helpful in making the subjects more concrete. The delivery is plenty interesting as it is, but has a slightly abstract quality about it that might be improved with a few photographic images or drawings. The appearance of the subject ships, a schematic drawing or cross-sectional plan illustrating the component parts of a wooden hull, or an enhanced drawing to illustrate wreckage buried in the sand could all help the visitor understand the site better. No more than two or three images per walk would be necessary, and they could be sandwiched in mylar to be passed around among visitors or inexpensively xeroxed for free distribution. An 8 1/2 x 11-inch format would be adequate size, unless they were meant for group viewing, although the latter alternative does not seem practical for field use. Many of the graphics in this document were prepared with such a use in mind. The correct terminology for ship parts is an important part of any presentation on the wreckage along the beach, and interpretive staff should know the correct names for the principal parts. No one should expect them to know all the terminology, but the obvious and visible parts should be properly named.

Interpretive use of the historic structures within the Lakeshore is discussed in the Pictured Rocks National Lakeshore Interpretive Prospectus. The concept outlined there is to use the abandoned Grand Marais Coast Guard Station for exhibits focusing on the U.S. Life Saving Service, the Au Sable Light Station for a focus on the U.S. Lighthouse Service, and the Munising Coast Guard Station to deal with Coast Guard history. The idea is a sound and an exciting one. The buildings lend themselves to stabilization and restoration and to interpretive use. The structures in each of the three complexes are sound, attractive and large, and the largest of them flexibly adaptable. What appears to be the greatest challenge is the balance between restorative authenticity and handicap accessibility, and that is an achievable compromise.

In general the Interpretive Prospectus suggests restoring the exteriors of almost all of the buildings and developing appropriate landscape plans. Selected rooms within the major structure are slated for period restoration, while other spaces should be made purely functional. These larger, functional rooms would accommodate exhibits focusing on related themes. Some outdoor signs would be employed to identify functions of individual structures, and one or two large sign units at each site would address such themes as nearby shipwrecks, sand erosion, or former buildings on the site. All of these ideas sound exciting, and they should result in a particularly rewarding visitor experience.

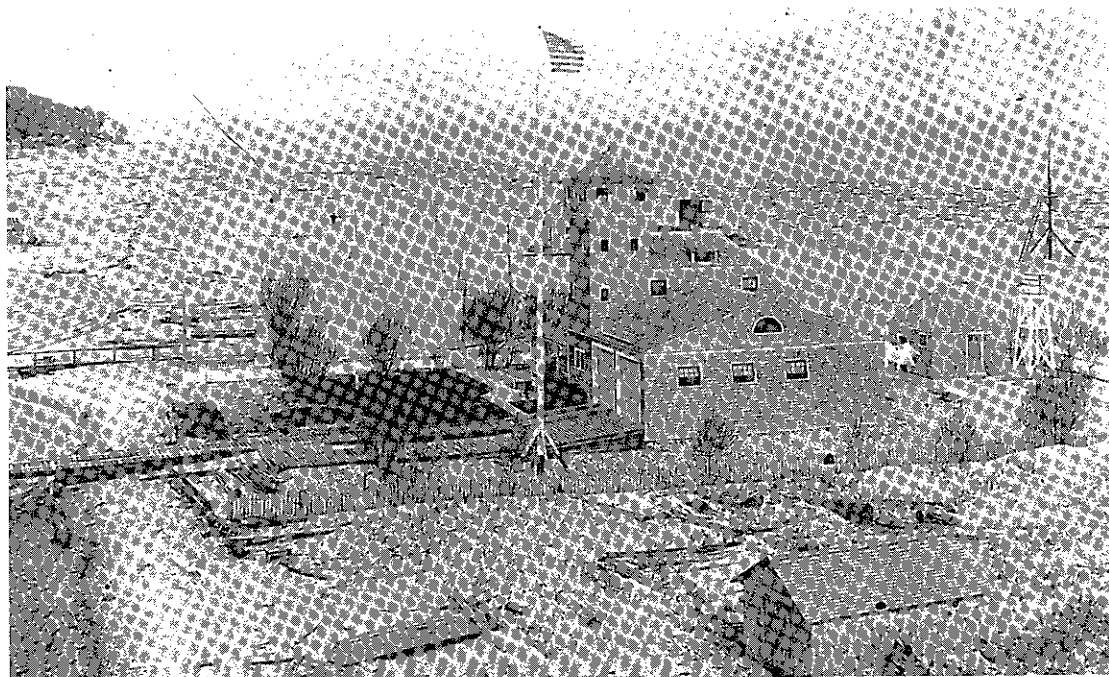


Fig. 5.1. Grand Marais' Life Saving Station was built inside the piers in 1899. U.S. Army Corps of Engineers photo.

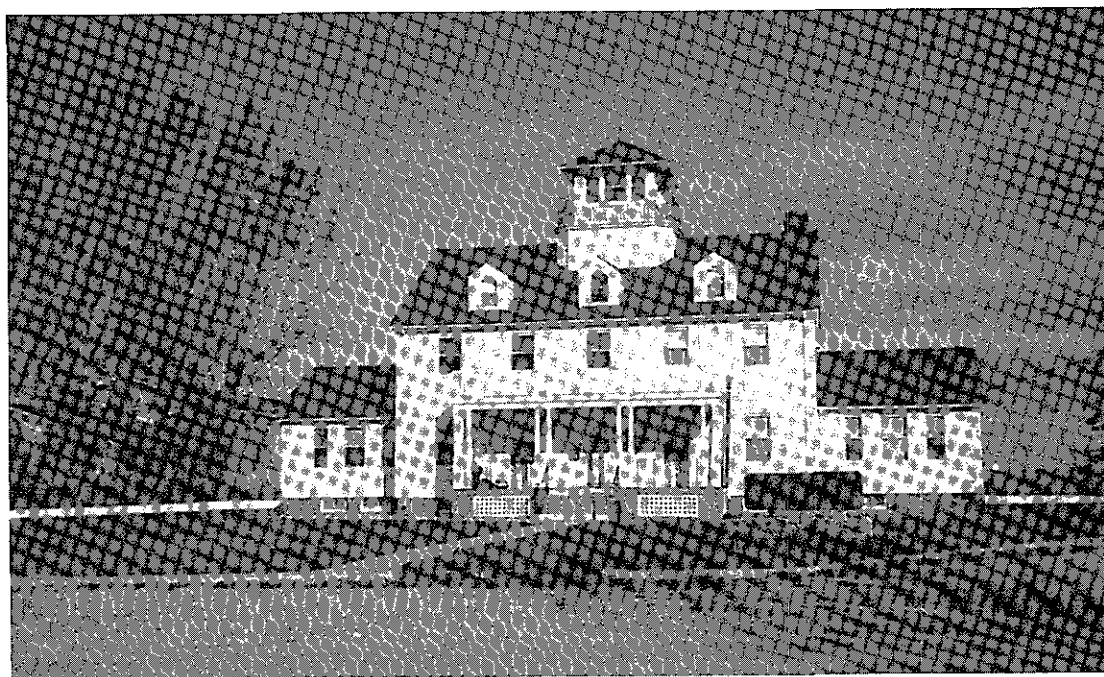


Fig. 5.2. The modern Coast Guard Station was built at Grand Marais in 1938 and decommissioned in 1983. NPS photo.

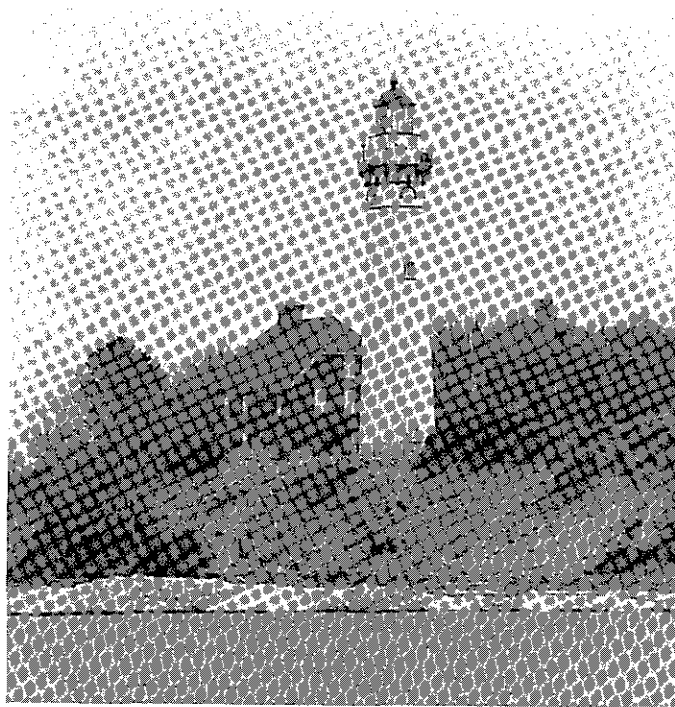


Fig. 5.3. The imposing Au Sable Lighthouse guards the dangerous reef. The structure was built in 1873 and automated in 1958. The Park Service has been entrusted with its care since 1982. Photo by Patrick Labadie.



Fig. 5.4. Munising's Coast Guard Station was built in 1931, and currently serves as headquarters for the Pictured Rocks National Lakeshore. NPS photo.

Every effort should be made to create an ambience inside the historic structures to complement the integrity of the site on the outside if that is possible. If the visitor can enter the building and even briefly achieve the feeling of stepping back in time or of walking into a building that is still serving its intended function, then we have achieved the most successful interpretation possible. The remainder of the building can be adaptively altered, but at least some space or spaces should bring inside the authenticity that is being sought on the exterior. The period room(s) can be determined by setting, location or by the availability of artifacts. Rooms that are not restored should be distinctly different in architectural style, color, lighting and so on.

Exhibits should have strong themes so that they "hang together," even if the theme happens to be variety or hodgepodge. Graphics, framing, colors and exhibit properties (mounts, pedestals, cases, etc.) should tie a unit together; if they are not compatible, they can have the opposite effect. Dissimilar frames or labels can make two adjacent illustrations look unrelated, for instance. All of these elements of display can be "home-made," but they should be consistent, particularly the labeling. Lettering size and style should be absolutely consistent, not only from one object to the next, but from one exhibit to the next and even from one building to another. *The Design Center* at Harper's Ferry undoubtedly has graphics design manuals for exhibits. Some scale models would add dimension and class.

Subjects suggested for interpretation in the dwelling at Au Sable (Interpretive Prospectus, page 23) seem too ambitious and varied, in spite of the relationship of one to another. "Transportation and Shipping" is a very broad subject that might be better addressed at Munising, although a description of specific wreck incidents would be in order. The remaining subjects all work well together. Recommendations for specific rooms are good.

The recommendations for the Munising Coast Guard station are also good. Some functioning Coast Guard rooms should be restored, such as a 1930s radio room, and perhaps examples of bunkrooms, readyrooms, or the galley, where visitors would get a feel for the way the Coast Guardsmen lived, what they wore, ate, or did with their spare time. The boathouse also begs for restoration and interpretation, especially with the authentic surfboat. Other boat gear should be collected to outfit at least part of the boathouse. With its views of the Munising Bay, this could be a magnificent exhibit. Large artifacts placed outside the boathouse should be located so that they do not intrude on the authenticity of the setting if possible. This is an enormously exciting site, with its smaller outbuildings all intact.

The suggestion to include a large table with reading materials in the main room of the Coast Guard station does not seem to be a practical one. *The demand for a reading place* would appear to be minimal, and the space could be better utilized for interpretive displays. The several subjects recommended for interpretation will require a lot of space, and the broader subject of Great Lakes ships and shipping will tax the space to its limits if it is attempted there at all. It would be possible to do an adequate job of discussing the Coast Guard without trying to deal with ships and shipping in any detail. Sand Point and Pictured Rocks-area wrecks should probably be addressed here, too, although they could possibly be done in the nearby boathouse. The artifacts outside relate to those specific wrecks.

The Grand Marais Coast Guard Station should confine its scope of exhibits to Sauble Dunes and Grand Marais focus, including the Life Saving Service and Grand Marais shipwrecks. If possible, the focus on Life Saving Service paraphernalia should be a priority (uniforms, beach apparatus, line-throwing guns, surfboats), and should all be

illustrated or displayed if available. Shipwreck incidents lend themselves to separate display units, and a brief history of the harbor would also be fitting. Although not within the boundaries of the lakeshore, the exciting RUNNELS, MANHATTAN, NIRVANA and GALATEA incidents all lend themselves to interpretation. Three of the four involved the Life Savers, and good graphics are available. At least some artifacts are also available. The exhibits here need upgrading badly. Two or three scale ship models would be useful, but they should be kept in a similar scale.

Further Research Needs

A variety of research-related issues and questions were left unaddressed, and much more research is encouraged. Time constraints forced some painful choices in priorities during the year-long project, and many tantalizing questions were necessarily relegated to the back burner. Some significant sites were not located at all and other were only superficially documented. One wreck remains unidentified. No attempt at all was made to examine or document the various wrecks at Grand Marais, several of which have relevance to the Life Saving Station and the museum there. Much more can be gleaned from a more careful search of the historical record, too, relative to some of the marine loss incidents and subsequent salvage work.

In the field, several priorities stand out. The GALE STAPLES wreckage on Au Sable Reef was carefully studied, but there are significant fields of further vessel remains both west and east of the reef that were not seen or documented. Divers have described a large mass of wreckage west of the reef in 25 or 30 feet of water that appears to include sections of vessel side plus the stern portion of the SITKA. Some of the distinctive GALE STAPLES hull may also be at that location, and could be easily distinguished because of the characteristic framing scheme. This site should be thoroughly mapped and photographed.

East of Au Sable Reef is an interesting area with fairly dramatic topographical features where some wreckage was seen, including what is almost certainly a section of the UNION's hull. Because other sections of wreckage led off in a northerly direction, it is likely that the bulk of the UNION's elusive wreck lies nearby. A length of hatch coaming strengthens that conviction, and there are boiler and machinery parts in the same area. The possibility cannot be dismissed that all of this is from the GALE STAPLES or even the more westerly SITKA, but it appears to be quite different from both and as a result, is more likely remnants of the UNION. This whole area east of Au Sable Reef needs examination and survey.

The entire perimeter of Au Sable Reef should be surveyed with remote-sensing equipment to determine what other wrecks lie in the vicinity. The best information available at this time is vague and incomplete. The sites visited on top of the reef are sufficiently attractive to draw charters all the way from Munising, but the possibility of adding two or more other sites within a few hundred yards makes it a prime concentration equivalent to some of the best sites on Lake Superior for the sport diving public. If natural processes result in further burial of the SMITH MOORE wreck in sand, charter operators may need to develop alternative dive sites in order to sustain the diving traffic. This could be a strong incentive for investigation of "other" Au Sable wrecks.

All of the 1988 study of the SITKA and GALE STAPLES wreckage failed to establish whether or not the SITKA's engines and boilers had been salvaged from the site of its loss. The missing stern portion of the wreck is quite probably the section observed by Mr. Becker west of Au Sable, but his accounts make no mention of machinery. It is

suspected that the Gilchrist Co., which owned the SITKA, probably contracted for removal of the engine and boilers for re-use in other Gilchrist ships. This will only be shown by examination of the wreckage. Similarly, the boilers and machinery on top of the reef appear to be STAPLES', but there are no signs of the stern portion of its bottom, nor of any of its sides. Because of the unorthodox style of framing and construction, nothing is known of the method of fixing the sides to the bottom, although large sections of the bottom have survived. Where are the sides of this great (290-foot) ship? Only further searches will clarify whether those large sections lie east of the reef or whether they were simply taken to pieces by natural processes. It would add much to our understanding of shipbuilding technology to find these missing parts of the STAPLES, and it might answer for us as well exactly what happened to this ship when it stranded in full view of the lighthouse crew so many years ago.

The propeller UNION is among the most interesting ships in the lakeshore population from the standpoint of history and construction. The details of its loss are unclear, and the exact location is unknown. We are told that it stranded "on Au Sable Reef," and we know that it was bound from west to east at the time, loaded with iron ore. While that might lead to the conclusion that the ship came to rest on the west side of the reef, the only hints we have found make it appear that the remains lie east of the reef instead. The section of side and the hatch-coaming nearby are probably from this historic craft. Discovery of this vessel should be a real priority. The ship's design and construction by William Bates of Manitowoc qualifies it for special scrutiny. It is difficult to resist speculating that the wreck has not yet been discovered by any divers and that, because of the topographical relief where it lies, there is a rich store of undisturbed artifacts. The site, nearly a mile east of the light and a half mile offshore, appears to have enjoyed a certain immunity from exploration.

Farther east, the researchers were unable to find any trace of the elusive SOUTH SHORE hull, which has been so frequently reported from the Log Slide. Crescent-shaped groupings of rocks there suggest the shape of a small hull, but no timbers or structure was found. The boiler was easily seen farther to the east, but no signs of the ship's hull were located at all. A survey of the area may not prove useful in view of the deep sand there, but sightings should be noted and investigated when further reports are made from the top of the dunes. The wreck could probably be located with a magnetometer, but it is doubtful that side-scan sonar would prove useful as it might in the Au Sable Reef survey.

At the western end of the park, several sites merit added field research. The unidentified schooner east of Sand Point might give up its secrets if more of the wreck was exposed. Much could be learned about its description and its extent with the removal of some of the sand. It does not appear to be particularly sensitive to exposure, so that no damage is likely to result from careful airlifting. The wreck could become an appealing dive site, particularly considering its proximity to the MANHATTAN, the HERMAN HETTLER and the MARY M. SCOTT. The nature of the ship's cargo and perhaps even its identity might be established. On the other hand, there is more possibility of unearthing artifacts if any dredging is undertaken, and every caution should be taken in evaluating the advisability of disturbing the sand.

East of the unidentified wreck, the main section of the MICHAEL GROH and the ELMA wreck near Miner's Castle remain to be documented. Both were only found after completion of the 1988 field work, and although some field measurements and observations were made by volunteers, both should be thoroughly and accurately surveyed.

What is undoubtedly the Lakeshore's most historic wreck is the old steamboat SUPERIOR, whose remains lie at Spray Falls. The ship was examined and sketched, and some photographs were also taken of the site. The site is still poorly understood, however, and the location of the various boilers and hull sections should be accurately plotted with relation to the shoreline features. Relatively little of the ship's hull was exposed in the summer of 1988, and when the bottom conditions are favorable, that should be documented more thoroughly than was possible in this report. Archeologically correct drawings should be done of the antiquated boilers, which probably date to 1834.

The sand and rock bottom at the SUPERIOR site conceals artifacts varying from large timbers and machinery castings to small personal effects and cabin hardware. Divers report that hundreds of artifacts have been removed from the site over the decades since the ship's loss in 1856, but many more are certainly still there. Large rocks from the cliff face have fallen unto the wreck, sometimes several rocks deep, and timbers may be seen underneath. This site should be monitored if possible, for removal of artifacts for their preservation. The thorny question of removal for such a purpose is not in the purview of this report, but the state and the Park Service might care to consider the rarity of the ship's remaining relics and the impracticality (impossibility!) of supervising the site. Slides and video sequence of this wreck would lend themselves to an interpretive program with enormous appeal, considering the dramatic details of the ship's loss. The interpretation could be made doubly effective with the use of real or replicated artifacts.

Like the SUPERIOR wreck, portions of the GEORGE are also buried beneath rock falls near Mosquito Beach. The main body of the wreck is well documented, but there are many artifacts around it in the sand and buried under the rocks. One section of the hull, probably a side, lies inshore and far to the west of the hull. This whole site should also be drawn out as it relates to the shoreline, and some effort should be made to find the extent of frames and wreckage to the west.

The KIOWA wreck is the best documented site in the Lakeshore, but one of the ship's two huge scotch boilers cannot be accounted for. Several sweeps were made outboard and forward (west) of the wreck, but no sign of the boiler could be found, so it is assumed that it was salvaged. When water clarity is at its best, a broader search is suggested in order to dismiss for all time the suspicion that the boiler might still lie near the site.

Some collectable and portable artifacts were seen in the KIOWA wreckage during the 1989 field work, and the locations and descriptions were carefully noted. The Preserve and NPS should consider some means of protecting these items. They could be fixed securely in place with chain, buried or removed. Monitoring the site from shore, even if possible, will not prevent their removal.

The KIOWA is the site of one of the Lakeshore's many puzzles, with the futtock of a wooden ship's framing found in the bilge. Although no wooden wreck is known to lie "up-current" of the KIOWA for several miles, the piece was evidently swept into the wreckage by the prevailing west-to-east currents. The 6-foot oak piece weighs several hundred pounds and probably never did float on the surface, although it may have at one time been nearly neutrally buoyant. Water depth at the site is slightly more than 40 feet, so a visual search would not be easily conducted over a large area. A side-scan search may turn up a previously unknown wreck in the vicinity. Perhaps the schooner ANNIE COLEMAN or the VOLUNTEER does, after all, exist. The VOLUNTEER was reportedly lost 6 miles west of Au Sable Light in 1896.

Finally, near Hurricane River, the MARY JARECKI wreck hides its own mysteries. Pipes and sheets of steel were seen in 20 feet of water several hundred feet out from the mouth of the river and several hundred yards west of the ship's hull. These are thought to represent parts of a crushed and broken steam boiler, and they probably identify the inner portion of a field of wreckage. So much of the ship is unaccounted for, that only the JARECKI's hull bottom and a short portion of one side may be seen at the beach. A swim search or a side-scan survey of the deeper area may bring to light more of this interesting ship, and it may also offer some clues about the whereabouts of the missing ONEIDA CHIEF. The ONEIDA CHIEF is supposed to have wrecked at Au Sable Point, but its remains have not been found. The only clue to the ship's location is a single iron pig presumed to have come from its cargo, found almost a half-mile west of the point. When one considers the general pattern of ice- and current-induced drift, it leads to the likelihood of the ONEIDA CHIEF being in the general locale of the MARY JARECKI. A remote-sensing survey of the whole shoreline from the Hurricane River to the east side of Au Sable Point would clear up many of the mysteries surrounding this part of the lakeshore.

More historical research is also needed. A thorough search of the Marquette Mining Journal will undoubtedly result in more incidents in the Lakeshore that have not yet been identified. It could offer some possibilities for the unidentified Sand Point schooner or for the frame-member found in the KIOWA. It could also clarify the mysteries of the alleged ANNIE COLEMAN and VOLUNTEER losses. Local papers may also shed some light on several more specific questions, particularly those involving salvage work. Most salvage jobs were not documented by journalists, particularly in the case of vessels that were known at the time to be total losses. If there was some prospect of recovering a ship, the salvage attempts were more likely to appear in the marine columns. Attempts to free the BERMUDA in 1869, 1870 and 1883, for instance, were all described in the papers. Efforts to float the MARY JARECKI were described during the next weeks in 1883. Numerous attempts to save the schooner GALATEA at Grand Marais were chronicled during 1905 and 1906. There are few details, on the other hand, of removal of machinery from the steambarge MICHAEL GROH near Miner's Castle in the spring of 1895, or from the SITKA at Au Sable in 1904, from the MANHATTAN near Trout Point in 1910, or from the H.E. RUNNELS at Grand Marais in 1920. There are shadowy details of some of the salvage, but the need for clarification exists in each of the cases.

Relative Significance

The underwater cultural resources of Pictured Rocks National Lakeshore are, collectively, a magnificent family of sites. They are related by the bonds of economics, tradition, technology, culture and geography. They have volumes to communicate to us about the ways our forebearers responded to those stimuli in their lives. Their significance, whether taken jointly or individually, must be the result of synthesizing the historical record and the material record. We must study what is thought about the sites from written sources as well as what is known about them from their remains; the two will hopefully complement each other. In his introduction to the Submerged Cultural Resources Study: Isle Royale National Park (1987), Daniel Lenihan says: "Archeologists are interested in using the material record to determine what people did, not what they think they did or said they did." Collectively, the wrecks have more to say about weather and geography and man's frailty than about anything else. They speak of tremendous natural forces and the utter folly of man's attempts to breast them in the era of wooden ships. In general, the sites do not conflict with the historical record, but

they substantiate it. They bring to life the tales of toil and tragedy that followed men of the sea in the nineteenth century.

As a subset of lakeshore wrecks, those several ships clustered at Au Sable Reef are together a remarkable grouping. They comprise a dramatic counterpart to the nearby Au Sable Light. Their presence demonstrates in the most concrete manner exactly why the light is necessary. The point, the reef, the lighthouse and all the shipwreck remains are interrelated elements of a single, integrated historic site. It is the perfect example of a thematic group appropriate for the National Register of Historic Places, and should be nominated for inclusion in the Register.

The Au Sable Point grouping has site integrity, with wreckage strewn on the reef and along the shore by natural processes. There are underwater and shoreline components that lend themselves to a variety of recreational uses and interpretive techniques. Each of the elements relates in the most concrete manner to the geography of the place, to the lighthouse, to significant events in local history, and to Great Lakes commerce in general, so that the site handily satisfies several essential criteria for eligibility. To say that the site is also unique is an understatement. The bold and dramatic setting of the light, with the reef virtually at its feet and the numerous large elements of wreckage strewn all around, are unmatched anywhere in the Great Lakes. There are probably few sites like it in the nation. The setting captures within its boundaries the whole character of Lake Superior's remorseless fury. The Au Sable Light is already on the National Register of Historic Places, and the shipwrecks on and around the reef should be added. These include the SITKA, the GALE STAPLES and the UNION, and possibly the schooner ONEIDA CHIEF, covering an area one mile west, north and east of Au Sable Lighthouse.

Individually, the shipwrecks have as many stories as there are sites. Each site has a different character and a different bank of information. Mostly, the ships tell us of Yankee inventiveness and craftsmanship and hard work. Most of the ships are painstakingly crafted of hard white oak. They are sturdy and tight, hewn with the utilitarian simplicity of fine New England furniture. It is hard to look at some without thinking of terrible suffering, as the schooner ELMA or the steamboat SUPERIOR.

In order, the most significant shipwrecks historically must be the SUPERIOR, the propeller MANHATTAN (at Grand Marais), the UNION and the schooner ELMA. The SUPERIOR earned its place in history as an elegant and popular liner, one of the finest and fleetest of its time. Its loss in 1856 was the first tragedy of its kind on Lake Superior, only surpassed in the number of lives lost with the sinking of the steamer ALGOMA at Isle Royale in 1885, and subsequent incidents.

The propeller MANHATTAN was one of the first steamships operating on Lake Superior, and one of the handful that was portaged around the rapids several years before the Soo Locks were built. The UNION was designed and built by the famous naval architect William Bates. It was a successful passenger steamer for some years before being rebuilt as one of the earliest iron ore freighters in 1872.

The ELMA was a mundane schooner-barge and unremarkable in design, but it made headlines for several days when it wrecked at Miner's Castle. The entire crew was assumed lost, but they survived miraculously by scaling the cliffs during a raging storm, from which they were plucked off two days later. Although the UNION has not yet been found and the MANHATTAN's wreckage was not examined, none of the four are believed to have much integrity left. The SUPERIOR is terribly fragmented. Of the MANHATTAN, only the hull bottom is intact, and the machinery has been removed. The UNION is

thought to be all broken up and the machinery salvaged. The ELMA's hull bottom is largely intact, but represents only a portion.

The most complete and intact wrecks are the schooner BERMUDA and the bulk freighter SMITH MOORE, both outside the park. Both are excellent examples of common working craft of their day, and while they are not the only examples of such craft in the Great Lakes, they are among the best preserved and most easily seen. Other ships as effectively preserved usually lie in much deeper water. Although neither of these losses was attended with major headlines like the SUPERIOR or the ELMA, both meet several of the criteria of eligibility for nomination to the National Register of Historic Places. They are excellent representatives of their type, they have structural integrity and site integrity, and have made significant contributions to local and regional history. The SMITH MOORE was named for an important Marquette businessman who was also the ship's master, at least for a time. The BERMUDA survived an earlier sinking nearby and shows the repairs that resulted. It has cargo still in the holds, a type and grade of local (Marquette) ore that is no longer available in Michigan mines.

The recent invasion of exotic zebra mussels into the Great Lakes may pose a serious threat to shallow, warm water wrecks like the BERMUDA, although it is not yet known whether the species can survive and reproduce in Lake Superior waters. In Lake Erie and the St. Clair River the small clams have massed on shipwrecks in layers 4 to 6 inches thick in just one year. The tenacious pests have complicated site documentation and made archeological investigation nearly impossible. The threat of their migration northward should be considered in evaluating the need to document BERMUDA.

A strong case can be made for nominating the SUPERIOR and the ELMA wrecks, and both should be defensible, despite their lack of structural integrity. Both ships had interesting histories, were successful vessels, and represented very important vessel types that made enormous contributions to the development of the region. Both suffered widely publicized tragedies, and both are still located exactly where those tragedies took place. It can be argued that the settings are as essential an element to the historic sites as are the ship's remains. The ship's tortured and fragmented conditions are so directly related to their losses that the condition does not compromise their eligibility; rather, it identifies them as the victim of the catastrophe. The rugged quality of the Pictured Rocks had a direct effect on the ships, and accidents like these have given the area some of its mystique. As far as is known, there are no other sites yet on the National Register that are similar, that is, shipwrecks whose significance in part lies in the geographical features of the site where they were wrecked. Both cases, however, appear to fit the criteria as defined in National Register Bulletin No. 20, Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places.

Bulletin No. 20 indicates that:

Shipwreck integrity is not limited to the survival of intact hulls. Integrity may also extend to a structure that exists in sufficient form to address architectural, technological or other concerns. It may also be applied to scattered or broken remains, if data can be generated that will permit the development of anthropological inferences and/or the formulation of testable research questions. Artifacts . . . may also contribute to integrity.

The nomination of the BERMUDA, the SMITH MOORE, the SUPERIOR and the ELMA to the National Register of Historic Places is recommended, along with the thematic group at Au Sable Reef and the docksite at Munising Falls.



Fig. 5.5. The remains of old Schoolcraft Furnace Company dock in Munising were examined briefly. NPS photo by Michael Eng.

Another site that was examined during the 1989 field work was the old (1867 to 1890) Schoolcraft Furnace Co. dock near Munising Falls. The dock was the center of Munising's only industry for decades, and it was a sizeable structure that extended out to 30 feet of water. The dock was supported on timber cribs of about 20-inch diameter, many of which still survive at the site. It extended approximately 300 feet into the bay and had an "L" or a "T" at the end for loading ships. Historic photographs show a Chicago passenger and freight steamer tied up there in the late 1870s. Historical records indicate that the Furnace produced about 100 tons of iron pigs per week, so it is reasonable to guess that vessel traffic at the dock was fairly consistent, with one or two ships calling each week to load or unload. Because of the significance of the Furnace, its present National Register status, and the relatively intact condition of the entire site, nomination of the dock is also recommended, either as an independent site or as a portion of a larger thematic group including the furnace, the falls, the lower portion of the river with its stone embankments, and the dock remains.

The old Schoolcraft Furnace dock and another smaller dock a few hundred yards east should be studied and documented when the resources allow. Neither was thoroughly examined during the progress of this study.

To summarize, we can take some satisfaction in what we have brought to these pages, but this only represents a beginning. We have already identified many of the things that remain to be done with the cultural resources at Pictured Rocks, but the possibilities and challenges reach far beyond our imagination. With the professionalism and dedication of the Park Service staff, the enthusiasm of the Alger Underwater Preserve Committee, and the support of legions of sports divers, a great deal can be achieved with the wreck sites at Pictured Rocks. Given the present spirit of openness and cooperation between those three entities, there can be little doubt that the resources will be preserved, respected, and used in the most wholesome and enriching ways. This is what the American public has come to expect from the U.S. National Park Service. It is the essence of what we receive at Pictured Rocks National Lakeshore.

BIBLIOGRAPHY

- Abell, Sir Westcott
1948 The Shipwright's Trade. Conway Maritime Press, London.
- Adkins, Jan
1978 Wooden Ship: The Building of a Wooden Sailing Vessel in 1870.
Houghton Mifflin Co., Boston.
- Agassiz, Louis
1850 Lake Superior - With a Narrative of the Tour by J. Glist Cabot. Boston.
- Albion, Robert G.
1972 Naval and Maritime History: An Annotated Bibliography, 4th ed.
Maritime Historical Association, Mystic, Connecticut.
- Alger Underwater Preserve Committee, Inc.
1986 1985 Alger Underwater Preserve Diver Information Survey Results and
Secondary Economic Impacts. Alger Underwater Preserve Committee,
Munising, Michigan.
- American Bureau of Shipping
1900 Rules for Building and Classifying Vessels. American Bureau of
Shipping, New York.
- American Historical Association
1945 Calendar of the American Fur Company's Papers. Volumes II and III in
Annual Report of the American Historical Association, 1944.
Government Printing Office, Washington.
- Anderson, Edwin P.
1943 Audel's Marine Engineer's Handy Book. Theo. Audel & Company, New
York.
- Andrews, Frank
1910 Grain Movement in the Great Lakes Region. Bureau of Statistics Bulletin
No. 81, U.S. Department of Agriculture, Washington, D.C.
- Andrews, Israel D.
1852 Report on the Trade and Commerce of British North America and Upon
the Trade of the Great Lakes and Rivers. Communication from the
Secretary of the Treasury, U.S. Senate, Washington, D.C.
- Ashburn, T.Q.
1925 Transportation on Inland Waterways. In Transactions of the Society of
Naval Architects and Marine Engineers, Vol. 33, pp. 67-90.

- Association of Canadian Lake Underwriters
1869, 1873 Lake Vessel Register. W.C. Chewett & Co., Toronto (1869), Copp, Clark & Co., Toronto (1873).
- Association of Lake Underwriters
1879 Lake Hull Register. Free Press Book and Job Printing House, Detroit.
- Babcock, Washington I.
1899 Systems of Work in a Great Lakes Shipyard. In Transactions of the Society of Naval Architects and Marine Engineers, pp. 173-188, S.N.A.M.E., Philadelphia.
- Babcock & Wilcox Company
1918 Marine Steam. The Babcock & Wilcox Co., New York.
- Baker, Elijah III
1943 Introduction to Steel Shipbuilding. Mcgraw-Hill Book Company, New York.
- Baker, W.A. and Tre Tryckare
1965 The Engine Powered Vessel. Crescent Books, New York.
- Baker, William A.
1983 The Lore of Sail. Facts on File Publications, New York.
- Bald, F. Clever
1954 Michigan In Four Centures. Harper & Brothers, New York.
- Baldwin, N.S. and R.W. Saalfeld
1962 Commercial Fish Production in the Great Lakes, 1867-1960. Great Lakes Fishery Commission Technical Report No. 3, Ann Arbor.
- Barcus, Frank
1960 Freshwater Fury. Wayne State University Press, Detroit.
- Barkhausen, Henry N.
1947 Great Lakes Sailing Ships. Ships and Sailing Albums Book No. 2. Kalmbach Publishing Company, Milwaukee.
- Barnet, James
1867, 1872, Barnet's Coast Pilot for the Lakes. James Barnet,
1874, 1887 Chicago.
- Barry, James P.
1973 Ships of the Great Lakes: 300 Years of Navigation. Howell-North Books, Berkeley, CA.
- 1981 Wrecks and Rescues of the Great Lakes: A Photographic History. Howell-North Books. LaJolla.
- Bass, George
1966 Archeology Under Water. Frederick A. Praeger, New York.

- 1988 (ed.) Ships and Shipwrecks of the Americas; A History Based on Underwater Archeology. Thames and Hudson Publishing Co., London.
- Bass, M.N.
1961 Summary of Discussion of the Precambrian and Central Wisconsin. In New York Academy of Science, Vol. 91, pp. 432-465.
- Bates, Alan L.
1968 The Western Rivers Steamboat Cyclopaedium. Hustle Press, Leonia.
- Beasley, Norman
1930 Freighters of Fortune: The Story of the Great Lakes. Harper and Brothers, New York.
- Beeson, Harvey C.
1888-1921 Beesons Marine Directory of the Northwestern Lakes. Harvey C. Beeson, Detroit.
- Bennett, Robert F.
1976 Surfboats, Rockets, and Carronades. U.S. Government Printing Office, Washington, D.C.
- Benson, Barbara E.
1976 Logs and Lumber: The Development of the Lumber Industry in Michigan's Lower Penninsula, 1837-1870. Unpublished Ph.D. dissertation, University Microfilms International, Ann Arbor.
- Bibb, A.B.
1882 The Life-Saving Service on the Great Lakes. In Frank Leslie's Popular Monthly, Vol. XIII, No. 4, pp. 386-398.
- Biddlecombe, Captain George
n.d. The Art of Rigging: Containing an Explanation of Terms and Phrases, and the Progressive Method of Rigging Expressely Adapated for Sailing Ships. 1925 reprint, Marine Research Society, Salem.
- Blackbird, Andrew J.
1887 History of the Ottawa and Chippewa Indians of Michigan. Ypsilanti Job Printing House, Ypsilanti.
- Blue Book of American Shipping; Marine and Naval Directory of the United States
1895-1915 Marine Review Publishing Company, Cleveland.
- Board of Lake Underwriters
1860, 1863 Lake Vessel Register. Board of Lake Underwriters,
1866, 1871 Buffalo.
- 1866 Rules Relative to the Construction of Lake Sail and Steam Vessels. Matthews & Warren, Buffalo.
- Bowen, Dana Thomas
1940 Lore of the Lakes. D.T. Bowen, Daytona Beach.
1946 Memories of the Lakes. D.T. Bowen, Daytona Beach.

- 1952 Shipwrecks of the Lakes. D.T. Bowen, Daytona Beach.
- Boyer, Dwight
1966 Great Stories of the Great Lakes. Dodd, Mead & Co., New York.
- 1968a Ghost Ships of the Great Lakes. Dodd, Mead, & Co., New York.
- 1968b Great Ships of the Great Lakes. Dodd, Mead & Co., New York.
- 1971 True Tales of the Great Lakes. Dodd, Mead & Co., New York.
- 1974 Strange Adventures of the Great Lakes. Dodd, Mead & Co., New York.
- 1977 Ships and Men of the Great Lakes. Dodd, Mead & Co., New York.
- Bradford, Gershom
1952 The Mariner's Dictionary. Watervane Books, New York.
- Briggs, Jeffery P.
1968 An Archeological Survey of the Pictured Rocks National Lakeshore,
report to National Park Service. Museum of Anthropology, University of
Michigan, Ann Arbor.
- Brinks, Herbert J.
1965 Peter White: A Career of Business and Politics in an Industrial Frontier
Community. University of Michigan Press, Ann Arbor.
- Bryan, William
1896 The Western River Steamboat. In American Society of Mechanical
Engineers Transactions, Vol. 17, pp. 386-397.
- Bryce, George
1904 The Remarkable History of the Hudson's Bay Company. Reprinted by
Burt Franklin Press, New York.
- Buettner, H.J.
1965 Historical Fishery Statistics, Commercial Fisheries of the Great Lakes,
1879-1973. In Fishery Statistics of the United States, 1963, U.S. Fish
and Wildlife Service Statistics, Digest No. 57, pp. 444-466. Government
Printing Office, Washington, D.C.
- Bureau Veritas International
1896-1934 Great Lakes Register. Bureau Veritas International Register of Shipping,
Cleveland.
- Burke, John A.
1975 Barrels to Barrows, Buckets to Belts: 120 Years of Iron Ore Handling on
the Great Lakes. In Inland Seas, Vol. 31, No. 4, pp. 266-277.
- Burnham, Guy M.
1974 The Lake Superior Country in History and Story. Browzer Books, Ann
Arbor.

- Butler, B.S. and W.S. Birbank
1929 The Copper Deposits of Michigan. U.S. Geological Survey Professional Paper No. 144. Government Printing Office, Washington, D.C.
- Campbell, Marjorie W.
1962 McGillivray, Lord of the Northwest. Irwin & Co., Toronto.
- Canada Department of Marine & Fisheries
1874, 1877 List of Vessels on the Register Books of the
1886 Dominion of Canada. Supplement No. 4 to the Annual Report of the Department of Marine & Fisheries, Ottawa.
- Canada Department of Transport
1890-1984 List of Shipping. Department of Transport, Ottawa.
- Carrell, Toni
1983 Shipwrecks of Isle Royale National Park; Thematic Group Nomination to the National Register of Historic Places. Southwest Cultural Resources Center, National Park Service, Santa Fe.
- 1985 Submerged Cultural Resources Site Report, NOQUEBAY, Apostle Islands National Lakeshore. Southwest Cultural Resources Center Professional Papers No. 7, National Park Service, Santa Fe.
- 1986 Management Strategies for Shipwrecks on Submerged Public Lands. In Underwater Archeology: Proceedings of the Fourteenth Conference on Underwater Archeology, edited by Calvin R. Cummings, Special publication No. 7, Fathom Eight Press, San Marino.
- Carter, James L.
1967 Voyageur's Harbor. Pilot Press, Grand Marais.
- 1977 Au Sable Light, Sentinel of the "Great Sands." In Inland Seas, Vol. 33, No. 2, pp. 96-105.
- Carter, R.W.G. (editor)
1988 Coastal Environments. The New University of Ulster, Colrairie.
- Castle, Beatrice Hanscom
1987 The Grand Island Story. John M. Longyear Research Library, Marquette.
- Center for Archival Collections
1982 Naval Architectural Drawings, American Ship Building Company and Predecessor, 1867-1920. Publication MS-212 by Center for Archival Collections, Bowling Green State University, Bowling Green.
- Chapelle, Howard I.
1935 The History of American Sailing Ships. Bonanza Books, New York.
- 1936a Boatbuilding: A Complete Handbook of Wooden Boat Construction. W.W. Norton & Co., New York.
- 1936b American Sailing Craft. Bonanza Books, New York.

- 1951 American Small Sailing Craft. W.W. Norton, New York.
- 1960 The National Watercraft Collection. Smithsonian Institution, Washington, D.C.
- 1967 The Search for Speed Under Sail. Conway Maritime Press, London.
- Chapman, Charles F.
1957 Piloting, Seamanship and Small Boat Handling: A Practical Treatise Dealing with Those Branches of Motor Boating with which Every Yachtsman Should be Familiar. Motor Boating, New York.
- Chaput, Donald
1971 The Cliff: America's First Great Copper Mine. Sequoia Press, Kalamazoo.
- Chatterton, E. Keble
1909 Sailing Ships: The Story of Their Development from the Earliest Times to the Present Day. Sidgwick & Jackson, London.
- 1912 Fore and Aft; The Story of the Fore and Aft Rig from the Earliest Times to the Present Day. J.B. Lipincott, Philadelphia.
- Clark, John G.
1966 The Grain Trade in the Old Northwest. University of Illinois Press, Urbana.
- Clark, Thomas H. and Colin W. Stearn
1968 Geological Evolution of North America. The Ronald Press Co., New York.
- Classification of Lake Vessels and Barges
1871 Warren, Johnson & Co., Buffalo.
- Cleary, David
1975 Au Sable Light Station, Pictured Rocks National Lakeshore: The Life of the Keepers as Reflected in Their Official Journals. Unpublished manuscript, Historic Preservation Division, National Park Service, Denver.
- Collins, J.W.
1891 Introduction and Description of Fishing Vessels and Boats. In Fisheries of the Great Lakes in 1885, H.M. Smith and M.M. Snell, editors, pp. 1-31, Report to Commissioner of Fish, 1887. U.S. Bureau of Fish and Fisheries, Washington, D.C.
- Conway, John S.
1923 The United States Lighthouse Service, 1923. U.S. Department of Commerce, Lighthouse Service, Washington, D.C.
- Coves, Elliott
1897 Manuscript Journals of Alexander Henry and David Thompson, 1799-1814. Francis P. Harper, New York.

- Croil, James
1898 Steam Navigation and Its Relations to the Commerce of Canada and the United States. William Briggs, Toronto.
- Crowe, William S.
1977 Lumberjack. Senger Publishing Co., Manistique.
- Cumberland, Barlow
1913 Canoe, Sail and Stem: Early Navigation on the Great Lakes. In Canadian Magazine, Vol. 42, pp. 85-92.
- Cummings, Calvin R.
1978 The Southwest Region Model for National Park Service Cultural Resource Management. Paper presented to annual meeting of American Anthropological Association, Los Angeles. Ms on file, Southwest Cultural Resources Center, National Park Service, Santa Fe.
- 1981 Cultural Resources Management: A Statement of Concerns from a Conservation Archeology Perspective. In Journal of Field Archeology, Vol. 8, No. 1, pp. 95-98.
- 1986 Research Programs for the Management of Cultural Resources in Marine Protected Areas. Paper presented to the International Marine Protected Areas Seminar, June 1-12, in Proceedings.
- and Edward F. Miller
1987 Policies for the Management of Historical and Cultural Resources. Marine and Estuarine Management Division, National Oceanic and Atmospheric Administration, Washington, D.C.
- Curr, Robert
1907 Lake Shipyard Methods of Steel Ship Construction. In Marine Review, May 30, 1907, pp. 40-42.
- 1908 Shipbuilding on the Great Lakes. In Transactions of the Society of Naval Architects and Marine Engineers, Vol. 16, pp. 195-209.
- Curtis, W.H.
1918 The Elements of Wood Ship Construction. McGraw Hill, New York.
- Curwood, James Oliver
1909 The Great Lakes: The Vessels that Plough Them, Their Owners, Their Sailors and Their Cargoes, Together with a Brief History of Our Inland Seas. G.P. Putnam's Sons, New York.
- Cuthbertson, George A.
1931 Freshwater, A History and Narrative of the Great Lakes. Macmillan, New York.
- Cutler, Elizabeth and Walter M. Hirthe
1983 Six Fitzgerald Brothers, Lake Captains All. Wisconsin Marine Historical Society, Milwaukee.

- Davidson, Gordon C.
1918 The Northwest Company. Russell and Russell, New York.
- Davis, Charles G.
1929 Ships of the Past. 1977 reprint, Bonanza Books, New York.
- 1933 The Built-Up Ship Model. Marine Research Society, Salem. 1980
reprint, Edward W. Sweetman, Largo.
- 1960 The Ship Model Builder's Assistant. Edward W. Sweetman, New York.
- Davis, G.L., G.R. Tilton, L.T. Aldrich, G.W. Wetherill and M.N. Bass
1960 The Ages of Minerals from Metamorphic Zones in Northern Michigan.
Yearbook No. 59, Geophysics Laboratory, Carnegie Institute, Washington,
D.C.
- Defebaugh, James E.
1906 History of the Lumber Industry of America. American Lumberman,
Chicago.
- deKerchove, Rene
1961 International Marine Dictionary, 2nd ed. Van Nostrand Reinhold Co.,
New York.
- Desmond, Charles
1919 Wooden Ship-Building. Rudder Magazine. 1984 reprint, Vestal Press,
Vestal)
- 1935 Naval Architecture Simplified. Rudder Magazine, New York.
- Detroit Dry Dock Company
1894 Around the Lakes. Marine Review Publishing Co., Cleveland.
- Detroit Historical Publishing Company
1877 Marine History of the Lakes Ports. Detroit.
- Dickinson, J.N.
1967 The Canal at Sault Ste Marie, Michigan: Inception, Construction,
Operation, and the Canal Grant Lands. Unpublished Ph.D. dissertation at
University of Wisconsin, Madison.
- Disturnell, John
1857 A Trip Through the Lakes of North America. J. Disturnell, New York.
- 1863 The Great Lakes, or Inland Seas of America. Charles Scribner, New
York.
- 1871 The Great Lakes, or Inland Seas of America. W.G. Zieber, Philadelphia.
- Dohrmann, Donald R.
1976 Screw Propulsion in American Lake and Coastal Steam Navigation
1840-1860, a Case Study in the Diffusion of Technological Innovation.
Unpublished Ph.D. dissertation, Yale University. University Microfilms,
Ann Arbor.

- Doner, Mary Francis
1958 The Salvager: The Life of Captain Tom Reid on the Great Lakes. Ross and Haines, Minneapolis.
- Dornfield, A.A.
1957 Steam Ships: A Hundred Years Ago. In Chicago Historical Society New Series No. 4, pp. 148-156.
- Dorr, E.P.
1876 Rules for the Construction, Inspection, and Characterization of Sail and Steam Vessels. By the author, Buffalo.
- Dowling, Rev. Edward J.
1967 The Lakers of World War I. Marine Publishing Co., Sault Ste Marie.
1978 Know Your Lakers of World War I. Marine Publishing Company, Sault Ste Marie.
- Dunbar, Willis F.
1973 Michigan: A History of the Wolverine State. W.B. Eerdmans Publishing Co., Grand Rapids.
- Eddington, Walter J.
1943 Glossary of Shipbuilding and Outfitting Terms. Cornell Maritime Press, New York.
- Edwards, Emory
1886 Modern American Marine Engines, Boilers, and Screw Propellers: Their Design and Construction. Henry Carey Baird & Co., Philadelphia.
- Elliott, James L.
1967 Red Stacks Over the Horizon: The Story of the Goodrich Steamboat Line. W.B. Eerdmans Publishing Co., Grand Rapids.
- Ericson, Bernard
1962 The Evolution of Ships on the Great Lakes, 2 vols. Society of Naval Architects and Marine Engineers, Great Lakes and Great Rivers Section, Cleveland.
- Estep, H. Cole
1918 How Wooden Ships are Built. W.W. Norton & Co., New York.
- Evans, Stephen H.
1949 The U.S. Coast Guard, 1790-1915: A Definitive History. U.S. Naval Institute Press, Annapolis.
- Eyres, D.J.
1978 Ship Construction, 2nd ed. Weinemann Co., London.
- Fairbairn, Sir William
1865 Treatise on Iron Shipbuilding: Its History and Progress. Longmans and Green, London.

- Farmer, Silas
1890 History of Detroit and Wayne County and Early Michigan, 2 vols. Silas Farmer & Co., Detroit.
- Farrand, W.R.
1960 Former Shorelines in Western and Northern Lake Superior Basin. Unpublished Ph.D. dissertation at University of Michigan, Ann Arbor.
- 1969 The Quaternary History of Lake Superior. In Proceedings of the 12th Conference on Great Lakes Research, pp. 181-197, International Association of Great Lakes Research, Ann Arbor.
- Farrell, John P. and John D. Hughes
1984 Wave Erosion and Mass Wasting at Pictured Rocks National Lakeshore. Northern Michigan University, Marquette.
- Felch, A.
1895 The Indians of Michigan and the Cession of Their Lands to the United States. In Michigan Pioneer and Historical Collections, Vol. 16, pp. 274-297.
- Feltner, Charles E. and Jeri B. Feltner
1982 Great Lakes Maritime History: Bibliography and Sources of Information. Sejay Publications, Dearborn.
- Fincham, John
1843 A Treatise on Mastng Ships and Mast Making. Whittaker & Co., London.
- Fletcher, R.W.
1910 Steam Ships: The Story of Their Development to the Present Day. J.B. Lippincott Co., Philadelphia.
- Flint, Richard F.
1957 Glacial and Pleistocene Geology. Wiley & Sons, New York.
- Frost, Ted
1985 From Tree to Sea. Terrence Dalton Ltd., Lavenham, Suffolk.
- Garyantes, Hugo F.
1944 Handbook for Shipwrights. McGraw-Hill Book Co., New York.
- Gill, Claude S.
1794 Steele's Elements of Mastmaking, Sailmaking, and Rigging. 1932 reprint, Edward Sweetman, New York.
- Gilman, Chandler R.
1836 Life on the Lakes, Being Tales and Sketches Collected During a Trip to the Pictured Rocks of Lake Superior, 2 vols. George Dearborn Co., New York.
- Gjerset, Knut
1928 Norweigan Sailors on the Great Lakes. Norwegian-American Historical Association, Northfield.

- Gould, Richard A. (editor)
1983 Shipwreck Anthropology. University of New Mexico, Albuquerque.
- Graham, C.S.
1958 The Transition from Paddle-Wheel to Screw Propeller. In Mariner's Mirror, Vol. 44, pp. 45-46.
- Great Lakes Commission
1975a Commercial Navigation. Appendix C9 to Great Lakes Basin Framework Study. Great Lakes Commission, Ann Arbor.
- 1975b Shore Use and Erosion. Appendix 12 to Great Lakes Basin Framework Study, Great Lakes Commission, Ann Arbor.
- Great Lakes Register
1908 Rules and Regulations for the Classification and Building of Metal and Wooden Vessels. Great Lakes Register Board of Control, Cleveland.
- Greenhill, Basil
1951 The Merchant Schooners. 1988 reprint, Naval Institute Press, Annapolis.
- 1980 The Ship: The Life and Death of the Merchant Sailing Ship, 1815-1965. National Maritime Museum, Greenwich.
- 1988 The Evolution of the Wooden Ship. Facts on File Publishing Company, New York.
- Griffiths, John W.
1853 The Shipbuilder's Manual and Nautical Referee. J.W. Griffiths, New York.
- 1854 Treatise on Marine and Naval Architecture or Theory and Practice Blended in Ship Building. D. Appleton & Co., New York.
- Hall, Henry
1884 Report on the Ship-Building Industry of the United States. Tenth Census, 1880, Vol 8, pp. 1-276. Department of the Interior, Washington, D.C.
- Hall, John W.
1870 Marine Disasters of the Western Lakes During the Navigation Season of 1869. Wetunis Printing House, Detroit.
- Hall, Stephen P.
1976 Duluth-Superior Harbor Cultural Resources Study. U.S. Army Corps of Engineers St. Paul District, St. Paul.
- Halsey, John R.
1985 Michigan's Great Lakes Bottomland Preserves in Vol. II, Marine Parks & Conservation: Challenge and Promise, John Lien and Robert Graham, editors. National and Provincial Parks Association of Canada, Ottawa.
- 1987 Is There a Future for Michigan's Shipwrecks? Paper presented at 1987 Annual Conference, Michigan Museums Association, Muskegon.

- 1989 Nine Years Before the Mast: Shipwreck Management in Michigan Since 1980. Lecture presented at First Joint Archeological Conference, Baltimore.
- Hamblin, W.K.
1958 The Cambrian Sandstones of Northern Michigan. Michigan Geological Survey Publication No. 51, Ann Arbor.
- Hamilton, Christopher
1982 The Use of Shipwrecks as Indicators of Regional Economic Systems. Paper presented at Thirteenth Annual Conference on Underwater Archeology, Philadelphia.
- Hanna, John E.
1970 Great Lakes Water Levels, a Situation Report. In Limnos magazine, Vol. 3, No. 1, pp. 23-27. Great Lakes Foundation, Ann Arbor.
- Hansen, Emil M.
1942 Modern Marine Pipefitting. Cornell Maritime Press, New York.
1943 Ship Outfitter's Handbook. Cornell Maritime Press, New York.
- Harland, John
1984 Seamanship in the Age of Sail. The Naval Institute Press, Annapolis.
- Harmon, Daniel W.
1905 A Journal of Voyages and Travels in the Interior of North America. Allerton Book Co., New York.
- Harris, Walter J.
1976 The Chequamegon Country, 1659-1976. Walter J. Harris, Fayetteville.
- Hatcher, Harlan
1944 The Great Lakes. Oxford University Press, London.
1945 Lake Erie. Bobbs-Merrill Co., New York.
1950 A Century of Iron and Men. The Bobbs-Merrill Co., New York.
-and Erich A. Walter
1963 A Pictorial History of the Great Lakes. Crown Publishers, New York.
- Havighurst, Walter
1944 The Long Ships Passing. The Macmillan Co., New York.
1958 Vein of Iron: The Pickands Mather Story. Word Publishing Co., Cleveland.
1966a Three Flags at the Straits: The Forts of Mackinac. Prentiss-Hall, Englewood Cliffs.
1966b (ed.) The Great Lakes Reader. Macmillan Co., New York.

- Heden, Karl E.
1966 Directory of Shipwrecks on the Great Lakes. Bruce Humphries Co., Boston.
- Henry, Alfred J. and Norman B. Conger
1907 Meteorological Chart of the Great Lakes for the Season of 1906. Bulletin No. 2, U.S. Department of Agriculture, Weather Bureau, Government Printing Office, Washington, D.C.
- Heyl, Erik
1965-1969 Early American Steamers, 6 vols. Erik Heyl, Buffalo.
- Hinsdale, Wilbert B.
1925 Primitive Man in Michigan. No. 1 in Michigan Handbook Series. University of Michigan, Ann Arbor.
- 1931a Archeological Atlas of Michigan. No. 4 in Michigan Handbook Series, University of Michigan, Ann Arbor.
- 1931b Distribution of the Aboriginal Population of Michigan. No. 2 in Occasional Contributions from the Museum of Anthropology, University of Michigan, Ann Arbor.
- Hirthe, Walter M. and Mary K. Hirthe
1986 Schooner Days in Door County. Voyageur Press, Minneapolis.
- Hodge, William
1884 The Pioneer Steamboats on Lake Erie. Bigelow Brothers, Buffalo.
- Holbrook, Stewart H.
1948 Holy Old Mackinaw: A Natural History of the American Lumberjack. Macmillan Co., New York.
- Holecek, Donald F. and Susan J. Lothrop
1980 Attitudes of a Scuba Diving Population Concerning Government Regulation of Underwater Resources. Michigan Sea Grant Technical Report, Lansing.
- and E. Thomas Smiley
1982 Management Guidelines for Michigan's Great Lakes Bottomland Preserves. Publication MICHU-SG-82-201, Michigan Sea Grant College Program, Lansing.
- Hoopes, J.A., R.A. Ragotzkie and N.P. Smith
1973 Circulation Patterns in Lake Superior. Technical Report WIS WRC 73-04, Department of Civil & Environmental Engineering and Meteorology, University of Wisconsin, Madison.
- Hough, J.L.
1958 Geology of the Great Lakes. University of Illinois Press, Urbana.

- Hulse, Charles A.
1981 A Spatial Analysis of Lake Superior Shipwrecks: A Study in the Formative Process of the Archeological Record. Dissertation at Michigan State University, East Lansing.
- Humins, John H.
1985 The American Fur Company in the Old Northwest Territory. In Michigan History, Vol. 69, No. 1, pp. 24-31.
- Hunter, Louis C.
1949 Steamboats on the Western Rivers: An Economic and Technological History. 1969 reprint, Octagon Press, New York.
- Hutchinson, G.H.
1914 The Handling of Coal at the Head of the Lakes. In American Society of Mechanical Engineers Transactions, pp. 283-339.
- Hyde, Charles E.
1897 The Modern Marine Engine. In Cassier's Magazine, Vol. XII, No. 4, pp. 441-458.
- Inches, H. Chesley
1962 The Great Lakes Wooden Shipbuilding Era. Great Lakes Historical Society, Vermillion.
- Inland Lloyds
1882, 1884,
1885 Vessel Classification of the Inland Lloyds, American Hulls. Various printing houses, Buffalo.
- 1882, 1886,
1890, 1902 Vessel Classification of Inland Lloyds, Canadian Hulls. Budget Printing & Publishing Co., Toronto.
- 1887-1906 Inland Lloyds Vessel Register. Various printing houses, Buffalo.
- Innis, Harold A.
1930 The Fur Trade in Canada. Yale University Press, New Haven.
- Institute for Great Lakes Research
1982 F.W. Wheeler Company Hulls 25 to 75. Microfilm copies of shipbuilding plans, from Institute for Great Lakes Research, Perrysburg.
- International Correspondence Schools
1921 Types of Steam Boilers: Instruction Paper with Examination Questions. #1013, International Textbook Co., Scranton.
- Jackson, Charles T.
1849 Report on the Geological and Mineralogical Survey of the Mineral Lands of the United States in the State of Michigan. House Executive Document No. 5, Vol. 3, Part 2, 31st Congress, First Session.
- Jackson, Melvin H. (editor)
1983 The Historic American Merchant Marine Survey, 7 vols. The Ayer Company, Salem.

- James, H.W.
1958 Stratigraphy of Pre-Keweenaw Rocks in Parts of Northern Michigan.
Professional Paper 314C, U.S. Geological Survey, Government Printing
Office, Washington, D.C.
- Johnson, Arnold Burges
1889 The Modern Light-House Service. Government Printing Office,
Washington, D.C.
- Karpinski, Louis C.
1931 Bibliography of Printed Maps of Michigan, 1804-1880. Michigan
Historical Commission, Lansing. 1977 reprint, Meriden Publishing Co.,
Amsterdam.
- Keast, John
1942 Early Navigation on Lake Superior. Unpublished manuscript in
Marquette County Historical Society, Marquette.
- Kelley, R.W.
1968 Bedrock of Michigan. Small Scale Map No. 2, Michigan Geological
Survey, Lansing.
- and W.R. Farrand
1967 The Glacial Lakes Around Michigan. Geological Survey Bulletin No. 4,
Michigan Department of Conservation, Lansing.
- Kihlberg, Bengt (editor)
1963 The Lore of Ships. Tre Tryckare, Cagner & Co., Goteborg.
- Kimball, Sumner I.
1894 Organization and Methods of the United States Life-Saving Service.
Government Printing Office, Washington, D.C.
- Kinnell, Susan K. and Suzanne R. Ontiveros (editors)
1986 American Maritime History: A Bibliography. ABC-Clio, Inc., Santa
Barbara.
- Kinnunen, Ronald E., James R. Lempe and Thord C. Sundstrom
1987 Behavior Patterns of Divers Visiting the Alger Bottomland Preserve.
Publication MICHU-SG-87-505 from Michigan Sea Grant Extension
Program, Lansing.
- Kipping, Robert
1921 Rudimentary Treatise on Masting, Mastmaking, and Rigging of Ships.
Crosby Lockwood & Son, London.
- 1936 Sails and Sailmaking. The Technical Press, London.
- Klein, L.
1841 Notes on Steam Navigation Upon the Great Northern Lakes. In
American Railroad Journal, Vol. 12.

- Koelz, W.N.
1926 Fishing Industry of the Great Lakes. In Report to the U.S. Commissioner of Fisheries, 1925, pp. 553-617, U.S. Bureau of Fisheries Document 1001. Government Printing Office, Washington, D.C.
- Labadie, C. Patrick
1981 Inventory of Screw Steamers Built Upon the Great Lakes, 1840-1880. Unpublished manuscript on file, author's collection, Duluth.
- 1982 Preliminary Analysis of Great Lakes Lumber Steamers. Unpublished manuscript on file, author's collection, Duluth.
- 1984 Nineteenth Century Bulk Freighters on the Great Lakes System. Unpublished manuscript on file, author's collection, Duluth.
- 1985 Sidewheel Steamboats on the Great Lakes: An Analysis. Unpublished manuscript on file, author's collection, Duluth.
- 1988 The Era of Wooden Shipbuilding on the Lakes. Unpublished manuscript, Great Lakes Historical Society, Vermillion.
- Labaree, Benjamin W.
1988 A Supplement (1971-1986) to Robert G. Albion's Naval and Maritime History: An Annotated Bibliography, 4th ed. Mystic Seaport Association, Mystic.
- LaFayette, Kenneth D.
1977 Flaming Brands: Fifty Years of Iron Making in the Upper Peninsula of Michigan, 1848-1898. Northern Michigan University Press, Marquette.
- Laing, Alexander
1961 American Sail: A Pictorial History. Bonanza Books, New York.
- Lake Superior Iron Ore Association
1938 Lake Superior Iron Ores. Lake Superior Iron Ore Association, Cleveland.
- Landon, Fred
1964 Loss of Western Reserve. In Inland Seas, Vol. 20, No. 4, pp. 323-326.
- Landstrom, Bjorn
1961 The Ship: An Illustrated History. Doubleday & Co., Garden City.
- Lankton, Larry D. and Charles K. Hyde
1982 Old Reliable: An Illustrated History of the Quincy Mining Company. The Quincy Mine Hoist Association, Inc., Houghton.
- Lapham, J.A.
1869 Disaster on the Lakes. Papers Relative to the Losses of Vessels on the Lakes. House Document No. 10, 41st Congress, 2nd Session.

- Larsen, Curtis E.
1985 Geoarcheological Interpretation of Great Lakes Coastal Environments. In Archeological Sediments in Context, Julie K. Stein and W.R. Farrand, editors, pp. 91-110, Center for the Study of Early Man, Institute for Quaternary Studies, University of Maine, Orono.
- Larson, John W.
1981 Essayons: A History of the Detroit District, U.S. Army Corps of Engineers. U.S. Army Corps of Engineers Detroit District, Detroit.
- Laurent, Jerome K.
1983 Trade, Transportation and Technology: The American Great Lakes, 1866-1910. In the Journal of Transport History, Vol. 4, No. 1, pp. 1-24.
- Law, W.H.
1902 The Life Savers in the Great Lakes: Incidents and Experiences Among the Life Savers in Lake Huron and Lake Superior known as District 11. Winn & Hammond Press, Detroit.
- Lenihan, Daniel J.
1974 Shipwrecks as Archeological Phenomenon. In Underwater Archeology in the National Park Service: A Model for the Management of Submerged Cultural Resources, edited by Daniel J. Lenihan, Southwest Cultural Resources Center, National Park Service, Santa Fe.
- 1983a Managing Shipwrecks in Parks and Preserves. In Trends in Historic Preservation, Vol. 20, No. 2, pp. 29-31.
- 1983b Rethinking Shipwreck Archeology: A History of Ideas and Considerations for New Directions. In Shipwrecks Anthropology, edited by Richard A. Gould, pp. 37-64. University of New Mexico Press, Albuquerque.
- 1987 (ed.) Submerged Cultural Resources Study, Isle Royale National Park. Southwest Cultural Resources Center Professional Papers No. 8, National Park Service, Santa Fe.
- Leverett, Frank
1910 Surface Geology of the Northern Peninsula of Michigan. Michigan Geological and Biological Survey Publication No. 7, Lansing.
- 1929 Moraines and Shorelines of the Lake Superior Basin. Geological Survey Professional Paper No. 154-A, U.S. Geological Survey, Washington, D.C.
- and F. Taylor
1915 The Pleistocene of Indiana and Michigan and the History of the Great Lakes. U.S. Geological Survey monograph #53. Government Printing Office, Washington, D.C.
- Lien, S.L. and J.A. Hoopes
1978 Wind Driven Steady Flows in Lake Superior. In Limnological Oceanography, Vol. 23, pp. 91-103.

- Lindblad, A.F.
1924 A Critical Analysis of the Factors Affecting Safety and Operation of the Bulk Freight Vessels of the Great Lakes. Unpublished Ph.D. dissertation at University of Michigan, Ann Arbor.
- Lloyds Register of British and Foreign Shipping
1869 Rules and Regulations, 1869-1870. Lloyds Register, London.
- Longstretch, T. Morris
1924 The Lake Superior Country. The Century Co., New York.
- Lord, Clifford and Elizabeth H. Lord
1944 Historical Atlas of the United States. Henry Holt & Co., New York.
- Lucas, Theodore
n.d. Questions and Answers for Marine Engineers. Theo. Audel & Co., New York.
- Lumby, John R.
1974 Historic Fort William. Mika Press, Belleville.
- Lydecker, Ryck
1973 Pigboat: The Story of the Whalebacks. Sweetwater Press, Duluth.
- Lytle, W.M. and Forrest R. Holdcamper
1952 Merchant Steam Vessels of the United States, 1790-1868. The Steamship Historical Society of America, Staten Island.
- MacGregor, David R.
1973 Fast Sailing Ships: Their Design and Construction, 1775-1875. Nautical Publishing Co., Ltd., Lymington, Hampshire.
- 1984a Merchant Sailing Ships, 1815-1850: Supremacy of Sail. U.S. Naval Institute Press, Annapolis.
- 1984b Merchant Sailing Ships, 1850-1875; Heyday of Sail. U.S. Naval Institute Press, Annapolis.
- MacKay, Donald
1978 The Lumberjacks. McGraw-Hill Ryerson, Ltd., New York.
- MacKenzie, Alexander
1801 Voyages from Montreal on River St. Lawrence Through the Continent of North America 1789 and 1793. T. Codell Jr. and W. Davis et al., London.
- Main, Thomas
1893 The Progress of Marine Engineering from the Time of Watt Until the Present Day. Trade Publishing Co., New York.
- Manning, George C.
1943 Manual of Ship Construction. D. Van Nostrand, New York.

- Mansfield, J.B.
1899 History of the Great Lakes, 2 vols. J.H. Beers & Co., Chicago. 1972 reprint, Freshwater Press, Cleveland.
- Maps of Michigan and the Great Lakes, 1545-1845.
n.d. Burton Historical Collection, Detroit Public Library, Detroit.
- Marie, Audrey R.
1977 An Archeological Survey at the Au Sable Point Light Station, Pictured Rocks National Lakeshore, Michigan. Unpublished manuscript, Historic Preservation Division, National Park Service, Denver.
- Marine Record
1878-1902 Smith & Swainson, Cleveland.
- Marine Review
1890-1935 Penton Publishing Company, Cleveland.
- Marshall, Ernest W.
1968 Investigating the Great Lakes Ice Cover. In Limnos magazine, Vol 1, No. 4, pp. 1-11. Great Lakes Foundation, Ann Arbor.
- Marshall Cavendish Publishing Company
1975 The History of the Sailing Ship. Arco, New York.
- Mason, George C.
1945 A List of Hulls Built by F.W. Wheeler & Co., Bay City, Michigan. In Inland Seas, Vol 1, No. 4., pp. 54-56. Great Lakes Historical Society, Vermillion.
- Mason, Philip P.
1956 The Lumbering Era in Michigan History, 1860-1900. Michigan Historical Commission, Lansing.
- 1957 The History of Great Lakes Transportation. Brown-Branfield Company, Ann Arbor.
- Maybee, Rolland H.
1973 Michigan's White Pine Era, 1840-1900. Michigan History Division, Michigan Department of State, Lansing.
- McCannell, R.
1932 Shipping on Lake Superior: Shipping Out of Collingwood. Papers and Records No. 28, Ontario Historical Society, Ottawa.
- McCarty, John Myron
1971 Economic Aspects in the Evolution of the Great Lakes Freighter. Unpublished Ph.D. dissertation, University of Southern California. University Microfilms, Ann Arbor.
- McClellan, Stan
1979 Fathom Five Provincial Park - A Working Example of an Underwater Park. In Underwater Parks Symposium Proceedings, pp. 54-56. Extension Bulletin E-1350, Michigan State University, East Lansing.

- McDonald, William A.
1959 Composite Steamers Built by the Detroit Dry Dock Company. In Inland Seas, Vol. 15, No. 2, pp. 114-116. Great Lakes Historical Society, Vermillion.
- McDougall, Alexander
1968 The Autobiography of Captain Alexander McDougall. Great Lakes Historical Society, Vermillion.
- McEwen, W.A. and A.H. Lewis
1953 Encyclopedia of Nautical Knowledge. Cornell Maritime Press, Cambridge.
- McGowan, Alan
1980 The Ship: The Century Before Steam. The Development of the Sailing Ship, 1700-1820. National Maritime Museum, Greenwich.
- McKay, Lauchlan
1839 The Practical Shipbuilder. Collins, Keese & Co., New York. 1974 reprint, MacDonal & James, London.
- McKee, E.M.
1969 Mapping Lake Superior's Floor. In Limnos magazine, Vol. 2, No. 4, pp. 12-16. Great Lakes Foundation, Ann Arbor.
- Meakin, Rev. Alexander C.
1988 Master of the Inland Seas: The Story of Captain Thomas Wilson and the Fleet that Bore His Name. Great Lakes Historical Society, Vermillion.
- Menz, Katherine B.
1983 Historic Furnishings Report, Sleeping Bear Point Life-Saving Station, Sleep Bear Dunes National Lakeshore, Frankfort, Michigan. Branch of Historic Furnishings, National Park Service, Harpers Ferry.
- Michigan Department of Natural Resources
1967 Status Report on Great Lakes Fisheries, 1967. Fish Management Report No. 2.
- Michigan History Division
1975 Carp River Forge; A Report. Michigan Department of State, Lansing.
- Michigan Sea Grant Program
1977 Seines to Salmon Charters. Extension Bulletin E-1000, Michigan Sea Grant Program, Michigan State University, East Lansing.
- Mills, James Cook
1908 Giant Ore Carriers on the Great Lakes. In Cassier's Magazine, Vol. 35, pp. 109-119.
- 1910 Our Inland Seas: Their Shipping and Commerce for Three Centuries. A.G. McClurg & Co., Chicago. 1976 reprint, Freshwater Press, Cleveland.

- Mills, John M.
1979 Canadian Coastal and Inland Steam Vessels, 1809-1930. Steamship Historical Society of American, Providence.
- Milston, R.L.
1983 Selected Studies of Cambro-Ordovician Sediments Within the Michigan Basin. Michigan Geological Survey Report of INvestigations No. 26, Lansing.
- Milstein, Randall L.
1987 Pictured Rocks National Lakeshore, Northern Michigan. In Centennial Field Guide, Vol. 3, pp. 277-280, edited by Donald L. Biggs. North Central Section of the Geological Society of America.
- Moore, Charles (editor)
1907 The Saint Marys Falls Canal. The Semi-Centennial Commission, Detroit.
1915 History of Michigan, 3 vols. Lewis Publishing Co., Chicago.
- Morris, E.P.
1927 The Fore and Aft Rig in America: A Sketch. Yale University Press, New Haven.
- Morris, James
1979 Our Maritime Heritage: Maritime Developments and Their Impact on American Life. University Press of America, Washington, D.C.
- Morrison, John H.
1903 History of American Steam Navigation. Argosy-Antiquarian Press Ltd., New York. 1958 reprint, Stephen Daye Press, New York.
1905 Iron and Steel Hull Steam Vessels of the United States, 1825-1905. Steamship Historical Society of America, Salem.
- Muckelroy, Keith
1978 Maritime Archeology. Cambridge University Press, Cambridge.
1979 Discovering a Historic Wreck. National Maritime Museum, Kensington.
- Murphy, Larry E.
1981 Isle Royale Shipwreck Management Program, Phase I: Preliminary Assessment. Paper presented at Twelfth Annual Conference on Underwater Archeology, New Orleans.
1982 Isle Royale Shipwreck Management Program: A Pilot Study. Paper presented at Thirteenth Conference on Underwater Archeology, Philadelphia.
1983 Shipwrecks as Data Base for Human Behavioral Studies. In Shipwreck Archeology, pp. 65-90, edited by Richard A. Gould. University of New Mexico Press, Albuquerque.

-, Daniel Lenihan and Toni Carrell
1982 Underwater Archeology of Isle Royale National Park: An Interim Report Covering the 1981 Field Season. Southwest Cultural Resources Center, National Park Service, Santa Fe.
- and C. Patrick Labadie
1987 Major Vessel Types on Lake Superior: Sail to Steam. In Submerged Cultural Resources Study, Isle Royale National Park, pp. 42-61, edited by Daniel J. Lenihan. Southwest Cultural Resources Center Professional Papers No. 8, National Park Service, Santa Fe.
- Murphy, Rowley W.
1966 The Four Welland Canals. In The Great Lakes Reader, pp. 391-396, edited by Walter Havighurst. Collier, Macmillan, London.
- Murty, T.S. and D.B. Rao
1970 Wind Generated Circulations in Lakes Erie, Huron, Michigan and Superior. In Proceeding of the 13th Conference on Great Lakes Research, pp. 927-941. International Great Lakes Research Conference, Ann Arbor.
- Musham, H.A.
1946-1950 Early Great Lakes Steamboats. Series of five articles in American Neptune magazine. Marine Research Society, Salem.
- Nalty, Bernard C., Dennis L. Noble and Truman R. Strobridge
1978 Wrecks, Rescues, and Investigations: Selected Documents of the U.S. Coast Guard and Its Prodecessors. Scholarly Resources, Wilmington.
- National Board of Lake Underwriters
1873, 1875 Classification. National Board of Lake Underwriters, Buffalo.
- National Heritage Limited
n.d. Merchant Shipping on the Great Lakes, 3 parts. Fort William, Hinge of a Nation, Vol I. Research Department, National Heritage, Ltd., Toronto.
- Neu, Irene
1953 The Building of the Sault Canal, 1852-1855. In Mississippi Valley Historical Review, Vol. 40, No. 1, pp. 25-46.
- Nichols, John
1945 The Development of Marine Engineering. In Historical Transactions, 1893-1943. Society of Naval Architects and Marine Engineers, New York.
- Nimmo, Joseph
1885 Report on the Internal Commerce of the United States. Bureau of Statistics, U.S. Department of Treasury, Washington, D.C.
- Noble, Dennis L. (compiler)
1975 United States Life-Saving Service, Annotated Bibliography. Public Affairs Division, U.S. Coast Guard, Washington, D.C.

- and T. Michael O'Brien
1979 Sentinels of the Rocks. Northern Michigan University Press, Marquette.
- North, Douglas C.
1963 The Economic Growth of the United States, 1790-1860. Prentice-Hall, New York.
- Norton, Harold F.
1945 Developments in Shipbuilding. In Historical Transactions, 1893-1945, Society of Naval Architects and Marine Engineers, New York.
- Nute, Grace Lee
1944 Lake Superior. Bobbs-Merrill, New York.
- O'Brien, T. Michael
1976 Guardians of the Eighth Sea: A History of the U.S. Coast Guard on the Great Lakes. Government Printing Office, Washington, D.C.
- Odle, Thomas D.
1952 The American Grain Trade of the Great Lakes, 1825-1873. Unpublished Ph.D. dissertation at University of Michigan. University Microfilms International, Ann Arbor.
- Oldham, Joseph R.
1897 Shipbuilding and Transportation on the Great American Lakes. In Cassier's Magazine, August 1897, pp. 499-512.
- Opheim, Lee Alfred
1972 Twentieth Century Shipwrecks in Lake Superior. Unpublished Ph.D. dissertation at St. Louis University. University Microfilms International, Ann Arbor.
- Ostrom, M.E. and A.E. Slaughter
1967 Correlation Problems of the Cambrian and Ordovician Outcrop Areas, Northern Peninsula of Michigan. Michigan Basin Geological Society, Ann Arbor.
- Paasch, Captain H.
1890 Illustrated Marine Encyclopedia. W & J Mackay, Chatham. 1977 reprint, Argus Books, Watford, Herts.
- Pankhurst, J.F.
1893 The Development of Shipbuilding on the Great Lakes. In Transactions of the Society of Naval Architects and Marine Engineers, pp. 252-262. S.N.A.M.E., New York.
- Parker, John G.
1905 Autobiography of Captain John G. Parker. In Michigan Pioneer and Historical Collections, Vol. 30, pp. 582-585.
- Patterson, Susan S.
1976 Canadian Great Lakes Shipping: An Annotated Bibliography. University of Toronto Press, Toronto.

- Pease, E. Forrest
1918 Modern Shipbuilding Terms: Defined and Illustrated. J.B. Lippincott Co., Philadelphia.
- Peterson, John P., Thord C. Sundstrom and Ronald E. Kinnunen
1987 1986 Recreational Diving Activity in Michigan Bottomland Preserves. Michigan Sea Grant Extension Publication MICHU-SG-87-506. Michigan State University, East Lansing.
-, Thord Sundstrom and Steve Steward
1987 A Profile of Great Lakes Diver Activity, Travel, and Expenditure Patterns. Michigan Sea Grant Extension Publication MICHU-SG-87-508. Michigan State University, East Lansing.
- Peterson, Mendel
1965 History Under the Sea: A Handbook for Underwater Exploration. Smithsonian Institution, Washington, D.C.
- Petrejus, E.W.
1970 Modelling the Brig of War IRENE: A Handbook for the Building of Historical Ship-Models. N.V. Uitgeversmaatschappij "de Esch," Hengelo.
- Pickett, R.L.
1980 Observed and Predicted Great Lakes Winter Circulation. In Journal of Physical Oceanography, Vol. 10, No. 7.
- The Pictured Rocks
1886 In Report of the Pioneer Society of the State of Michigan, Vol 7.
- Pitezel, Rev. John H.
1883 Lights and Shades of Missionary Life: Containing Travels, Sketches, Incidents and Missionary Efforts during Nine Years Spent in the Region of Lake Superior. Walden & Stewe, Cincinnati.
- Polk, R.L.
1884, 1888 R.L. Polk & Company's Marine Directory of the Great Lakes. R.L. Polk & Co., Detroit.
1891
- Pomeroy, Lawrence A.
1946 The Bulk Freight Vessel. In Inland Seas, Vol 2, No. 3, pp. 191-200. Great Lakes Historical Society, Vermillion.
- Preble, George Henry
1883 A Chronological History of the Origin and Development of Steam Navigation, 1534-1882. L.R. Hamersley & Co., Philadelphia.
- Purdy, T.C.
1883a Report on Steam Navigation in the United States. In U.S. Tenth Census, Vol. 8, pp. 655-724. Department of the Interior, Government Printing Office, Washington, D.C.
- 1883b Report on the Canals of the United States. In U.S. Tenth Census, Vol. 8, pp. 625-764. Department of the Interior, Government Printing Office, Washington, D.C.

- Putnam, George R.
1917 Lighthouses and Lightships if the United States. Houghton Mifflin Co., Boston.
- Quimby, George I.
1960 Indian Life in the Upper Great Lakes, 11,000 BC to AD 1800. University of Chicago Press, Chicago.
- Quinlan, Maria
1978 Lumbering in Michigan. In Michigan History magazine, Fall 1978, pp. 383-39.
- Rae, James D.
1967 Great Lakes Commodity Trade, 1850 to 1900. Unpublished Ph.D. dissertation at Purdue University. University Microfilms International, Ann Arbor.
- Ratigan, William
1960 Great Lakes Shipwrecks and Survivals. W. Eerdmans, Grand Rapids.
- Rawson, A.L.
1867 The Pictured Rocks of Lake Superior. In Harper's New Monthly Magazine, Vol. 34, No. 204, pp. 681-697, May 1867. Harper & Bros., New York.
- Rector, W. Gerald
1953 Log Transportation in the Lakes States Lumber Industry, 1840-1918. Arthur H. Clark Co., Glendale.
- Reed, Robert C.
1975 One Thousand Million Tons: Michigan Iron Ore Shipments Through 1974. Geological Survey Division Circular #12, Michigan Department of Natural Resources, Lansing.
- Robinson, Orrin W.
1938 Early Days of the Lake Superior Copper Country. n.p, Houghton.
- Robertson, ... and Scavia, ...
1984 North American Great Lakes. In lakes and Reservoirs, edited by F.T. Taub. Elsevier Science Publishing Co., Amsterdam.
- Rowland, K.T.
1970 Steam at Sea: A History of Steam Navigation. Praeger Publishers, New York.
- Sadler, Herbert C.
1909 Some Points in Connection with Shipbuidling on the Great Lakes, U.S.A. In Transactions of the Society of Naval Architects and Marine Engineers, Vol. 51, pp. 220-232.

- St. John, John R.
1846 A True Description of the Lake Superior Country: Its Rivers, Coasts, Bays, Harbors, Islands, and Commerce. 1976 reprint, Black Letter Press, Grand Rapids.
- Sawyer, Alvah L.
1911 A History of the Northern Peninsula of Michigan, 3 vols. Lewis Publishing Co., Chicago.
- Schoolcraft, Henry R.
1821 Narrative Journal of Travels from Detroit Northwest Through the Great Chain of American Lakes to the Sources of the Mississippi River in the Year 1820. E & E Hosford, Albany. 1970 reprint, Arno Press, Inc., New York.
- 1853 Information Respecting the History, Condition, and Prospects of the Indian Tribes of the United States. Lippincott, Gambo and Co., Philadelphia.
- Scott, George
1886, 1888 Scott's New Coast Pilot for the Lakes. Detroit Free
1890, 1892 Press Book and Job Printing House, Detroit.
1899, 1901
1906, 1914
- Scott, W.B. and E.J. Crossman
1973 Freshwater Fishes of Canada. Bulletin #184, Fisheries Research Board of Canada, Ottawa.
- See, Horace
1891 The Building of the Steamship in American. In Engineering Magazine, May 1891.
- Sheridan, Richard B.
1909 Material Handling Equipment for Lakes Vessels. In Transactions of the Society of Naval Architects and Marine Engineers, Vol. 17. S.N.A.M.E., New York.
- Slyker, Francis J.
1958 Reinforced Wooden Vessels on the Great Lakes. In Telescope magazine, March-April 1958. Great Lakes Maritime Institute, Detroit.
- Smiley, E. Thomas and Donald F. Holecek (editors)
1982 Aquatic Park Management: Symposium Proceedings. Michigan Sea Grant Extension Service, University of Michigan, Ann Arbor.
- Smith, Darrell H. and Fred W. Powell
1929 The Coast Guard, Its History, Activities, and Organization. Service Monograph No. 51, Brookings Institute, Washington, D.C.
- Smith, Edgar C.
1938 A Short History of Naval and Marine Engineering. Cambridge University Press, Cambridge.

- Smith, George S. and Francis P. McManamon (compilers)
1988 Archeology and the Federal Government. Cultural Resource Management Bulletin, Vol. 11, July 1988. National Park Service, Washington, D.C.
- Smith, H.M. and M.M. Snell
1891 Fisheries of the Great Lakes in 1885. Report to the Commissioner of Fish, 1887. U.S. Bureau of Fish and Fisheries, Washington, D.C.
- Smith, N.
1972 Summertime Temperature and Circulation Patterns in Lake Superior. Unpublished Ph.D. dissertation, Department of Oceanography, University of Wisconsin, Madison.
- Sommers, Lawrence M. (editor)
1977 Atlas of Michigan. Michigan State University Press, East Lansing.
- Standard, W.L.
1947 Merchant Seamen: A Short History of Their Struggles. International Publishers, New York.
- Stanton, Samuel Ward
1895 American Steam Vessels. Smith & Stanton, New York.
- Steel, David
1794 Steel's Elements of Mastmaking, Sailmaking and Rigging. 1932 reprint, Edward Sweetman, New York.
- Sterling, Frank Ward (editor)
1920 Marine Engineer's Handbook. McGraw-Hill Book Co., New York.
- Stonehouse, Frederick
1977a Marquette Shipwrecks. Avery Color Studios, Au Train.
- 1977b West Missing: Fifteen Vessels that Disappeared on Lake Superior. Avery Color Studios, Au Train.
- 1981 Historic Resource Study, Pictured Rocks National Lakeshore. Mark F. Pfaller Associated Inc., Milwaukee.
- 1983 Munising Shipwrecks. Avery Color Studios, Au Train.
- 1984 Went Missing II. Avery Color Studios, Au Train.
- 1985 Lake Superior's "Shipwreck Coast": A Survey of Maritime Accidents from Whitefish Bay's Point Iroquois to Grand Marais, Michigan. Avery Color Studios, Au Train.
- 1988 Keweenaw Shipwrecks: A Survey of Maritime Accidents from Big Bay Point West to Ontonagon, with Emphasis on the Keweenaw Peninsula. Avery Color Studios, Au Train.

- Stonehouse, Harold B.
1969 The Precambrian Around and Under the Michigan Basin. In Studies of the Precambrian of the Michigan Basin. Michigan Basin Geological Society, Lansing.
- Storey, Dana A.
1971 The Building of a Wooden Ship, Sawn Frames and Trunnel Fastened. Barre Publishers, Barre.
- Strobridge, Truman R.
1974 Chronology of Aids to Navigation and the Old Lighthouse Service, 1716-1939. U.S. Coast Guard, Washington, D.C.
- Swanson, W.E.
1941 Modern Shipfitter's Handbook. Cornell Maritime Press, New York.
- Swineford, A.P.
1876 Early History and Review of the Copper, Iron Silver, Slate and Other Material Interests of the South Shore of Lake Superior. In Mining Journal, Marquette.
- Taggart, Robert
1983 Evolution of the Vessels Engaged in the Waterborne Commerce of the United States. National Waterways Study, U.S. Army Engineer Water Resources Support Center, Washington, D.C.
- Talbott-Booth, E.C.
1943 Merchant Ships. Macmillan & Co., Long.
- Taylor, F.B.
1894 A Reconnaissance of the Abandoned Shorelines of the South Coast of Lake Superior. In American Geologist, Vol. 13, pp. 365-383.
- Taylor, George R.
1951 The Transportation Revolution, 1815-1860. Holt, Reinhart & Winston, New York.
- Thomas, Robert
1864 Register of the Shipping of the Lakes and River St. Lawrence. Wheeler, Matthews & Warren, Buffalo.
- Thompson, Douglas G.
1983 The ANNIE FALCONER Archeological Survey and Salvage Project, 1982. POW Kingston, Ltd. and Ontario Heritage Foundation, Toronto.
- Thompson, Dr. Stanley, M.S. Renecca and L. Johnson
1982 Grain Transportation on the Great Lakes - St. Lawrence Seaway. Michigan State University Cooperative Extension Bulletin E-1432, Michigan State University, East Lansing.
- Thompson, Thomas S.
1859, 1861 Thompson's Coast Pilot for the Upper Lakes. James
1863 Barnet, Chicago.

- 1865, 1869 Thompson's Coast Pilot for the Upper Lakes. Detroit
1878 Free Press Books and Job Printing House, Detroit.
- Throckmorton, Peter (editor)
1987 The Sea Remembers: Shipwrecks and Archeology from Homer's Greece to the Rediscovery of the TITANIC. Weidenfeld & Nicholson, New York.
- Tilden, Freeman
1957 Interpreting our Heritage: Principles for Visitor Services in Parks, Museums, and Historic Places. University of North Carolina Press, Chapel Hill.
- Tody, W.H.
1973 History of the Great Lakes Fishery. Seminar at Michigan State University, Department of Fisheries and Wildlife, East Lansing.
- Tonnage of the Lakes
1855 The Buffalo Democracy, February 28, 1855. Buffalo.
- Torres, Louis
1978 An Inventory of Cultural Resources, Pictured Rocks National Lakeshore. Unpublished manuscript, Historic Preservation Division, National Park Service, Denver.
- Towle, Edward L.
1964 Bibliography on the Economic History of the Great Lakes - St. Lawrence Drainage Basin. University of Rochester Canadian Studies Program, manuscript on file at Michigan State Library, East Lansing.
- Trimble, Captain George (compiler)
1907 The Lake Pilot's Handbook. Riverside Printing Co., Port Huron.
- True, Dwight
1956 Sixty Years of Shipbuilding. Society of Naval Architects and Marine Engineers, Great Lakes Section, Ann Arbor.
- Tunell, George G.
1898 Transportation on the Great Lakes. In House Document No. 277, pp. 1-106, 55th Congress, 2nd Session.
- Tuttle, Charles R.
1873 A General History of the State of Michigan. Tyler & Co., Detroit.
- U.S. Army Corps of Engineers
1866- Annual Report of the Chief of Engineers. Government
Present Printing Office, Washington, D.C.
- 1891-1963 Survey of the Northern and Northwestern Lakes. Bulletin No. 1, U.S. Lake Survey Office, Detroit. No's 1-70 published periodically, 1891-1963; renamed Great Lakes Pilot in 1964.
- 1930 Transportation on the Great Lakes. Transportation Series No. 1, Board of Engineers for Rivers and Harbors, Government Printing Office, Washington, D.C.

- 1937 History of Accidents, Casualties, and Wrecks on Lake Superior, 1847 to 1930 inclusive (also known as Wells List). Unpublished manuscript on file, Duluth Area Office, Duluth.
- 1939 The United States Lake Survey. U.S. Lake Survey Office, Detroit.
- U.S. Bureau of the Census
1960 Historical Statistics of the United States, Colonial Times to 1957. Government Printing Office, Washington, D.C.
- U.S. Coast Guard
n.d. Accidents and Casualties to Vessels in the Eleventh Coast Guard District for the Period July 1, 1908 to June 30, 1918. U.S. National Archives Records Group 26, Washington, D.C.
- n.d. Life Saving Service Reports of Assistance Rendered, Grand Point Au Sable, Lake Superior, 1883-1902. Records Group 26, U.S. National Archives, Washington, D.C.
- n.d. Strandings Reported to Have Occurred on the Great Lakes for the Ten-Year Period 1928 to 1937. Records Group 26, U.S. National Archives, Washington, D.C.
- n.d. Marine Casualties on the Great Lakes, 1863-1973. Microfilm Reel No. T-279 from Records of the U.S. Coast Guard, Records Group 26, U.S. National Archives, Washington, D.C.
- n.d. U.S. Coast Guard Casualty and Wreck Reports, 1913-1939. Microfilm Reel No. T-925 from Records of the U.S. Coast Guard, Records Group 26, U.S. National Archives, Washington, D.C.
- n.d. U.S. Coast Guard Reports of Assistance Rendered to Individuals and Vessels, 1916-1940. Microfilm Reel No. T-920 from Records of the U.S. Coast Guard, Records Group 26, U.S. National Archives, Washington, D.C.
- U.S. Customs Service
n.d. Collector of Customs Reports of Casualties from the Customs House Districts: Duluth, 1874-1901. U.S. Customs Service, Washington, D.C.
- U.S. Department of Agriculture
1893 Wreck Chart of the Great Lakes from 1886 to 1891. Weather Bureau, U.S. Department of Agriculture, Washington, D.C.
- 1894 Report of Wrecks Which Occurred on the Great Lakes from December 17, 1885 to November 15, 1893. Weather Bureau, U.S. Department of Agriculture, Washington, D.C.
- 1895 Wreck and Casualty Chart of the Great Lakes, 1894. Weather Bureau, U.S. Department of Agriculture, Washington, D.C.
- 1898 Wrecks and Casualties on the Great Lakes During 1895, 1896, and 1897. Weather Bureau, U.S. Department of Agriculture, Washington, D.C.

U.S. Department of Commerce
1794 - Enrollments and Registries issued to Merchant
Present Vessels at U.S. Ports. Records of the Bureau of Marine Inspection and Navigation. Records Group 41, U.S. National Archives, Washington, D.C.

U.S. Department of the Interior
1988 Guidelines for Recording Historic Ships. Historic American Buildings Survey/Historic American Engineering Record Division, National Park Service, Washington, D.C.

U.S. Government Accounting Office
1977 The U.S. Great Lakes Commercial Fishing Industry Past, Present, and Potential. Report to Congress by the Comptroller General, Government Printing Office, Washington, D.C.

U.S. Life-Saving Service
1876-1915 Annual Report of the United States Life-Saving Service. Government Printing Office, Washington, D.C.

U.S. Lighthouse Board
1852-1910 Annual Report of the Lighthouse Board. Government Printing Office, Washington, D.C.

1855 Laws of the United States Relating to the Establishment, Support, and Management of the Light-Houses, Light-Vessels, Monuments, Beacons, Spindles, Buoys, and Public Piers of the United States from August 7, 1789 to March 3, 1885. A.O.P. Nicholson & Co., Washington, D.C.

1869 Organization and Duties of the Light-House Board: and Rules, Regulations, and Instructions of the Light-house Establishment of the United States with Laws and Circulars Relating Thereto. Government Printing Office, Washington, D.C.

1871 Compilation of Public Documents and Extracts from Reports and Papers Relating to Light-Houses, Light-Vessels, and Illuminating Apparatus, and to Beacons, Buoys, and Fog-Signals, 1789 to 1871. Government Printing Office, Washington, D.C.

1881 Instructions to Light Keepers. Government Printing Office, Washington, D.C.

1902 Instructions to Light Keepers and Masters of Light-House Vessels. Government Printing Office, Washington, D.C.

U.S. Navy, Bureau of Ships
1983 Wood, A Manual for Its Use as a Shipbuilding Material. Teaparty Books, Kingston.

....., Hydrographic Office
1906 Sailing Directions for Lake Superior. Government Printing Office, Washington, D.C.

- U.S. Shipping Board
1918 The Elements of Wooden Ship Construction. Emergency Fleet Corporation, U.S. Shipping Board, Philadelphia.
- U.S. Treasury Department
1872 Steam Vessels of the United States. Report of the Secretary of the Treasury, HR Document 138, 42nd Congress, 2nd Session.
- U.S. War Shipping Administration
1945 A Glossary of Legal, Insurance, and Shipping Terms. U.S. Merchant Marine Cadet Corps, Kings Point.
- Underhill, Harold A.
1938 Sailing Ship Rigs and Rigging, with Authentic Plans of Famous Vessels of the Nineteenth and Twentieth Centuries. Brown, Son & Ferguson, Glasgow.
1946 Masting and Rigging the Clipper Ship and Ocean Carrier. Brown, Son, Ferguson, Glasgow.
1958 Plant on Frame Models and Scale Masting and Rigging, 2 vols. Brown, Son & Ferguson, Glasgow.
- Vander Linden, Rev. Peter J. (editor)
1979 Great Lakes Ships We Remember. Freshwater Press, Cleveland.
1984 Great Lakes Ships We Remember II. Marine Historical Society of Detroit, Detroit.
- Van Dorn, William G.
1974 Oceanography and Seamanship. Dodd, Mead & Co., New York.
- Van Gaasbeek, Richard M.
1918 A Practical Course in Wooden Boat and Ship Building. Frederick J. Drake & Co., Chicago.
- Van Oosten, John
1938 Michigan's Commercial Fisheries on the Great Lakes. In Michigan History Magazine, Vol. 22, pp. 3-40.
- Van Riemsdijk, J.T.
1980 The Pictorial History of Steam Power. Octopus Books, London.
- Vrana, Kenneth J.
1989 Michigan Bottomland Preserves Inventory. Michigan Sea Grant College Program publication MICHU-SG-89-500. Michigan State University, East Lansing.
- Walker, Captain Augustus
1902 Early Days on the Lakes. In Publications of the Buffalo Historical Society, Vol. 5, pp. 287-323.

- Walsh, George Ethelbert
1899 American Lake Shipping and Casualties. In Cassier's Magazine, April 1899, pp. 499-507.
- Walton, Thomas
1902 Steel Ships: Their Construction and Maintenance. Charles Griffin & Co., Ltd., London.
- Wayne, W.J. and J.H. Zumberge
1965 Pleistocene Geology of Indiana and Michigan. In The Quaternary of the United States, pp. 63-84. Princeton University Press, Princeton.
- Weiss, George
1926 The Lighthouse Service, Its History, Activities and Organization. Service Monographs No. 40. Johns Hopkins Press, Baltimore.
- Wells, Homer
1938 History of Accidents, Casualties, and Wrecks on Lake Superior, 1847 to 1930 Inclusive. Unpublished manuscript on file, U.S. Army Corps of Engineers Duluth Area Office, Duluth.
- Wells, Robert W.
1978 Daylight in the Swamp! Doubleday & Co., Garden City.
- White, Lt. Richard D. and Truman R. Strobridge
1975 Nineteenth Century Lighthouse Tenders on the Great Lakes. In Inland Seas, Vol. 31, No. 2, Summer 1975. Great Lakes Historical Society, Vermillion.
- Whittier, Bob
1983 Paddle Wheel Steamers and Their Giant Engines. Seamaster Books, Duxbury.
- Williams, Ralph D.
1905 Honorable Peter White: A Biographical Sketch of the Lake Superior Country. Penton Publishing Co., Cleveland. 1986 reprint, Freshwater Press, Cleveland.
- 1907 Commerce of the Great Lakes. In St. Mary's Falls Canal Semi-Centennial, 1905, edited by Charles Moore. Semi-Centennial Commission, Detroit.
- Williams, W.R.
1960 Col. McKnight's Lake Superior Line. In Inland Seas, Vol. 16, No. 2, pp. 138-144, Summer 1960.
- Williamson, Samuel H.
1970 The Growth of the Great Lakes as a Major Transportation Resource, 1870-1911. In Research in Economic History, Vol. 2, edited by Paul Useling. Department of Economics, University of Illinois, Urbana.

- Wolff, Julius F. Jr. Dr.
 1965 The Coast Guard Comes to Lake Superior, 1874-1875. In Inland Seas, Vol. 21, No. 1, pp. 14-21, Spring 1965. Great Lakes Historical Society, Vermillion.
- 1975-76 One Hundred Years of Rescues: The Coast Guard on Lake Superior. In Inland Seas, Vol. 31, No. 4, pp. 255-265, Winter 1975 and Vol 32, No. 1, pp. 32-40 and 49-51, Spring 1976. Great Lakes Historical Society, Vermillion.
- 1979 The Shipwrecks of Lake Superior. Lake Superior Marine Museum Association, Duluth.
- Work Projects Administration
 1941 Michigan: A Guide to the Wolverine State. American Guide Series, Oxford University Press, New York.
- Workman, James C.
 1945 Shipping on the Great Lakes. In Historical Transactions, 1893-1943, pp. 363-388. Society of Naval Architects and Marine Engineers, New York.
- World Ship Society
 1962 Preliminary List of Canadian Merchant Steamships, 1809-1930. Toronto Branch, World Ship Society, Toronto.
- Wright, Joseph B.
 n.d. History of Munising and Alger County. In Guide to Alger County, Michigan: Home of the World Famous Pictured Rocks. n.p.
- Wright, Richard J.
 1970 Freshwater Whales: A History of the American Ship Building Company and Its Predecessors. Kent State University Press, Kent.
- 1973 Inventory of Shipwrecks Within Michigan Coastal Waters. Michigan Department of Natural Resources and Northwest Ohio-Great Lakes Research Center, Bowling Green.

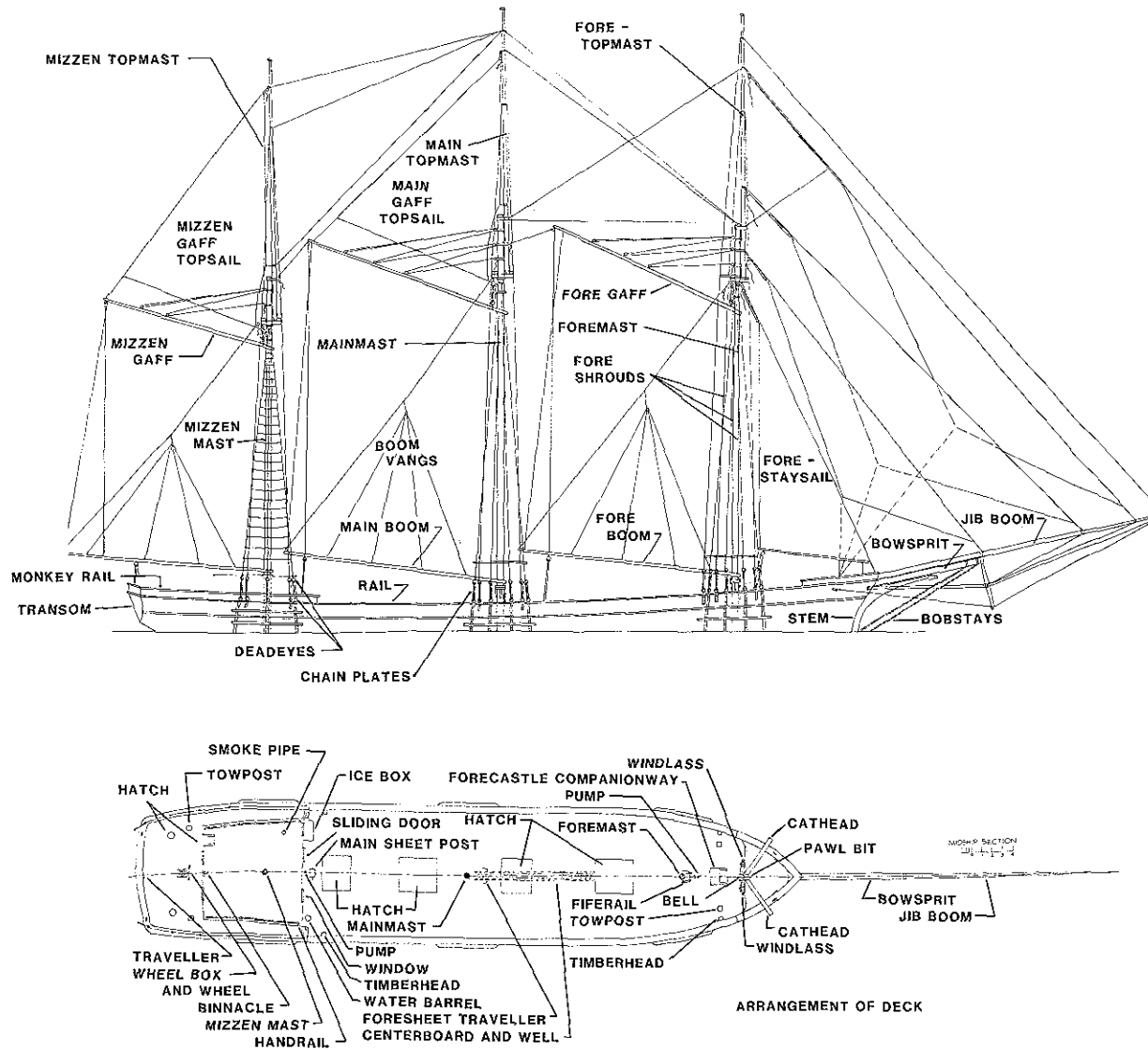


Figure A-1. Typical Great Lakes Schooner (after Historic American Merchant Marine Survey).

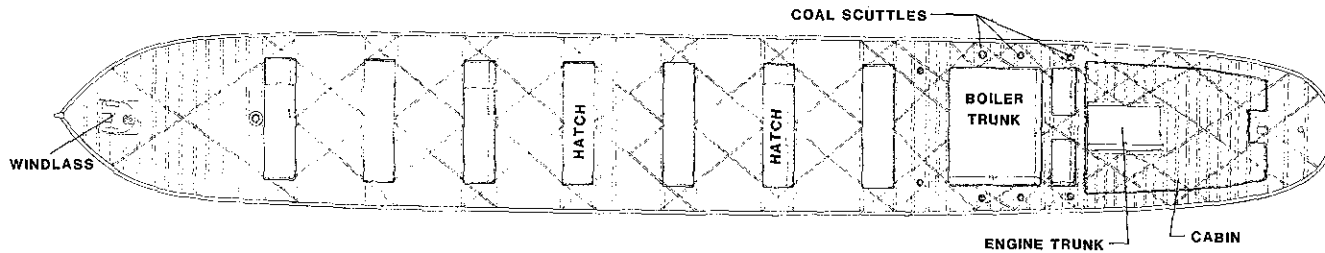
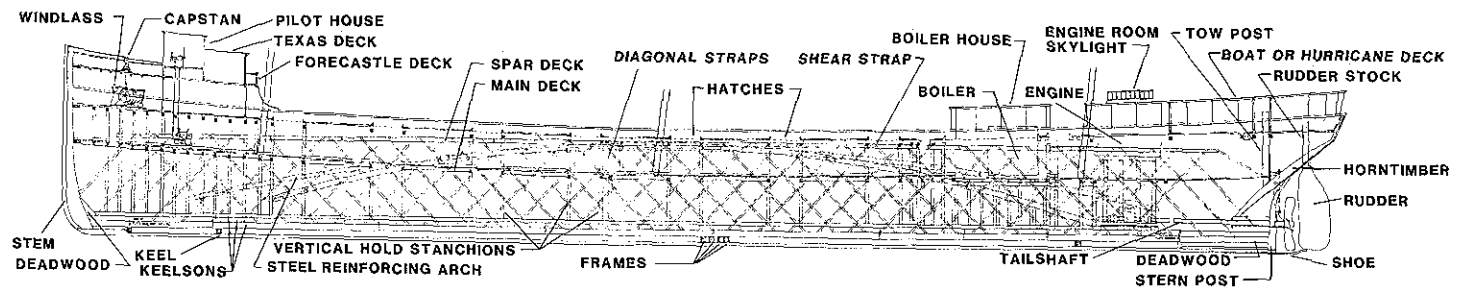
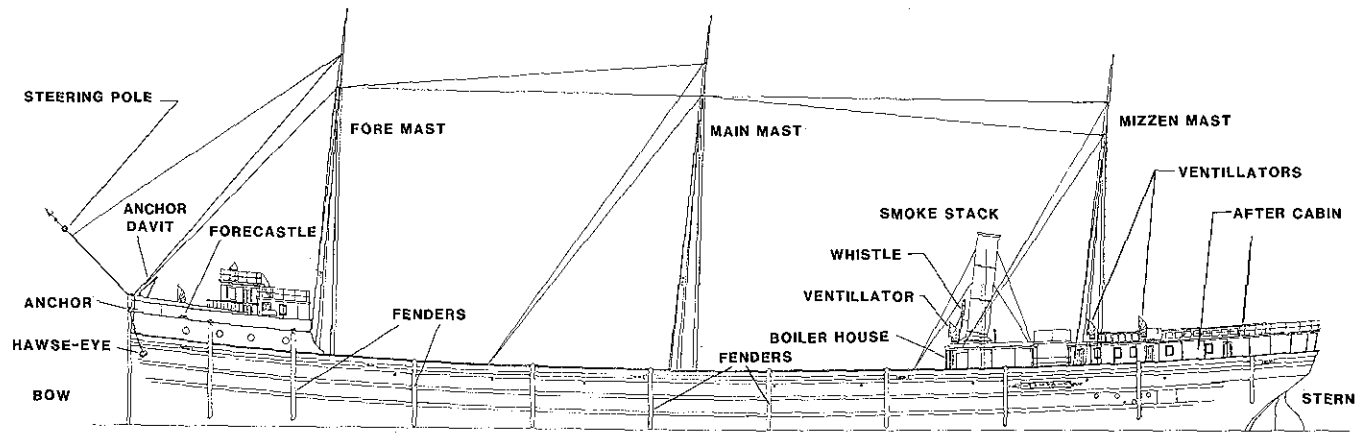


Figure A-2. Typical Great Lakes wooden bulk freighter (after Institute of Great Lakes Research, Bowling Green State University).

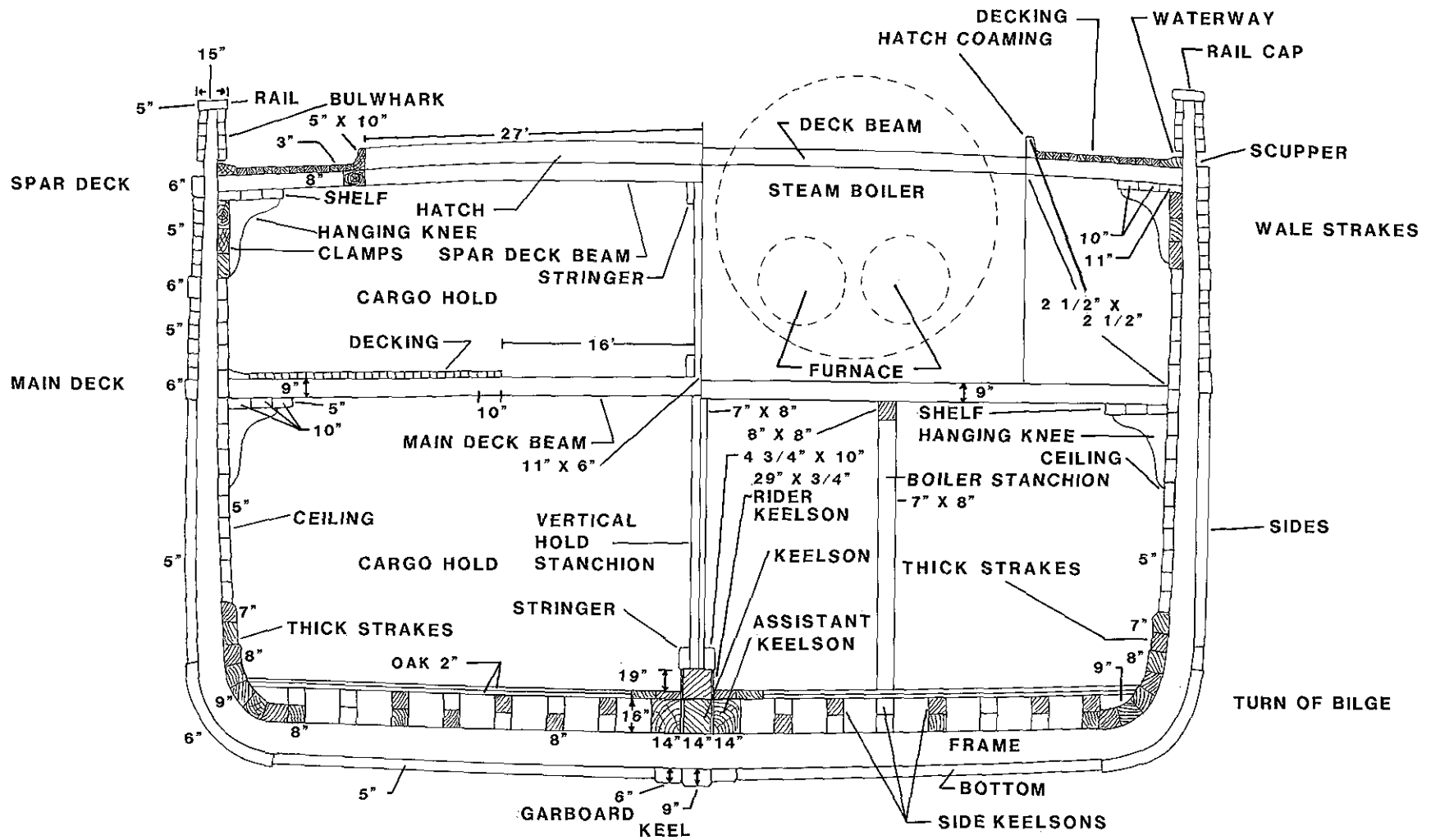


Figure A-3: Cross-sectional details of a typical Great Lakes wooden bulk freighter (after Institute of Great Lakes Research, Bowling Green State University).

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.