Submerged Cultural Resources Study

ISLE ROYALE NATIONAL PARK

DANIEL J. LENIHAN, Editor
SUBMERGED CULTURAL RESOURCES UNIT
NATIONAL PARK SERVICE

ISLE ROYALE NATIONAL PARK

SUBMERGED CULTURAL RESOURCES STUDY

ISLE ROYALE NATIONAL PARK

by

Daniel J. Lenihan, Editor
Principal Investigator
Submerged Cultural Resources Unit

Toni Carrell
Submerged Cultural Resources Unit

Thom Holden
Canal Park Museum

C. Patrick Labadie
Canal Park Museum

Larry Murphy
Submerged Cultural Resources Unit

Ken Vrana
Submerged Cultural Resources Unit

Illustrations by Jerry Livingston

Southwest Cultural Resources Center Professional Papers
Number 8

Santa Fe, New Mexico
1987

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 area, and preliminary recommendations for long-term management. It is designed to have application to General Management Plans and Development Concept Plans 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 area. This may involve test excavations. The intended audience is managerial and professional, not the general public.

Submerged Cultural Resources Site Report

Comprehensive 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		ix
LIST OF TABLES		xii
ACKNOWLEDGMENTS		xv
EXECUTIVE SUMMARY		xix
I.	INTRODUCTION	1
	Daniel Lenihan	
	Underwater Archeology and the Age of Steam	2
	Research Design	3
	General Problem Statement	5
	Specific Field Objectives	7
	Methodology	10
	This Report	16
II.	LAKE SUPERIOR MARITIME TRADITION: SOCIOECONOMIC CONTEXT	19
	Larry Murphy, Daniel Lenihan	
	Introduction	19
	Socioeconomic Processes Affecting Lakes Navigation	21
	Growth of Great Lakes Navigation	26
	Growth of Lake Superior Navigation	29
	Growth of Shipping and Navigation Improvements	38
III.	MAJOR VESSEL TYPES ON LAKE SUPERIOR: SAIL TO STEAM	43
	C. Patrick Labadie, Larry Murphy	
	Schooner Development	46
	Development of Structural Support Systems	49
	Developments in Form and Technology	49
	Steam Vessels	50
IV.	SHIPWRECKS OF ISLE ROYALE: THE HISTORICAL RECORD	63
	Larry Murphy, Thom Holden	
	Introduction	63
	CUMBERLAND	65
	CHISHOLM	72
	ALGOMA	80
	MONARCH	104
	GLENLYON	119
	AMERICA	127
	COX	153
	CONGDON	169
	EMPEROR	175
	KAMLOOPS	187
	DUNELM	210

V.	SHIPWRECKS OF ISLE ROYALE: THE ARCHEOLOGICAL RECORD	215
	Larry Murphy, Daniel Lenihan, C. Patrick Labadie	
	Introduction	215
	CUMBERLAND/CHISHOLM	220
	ALGOMA	254
	MONARCH	259
	GLENLYON	276
	AMERICA	285
	COX	295
	CONGDON	306
	EMPEROR/DUNELM	312
	KAMLOOPS	326
VI.	UNDERWATER COMPONENTS OF LAND-BASED SITES AND OTHER SUBMERGED CULTURAL RESOURCES	335
	Toni Carrell with contributions from Ken Vrana, Larry Nordby	
	Introduction	335
	Historical Overview	336
	Site Specific Investigations	355
	Cemetery Island Site	357
	American Fur Company Fishery at Checker Point	365
	Wright Island Fishery	372
	Star Island Fishery	382
	Minong Mine Town Site and Docks	398
	Island Mine Town Site, Powder House and Wharf	409
	Ghyllbank Mining/Lumbering Wharf	418
	Tobin Harbor Resort	423
	Belle Isle Resort	430
	Passage Island Lighthouse	438
	Civilian Conservation Corps Camp Siskiwit at Senter Point	446
	Other Known or Suspected Sites	453
	Siskowit Mine	453
	Additional Research Locations	456
	Vernacular Watercraft	457
VII.	MANAGING SHIPWRECKS IN A NATIONAL PARK: THE ISLE ROYALE EXPERIENCE	475
	Ken Vrana with contributions from Jay Wells	
	Introduction	475
	Administrative History	476
	Present Day Management	493
VIII.	CONCLUSION	525
	Daniel Lenihan	
	Introduction	525
	Retrospective	525
	Management Recommendations	527
	Future Research	530
BIBLIOGRAPHY		537

LIST OF FIGURES

1.1.	Isle Royale	4
1.2.	Isle Royale shipwrecks	4
1.3.	Generation of line drawings	11
1.4.	Jerry Livingston shows results	11
1.5.	Video documentation	12
1.6.	Diver propulsion unit	12
1.7.	Remote operated vehicles	13
1.8.	ROV Sea-Rover	13
1.9.	RV SEWARD JOHNSON	14
1.10.	CORD ROV aboard SEWARD JOHNSON	14
2.1.	Freight through the Sault Ste. Marie Canal	41
2.2.	U.S. Documented Merchant Vessels Sail/Steam	41
4.1.	Side-wheel steamer CUMBERLAND	71
4.2.	Side-wheel steamer WESTERN WORLD	71
4.3.	Artist's rendition of HENRY CHISHOLM	79
4.4.	Construction yard photograph	79
4.5.	Canadian Pacific Railway passenger vessel ALGOMA	103
4.6.	ALGOMA at the dock	103
4.7.	Passenger/package freight vessel MONARCH	117
4.8.	MONARCH after alterations	117
4.9.	Bow of MONARCH on the rocks at Isle Royale	118
4.10.	Bow of MONARCH, offshore view	118
4.11.	Later view of package freighter GLENLYON	126
4.12.	Stern of GLENLYON	126
4.13.	Passenger/package freighter AMERICA	151
4.14.	AMERICA after the 1911 alterations	151
4.15.	Birth of AMERICA	152
4.16.	Demise of AMERICA	152
4.17.	GEORGE M. COX after the 1933 refit	166
4.18.	GEORGE M. COX as PURITAN in March 1920	167
4.19.	PURITAN with temporary bulkhead in place	167
4.20.	GEORGE M. COX hard aground at Rock of Ages	168
4.21.	Stern view of COX aground at Rock of Ages	168
4.22.	Bulk freighter CHESTER A. CONGDON	173
4.23.	CHESTER A. CONGDON aground at Canoe Rocks	173
4.24.	CHESTER A. CONGDON aground--view from the bow	174
4.25.	CHESTER A. CONGDON --View from the deck	174
4.26.	Bulk freighter EMPEROR	186
4.27.	Port side view of EMPEROR	186
4.28.	KAMLOOPS as it appeared at the time of loss	209
4.29.	Package freighter DUNELM aground at Canoe Rocks	213
4.30.	DUNELM under tow after release from stranding	213
5.1.	CUMBERLAND/CHISHOLM site map	237
5.2.	Environmental cross section CUMBERLAND/CHISHOLM	238
5.3.	Environmental cross section CUMBERLAND/CHISHOLM	239

5.4.	CUMBERLAND general arrangement plans	240
5.5.	CUMBERLAND/CHISHOLM midship cross sections	241
5.6.	Structural elements, stern of CUMBERLAND	242
5.7.	Segment of CUMBERLAND paddle wheel	242
5.8.	Firebox boiler of CUMBERLAND	243
5.9.	Hull structure of CUMBERLAND	243
5.10.	Top of A-frame of CUMBERLAND	244
5.11.	Port bow of CUMBERLAND	245
5.12-13.	Two views of CHISHOLM side	246
5.14.	Steam water pump on CUMBERLAND/CHISHOLM	247
5.15.	Rudder of HENRY CHISHOLM	247
5.16.	Firebox boiler	248
5.17.	Single-ended "Scotch" boiler	248
5.18.	CHISHOLM engine at depth of 140'	249
5.19.	Propeller of HENRY CHISHOLM	250
5.20.	MASSACHUSETTS plans of 1881	251
5.21.	MASSACHUSETTS rudder arrangement	252
5.22.	CHISHOLM hull bottom	253
5.23.	Draft markings on stern of CHISHOLM	253
5.24.	Sample area of ALGOMA site	258
5.25.	MONARCH site map	267
5.26.	MONARCH general arrangement plans	268
5.27.	Palisades Cliff and side-scan sonar of MONARCH	269
5.28-29.	Two views of MONARCH engine mount	270
5.30.	Jerry Livingston on thrust-bearing mount	271
5.31.	Forward end of starboard stern section of MONARCH	271
5.32.	Scattered wreckage of MONARCH	272
5.33.	Artifact scatter off the port side of MONARCH	272
5.34.	Overboard discharge pipe for condenser	273
5.35.	Manually operated water pump	273
5.36.	Metal sheeting from boiler room of MONARCH	274
5.37.	Rudder skeg of MONARCH	274
5.38.	Bottles in cargo concentration area of MONARCH	275
5.39.	Hull structure and fixtures of MONARCH, 130' deep	275
5.40.	GLENLYON site map	281
5.41.	Anchor pocket of GLENLYON	282
5.42.	Triple-expansion engine of GLENLYON	283
5.43.	Detail photo of the thrust bearing of GLENLYON	283
5.44-45.	Views of GLENLYON steam engine and main shaft	284
5.46.	AMERICA in the North Gap of Washington Harbor	291
5.47.	AMERICA site map	292
5.48.	The fine-lined bow of AMERICA	293
5.49.	View up the main stair case	294
5.50.	View of the purser's cabin	294
5.51.	GEORGE M. COX site map	301
5.52.	Forepeak and chain locker of GEORGE M. COX	302
5.53.	Examining the main shaft	302
5.54.	Dropping through the starboard stern gangway	303
5.55.	Steam drums atop Scotch boilers of COX	303
5.56.	Interior of COX aft of engine spaces	304
5.57.	COX boilers with nylon base line	304
5.58.	Field drawing of stern of GEORGE M. COX	305
5.59.	Ship knee located in a deep water ravine	305
5.60.	Artist's perspective of CONGDON bow	310

5.61.	Drawing of relationship of bow and stern of CONGDON	311
5.62.	Artist's perspective of EMPEROR	318
5.63.	Cargo of EMPEROR	319
5.64.	Windlass of EMPEROR	319
5.65.	Stern mast of EMPEROR	320
5.66.	View into the firemen's cabin	321
5.67.	Stern cabin of EMPEROR	321
5.68.	Video operations operations on EMPEROR	322
5.69.	Spare prop blades on the stern of EMPEROR	322
5.70.	Starboard stern cabins of EMPEROR	323
5.71.	Bunks inside the starboard stern cabin of EMPEROR	323
5.72.	Auxiliary controls of EMPEROR in engine room	324
5.73.	DUNELM stranding site	325
5.74.	Artist's perspective of KAMLOOPS	332
5.75.	Engine room skylights of KAMLOOPS	333
5.76.	Stern wheel of KAMLOOPS	333
6.1.	Historic Sites With Underwater Remains Location Map	356
6.2.	Cemetery Island Site Map	360
6.3.	Graveyard on Cemetery Island	360
6.4.	Historic bottles	362
6.5.	Historic ceramics and bottles	362
6.6.	Reproduction of Ives' Survey Plat	367
6.7.	Sketch map of American Fur Company Fishery Site	367
6.8.	Probable American Fur Company Fishery landing site	370
6.9.	View to the south at American Fur Company Site	370
6.10.	Overview of Wright Island	375
6.11.	The Johnson/Holte Fishery	375
6.12.	Wright Island Fishery Base Map	377
6.13.	Original Mike Johnson dwelling	378
6.14.	The present Holte residence	378
6.15.	View of the Holte net house	380
6.16.	Artifact scatter off shore	380
6.17.	Star Island Fishery, early 1930s	385
6.18.	Rear of Johnson fish house	385
6.19.	Net house construction, saddle-notched logs	386
6.20.	Arnold and Olga Johnson residence	386
6.21.	Milford and Myrtle Johnson residence	387
6.22.	Star Island Fishery, 1952	387
6.23.	Star Island Fishery Base Map	390
6.24.	Key to features identified at Star Island	391
6.25.	Spatial distribution of activity areas	396
6.26.	Minong Mine generalized site map	403
6.27.	The cog railroad bed at Minong Mine	404
6.28.	Location of historic wharf and warehouse	404
6.29.	Freighter hatch covers used in wharf	406
6.30.	Cribs associated with Minong Mine wharf	406
6.31.	McCargoe Cove town site and dock sketch map	407
6.32.	Island Mine features	414
6.33.	Remains of the powder house on Senter Point	414
6.34.	Island Mine wharf base map	416
6.35.	Rock-filled cribs, Island Mine	417
6.36.	Buoys mark the outline of the extant cribs	417
6.37.	Ghyllbank, Washington Harbor, 1889	420
6.38.	Ghyllbank Copper Company headquarters building	420

6.39.	Remains of the Ghyllbank wharf	422
6.40.	Ghyllbank wharf sketch map	422
6.41.	Minong Lodge as it appeared in 1938	425
6.42.	Minong Lodge main dock looking west	425
6.43.	Louis Mattson and August Anderson fishery	427
6.44.	Remains of Minong Lodge and main dock in 1951	427
6.45.	Minong Island and Scoville Point sketch map	429
6.46.	Remains at the Mattson/Anderson site	429
6.47.	The main lodge and dock at Belle Isle Resort	433
6.48.	Belle Isle Resort golf course	433
6.49.	Lodge and other service buildings, 1937	435
6.50.	Belle Isle base map	435
6.51.	Remains found off shore of Belle Isle dock	437
6.52.	Resort buildings being burned in 1963	437
6.53.	Typical US Lifesaving Service dinghy, circa 1930s	441
6.54.	U.S. Coast Guard cabin motor launch, 1941-1947	441
6.55.	Passage Island Lighthouse and radio tower	443
6.56.	Passage Island sketch map	443
6.57.	CCC Camp Siskiwit crib dock	449
6.58.	CCC occupied Mead Lumber Co. buildings	449
6.59.	Mead Lumber Company wharf	450
6.60.	Location map of Camp Siskiwit, Camp Isle Royale, and Mead Lumber Company.	450
6.61.	Remains of Senter Point crib dock underwater.	452
6.62.	Shoreline evidence of former CCC crib dock	452
6.63.	Prehistoric pot found in Rock Harbor Channel	455
6.64.	Mackinaw sailboat	459
6.65.	Commercial fishing skiff	459
6.66.	Recreational rowboat/rowing skiff	462
6.67.	SKIPPER SAM, a double-ended gas boat, circa 1930s	462
6.68.	Typical modern gas boat circa 1950s	464
6.69.	Double-ended launch at the turn of the century	464
6.70.	Typical post-1900 resort-era launch	466
6.71.	Typical launch circa 1900	466
6.72.	Stern detail on gas boats and launches	467
6.73.	Stripped down NOR'LAND being towed by NELLS J.	467
6.74.	Fish tugs outfitting for the fishing season	470
6.75.	STANLEY, a typical 1930s-era fish tug	470
7.1.	Sport diver on AMERICA	519
7.2.	Mooring buoy warning notice	520
7.3-6.	Preparation for buoy placement on dive site	521
7.7.	Buoy weight lift-apparatus	522
7.8.	Mitigation of anchor damage	523
7.9.	Placement of trail marker on a shipwreck	523
7.10.	Recent response to "May Day" from ISLE ROYALE	524

LIST OF TABLES

2.1	Critical Navigation Improvements	38
4.1	Comparison of Ten Steam Vessels at Isle Royale	64
5.1	CUMBERLAND/CHISHOLM Comparison	221
8.1	Listing of Isle Royale Shipwrecks	533

ACKNOWLEDGMENTS

Writing the acknowledgments for this report was not an easy task. The project was, by nature, a complex joint research and management venture and the list of people who provided substantial assistance to its successful completion is lengthy. First, it should be understood that Isle Royale National Park is a wilderness area in northern Lake Superior, and that cost-effective research in this Park is not feasible without the active support of the Park staff. Jack Morehead was Superintendent of Isle Royale when the project was conceived, and his expression of management concern, as well as his personal interest in seeing state of the art research take place on submerged sites, was the primary reason for it happening. Doug Scovill, Chief Anthropologist of the National Park Service and Cal Cummings, Senior Service Archeologist, provided the impetus from the cultural resources management sector of the agency necessary to generate the funding and support for the program. Stu Croll was Chief Ranger at Isle Royale during the entire period in which field activities were conducted, and his support of logistics, planning, and as a sounding board for what would and wouldn't work "on the ground" at Isle Royale was invaluable. Superintendent Don Brown was not only supportive of the program, but raised some new issues emphasizing interpretation of shipwrecks to the non-diving public that have become a significant area of endeavor with the Submerged Cultural Resources Unit. Thomas Hobbs became Superintendent in 1985, and though confronted with a host of issues far different from those he experienced in Yellowstone National Park, he immediately adapted to the situation and gave us his complete support.

Others at Isle Royale who lent us continued support over the years were Ann Belleman, Carol Maass, Elen Maurer, Bruce Reed, Bruce Weber, Chuck Dale, and Larry Wiese. In addition to the field assistance they rendered, Park Ranger Ken Vrana and District Ranger Jay Wells' level of commitment is best symbolized by their contributions to the writing of this report. Dave Snyder spent many hours reproducing files from the Park's office in Houghton and reviewing this report in draft. Robert Olli and Dennis Mielock of the Park maintenance staff rendered assistance in the most basic sense of the term. They scrambled to our rescue in the wee hours of the morning in 1980 to prevent our University of Wisconsin research tug from being added to the Isle Royale shipwreck population. Cliff Hannula kept our motors humming and, in association with Jay Wells, built the first "underwater mule" for use by divers in placing shipwreck mooring buoys. Lee Jameson dived with us and gave us access to maintenance division assets for our survey work whenever he could possibly justify it.

From the Midwest Regional Office, Andy Ketterson was our primary contact point; he made life easy for us in an administrative sense and found small pots of money at critical times to help us take advantage of research opportunities, such as the visit of RV SEWARD JOHNSON to Isle Royale. Cal Calabrese, Chief of the National Park Service Midwest Archeological Center, was supportive of the project and delegated Archeologist Mark Lynott to coordinate directly with us. Mark reviewed our preliminary and interim reports and this report in draft form and contributed on site

as an instructor in a training course on "Submerged Cultural Resources, Skills and Issues" held at Isle Royale National Park.

From my own office in Santa Fe, Regional Director Bob Kerr provided his support to this and all endeavors of the Submerged Cultural Resources Unit. Bob believed in the principle of knowing your resources, whether they were dry or wet, and he provided a roof for the team and administrative support, because he felt it was "for the good of the Service." John Cook took over the Regional helm during our last year of work at Isle Royale and has continued the high level of nurture at home that allowed us to keep our energies focused on the field. Dick Sellars, Chief of our Center, not only supported us unfailingly during the five years that we devoted partial time to Isle Royale, but also visited us in the field and stoically subjected his landlubber's belly to the tortures of bouncing boats, cold and Dramamine. Larry Nordby and Jim Bradford lent their considerable archeological field talents to our project; Larry also contributed to the writing of one section of this report. Jerry Livingston, who has rendered almost all of the graphics for this report, demonstrated again and again at Isle Royale the great utility of having a diving scientific illustrator in the field. Ron Ice permitted the denuding of his archeological staff for several three-week periods during his own field season, because he believed in the importance of the Isle Royale Project, and we thank him for his forbearance.

We also benefited greatly from the input of a number of folks from the Great Lakes Region. Patrick Labadie, Director of the U.S. Army Corps of Engineers Canal Park Museum in Duluth, was a magnificent find for us because of his great knowledge of regional history and maritime material culture. Thom Holden, also of the Canal Park Museum, provided us with access to his personal files on Isle Royale shipwrecks and the benefit of his knowledge of Lake Superior maritime disasters all through the project. Ric Wright from Bowling Green State University performed an extremely helpful records search for us in the files of the Institute for Great Lakes Research. Ric has since passed away, his contributions to Great Lakes navigation research will be missed. Gerrie Noble of the Thunder Bay Historical Museum has provided useful historical information to the Park for many years. James Marshall gave freely of his first-hand experience regarding the salvage of the steamship AMERICA.

Other assistance with archival materials came from the following: Jim Delgado, Golden Gate National Recreation Area; David Hull and John Maounis of the J. Porter Shaw Library, National Maritime Museum, San Francisco; Penny C. Grigsby, New Mexico State Library; Ken Hall and John Vandereedt of the Judicial, Fiscal and Social Branch of the National Archives, Washington D.C.

Larry Sand, Captain of SUPERIOR DIVER, was the charter contractor for most of our intensive field sessions. His skill and competence not only helped keep us alive, but aided measurably in the effectiveness of our operations. Scott McWilliam from Thunder Bay, Ontario, Gerry Buchanan, Duluth, Minnesota, and the late Monty Florentz are sport divers who somewhat obscure the distinction between professional and amateur maritime archeologist. They demonstrated great commitment to seeing the shipwrecks of Isle Royale inventoried and devoted many long hours of volunteer time to helping us carry out this task. We never had the opportunity to dive with Ken Merryman or Ken Engelbrecht due to scheduling conflicts, but in several long conversations they freely communicated much useful information from their extensive experience at Isle Royale wreck diving. Joe Strykowski donated his considerable photographic skills to the Isle Royale project during the 1985 field session. Mitch Kezar donated a series of slides that he obtained while working with us under contract to the National Geographic Society.

The National Geographic Society assigned a team of technicians under the able leadership of Emory Kristof to help in the documentation of KAMLOOPS using Remote Operated Vehicles. Donald Shomette also contributed to this phase of the project. John Brooks spent three weeks with our team in 34-degree water, contributing his talents in underwater photography. This was a fair commitment from someone who lives and works off a boat in the Bahamas. The Harbor Branch Research Vessel SEWARD JOHNSON was made available to us through a NOAA Sea Grant project conducted by Michigan State University. We thank Bill Cooper, Ken Pott and Patrick Labadie for their roles in making this possible.

For information and assistance in understanding the commercial fishing, resort, and mining sites at Isle Royale and the vernacular small craft we would like to thank the late Myrtle Johnson, Tim Cochrane, Ingeborg Holte, Milford Johnson Jr., Reuben Hill, Stanley Sivertson, Roy Oberg, Marge McPherren, Elvis Moe, Donald Anderson, Donald Wobrink, Phil Gale, and Jim Woodward. Isle Royale concession personnel who went out of their way to help us include manager Ron Sanders. Last, but definitely not least, were the many seasonal employees at Isle Royale that gave up their lieu days to help with boating operations, participate in the diving research activities and stoke the sauna.

Barbara Stanislawski has taken the brunt of the secretarial duties involved in the typing and arrangement of this report in a finished format. In addition to the authors and contributors, various sections of this report were reviewed in draft form by the following people: Jim Bradford, James Delgado, Kevin Foster, Allen Saltus, David Snyder, Bob Krumenaker, Stu Croll, Bruce Weber, Thomas Hobbs, Jack Morehead, Don Brown, Dick Gould, Ron Ice, Cal Cummings, Mark Lynott, Patrick Martin, Joy Waldron Murphy, and National Park Service Chief Historian Ed Bearss. Alice Benfer did a helpful review of the entire final draft, and Ernesto Martinez did final inking of all of the sketch maps in Chapter VI.

Daniel J. Lenihan

EXECUTIVE SUMMARY

With the formation of the Submerged Cultural Resources Unit in 1980, a decision was made by the National Park Service to use Isle Royale National Park as the focus of a prototype research program to inventory maritime archeological sites. The phase of management-oriented archeological research, which emphasizes documentation and evaluation of known sites, was considered the priority for a park with a known significant resource base and established sport diver use patterns. Other national parks in California and Texas were chosen as test cases for the survey or discovery phase of submerged cultural resources management.

Little in the way of guidelines existed for conducting submerged sites inventories, so much communication between managers and researchers was critical to the program's successful completion. This report is the result of the Isle Royale underwater research effort and it includes a series of recommendations for future protection and interpretation of underwater archeological sites that should have application to many other areas of the National Park System. It is designed to provide information for line managers on specific submerged cultural resource issues (as in Chapter VII and VIII) with substantial backup information to satisfy interpretive needs at the park (as in Chapters IV, V and VI). The obligation to maintain strict professional standards in reporting on National Park Service cultural research activities was also recognized, and some chapters such as II and III may be of primary interest to maritime archeologists or historians.

The fieldwork at Isle Royale was composed of short, intense sessions lasting 2-3 weeks each year for 5 years. Total time spent in the park by the research team was 16 weeks with an average of five individuals working at any one time. Background research and report writing was usually conducted during the winter and scheduled around other commitments of the unit. The occurrence of unexpected major research opportunities during the summers of 1985 and 1986 encouraged extension of the final report completion date from fall of 1984 to winter of 1986.

The intention was to develop a methodology that was as cost efficient as possible and that allowed a strong interface between area personnel and the research team. Much of the philosophy for approaching submerged cultural resources management identified in this report is a product of many hours of discussion with park managers and field staff. Experiments in underwater site interpretation were also put into effect and assessed during the 5 years since the inception of the project.

In addition to this report, a considerable quantity of videotape footage and photographs have been organized into a format that permits easy accessibility to interested managers or researchers. One copy of all material is to be kept at the park and the originals are archived at the headquarters of the Submerged Cultural Resources Unit.

CHAPTER I. INTRODUCTION

Isle Royale National Park was certainly not originally established for the purpose of preserving shipwrecks. It is tempting, however, to ascribe some grand scheme to the existence of such a dramatic assortment of wrecked vessels within the protected waters of a national park. The island is literally surrounded by an array of ship remains that represent many types and stages of development of maritime steam technology from the 1870s to the mid-1900s. This assortment includes passenger/package freighters, bulk freighters, a side-wheeler, wooden-hulled ships and steel behemoths more than 500 feet in length, one of which went down as recently as 1947. If one were given the opportunity of designing an underwater museum of Great Lakes marine architecture, it is likely that it would differ only slightly from what is presently within the waters of Isle Royale. Perhaps the remains of a wooden schooner to complement the steam vessels would be the most welcome addition. Even some of the local fishing craft of unique vernacular design have found their way to the bottom of the Lake and have assumed the roles of diving exhibits. For the professional archeologist, the non-shipwreck underwater sites also offer an excellent opportunity for studying subsistence patterns in a lacustrine, sub-arctic environment; where better than a clear lake surrounding an island where the cold water conveniently preserves even the organic residues of past human behavior?

This last factor, the nature of the underwater environment around Isle Royale, contributes much to the Park's aura of being an underwater museum. The sights greeting a diver are stirring to even the most experienced and hard-to-please members of that fraternity. The more modern, intact wrecks such as AMERICA, EMPEROR and CONGDON attract most of the first-timers, because they comprise a superlative underwater experience. Very few places in the world offer shipwrecks with such a "presence" in conditions that highlight the other-worldliness of the diving experience. It is possible to swim down companionways, through stateroom doors, up stairs and over engines that appear as if it would take only a head of steam to bring them back to life. Old-fashioned shoes amid the confusion of crushed bulkheads bring home the poignant personal tragedy that was experienced by so many crew and passengers and their surviving families. There is something about being there and feeling the cold water starting to creep through one's protective suit and sensing the pressure and dominance of the Lake that permits an empathy with an event in history that is hard to imagine from a dry, warm perspective on land.

This unique experience is as much a part of the quality of life that should be preserved in national parks as is the beautiful, natural scenery that characterizes the island. In order to leave the historic scenes as undisturbed as possible, a totally nondestructive approach was employed in the study and recording of these remarkable underwater sites.

Underwater Archeology and the Age of Steam

Although the management concerns that prompted our inventory of submerged sites at Isle Royale are clear to most, not so the archeological import of studying steam age technology. Often, those who can relate well to underwater archeological studies of ancient sailing ships cannot understand the attention paid by archeologists to late Nineteenth Century and early Twentieth Century steam vessel wrecks, such as the ones at Isle Royale. The questions posed in this regard are reasonable ones: aren't there plans in existence for many of those vessels, and aren't there representatives of this type of vessel still afloat? The answer to both questions is "no." In fact, there are not plans available for many of the vessels that sank at Isle Royale, and when plans do exist, they rarely deal with hull features above the waterline and/or superstructure and the modifications that were endorsed over time, which are of great importance to the archeologist studying behavioral adaptations. Likewise, only the two steel-hulled bulk freighters that are wrecked at Isle Royale have any representatives of their vessel type still afloat.

Archeologists are interested in using the material record to determine what people did, not what they think they did or said they did. Additionally, much of what we need to know about past human behavior is best represented in the archeology of the mundane -- the things that contemporary writers thought too obvious or insignificant to record. Thus is evidenced the complementary nature of the historic record and the archeological record, which is so exciting to those who feel that historical archeology will eventually serve as the proving ground for all anthropologically-oriented archeological theory.

There is another issue regarding the documentation of steam technology that should be mentioned: the problem of myopia in the study of the recent past. Because we are closer to something in time does not necessarily mean we understand it better. This is particularly true of the last two centuries in Euroamerican affairs. Although steam engines in the most literal sense have been in existence for thousands of years in such novel forms as door closing mechanisms on ancient tombs, they were more appropriately termed "devices." It was not until the late 1700s that steam engines were used on land for doing work, and the 1800s before they saw effective utilization as a source of motive power on ships. Although historians will argue over the issue of whether Fitch or Rumsey or somebody else may have been the real "inventor" of the steamboat, it matters not a whit to the social scientist. The popular belief that Fulton invented the steamboat in 1807 serves quite well, because the steamboat NORTH RIVER of CLERMONT effectively ushered in the new age of maritime steam technology by succeeding in capturing the imagination of the general public.

CLERMONT was important because it worked, and because the fact that it worked was well marketed. Social dynamics are less keyed to historical facts than they are to a society's notion of what those facts are. Fulton's boat had good press, and Fulton had good biographers, so steam came alive in the imagination of people who had the money to build boats.

The enormous impact of steam technology on man is worth contemplating. It may put into perspective why it is such an important and difficult period of human endeavor to document in the historical and material records. It would not be an unbalanced assessment to state that man evolved from a common heritage shared by several other extant primates, learned complex manipulation of tools and symbolic thought over several million years, and in the Eighteenth Century invented the steam engine, which was followed shortly thereafter by nuclear power.

The thermodynamic forces involved in the steam engine dwarfed anything seen before and presented an unparalleled potential to the species to manipulate phenomena. The strength of thousands of beasts of burden could be harnessed in one machine that need only be fed various sorts of combustibles that were easily available. Mines could be cleared of water, tunnels dug under rivers and canals built at speeds and in places never conceived before steam use. Most important for our purpose is the fact that steam also meant cargoes of magnitudes greater in size could be moved against the wind over water.

In short order, the only limits to shipbuilding were dictated by the composition of building material of the vessels; i.e. it is difficult to make wooden ships much over 300' in length that don't sag unacceptably in the middle or droop (hog) at the ends, regardless of how many engineering tricks are employed. It wasn't all quite that simple, of course. The atmospheric engine couldn't drive boats, and it took the development of adequate pressure cylinders, separate condensers and efficient boilers before steam power could be fully utilized for fast rotary motion and the full implications for steam at sea began to be realized.

The competition from sail was fierce at first, for it must be remembered that much of the creative surge of energy that typified the explosive development of steam technology was not absent from the lofts of sailmakers and shipwrights. The culmination of several thousand years of wind-ship technology was evident in the latter part of the Nineteenth Century. The most refined, most efficient and perhaps the most elegant sailing ships ever constructed were competing with steam ships into the Twentieth Century. Mixing fire and water is an unbeatable combination, however, and man's preference for his Promethean heritage prevailed.

Research Design

There has been a considerable degree of stress generated over the issue of "proper" scientific method in the social sciences. Although there has been somewhat of a fixation on research designs in terrestrial archeology, this has not been the case in maritime archeology, where a negative reaction regarding their use is sometimes evident (e.g. Bass 1983).

There is no doubt that useful, professional research has been carried out on underwater sites without benefit of explicit designs, but that does not excuse maritime archeologists in the public sector from meeting this basic requirement of scientific reporting. A research design is presented in this report so that the reader may know the rationale behind our field and archival activities, and better understand why certain methods and techniques were selected, and others rejected. This research was paid for with public funds and it concentrated on publicly-owned resources -- added reason for discussing our rationale and methods.

The research design was largely mechanistic in nature. Straightforward questions about the material record were asked and much energy was devoted to purely descriptive documentation of the sites. Our analysis and interpretation was geared toward integrating the hard data from the material record with the data from the archives. This results in a product of putty-like consistency, which hopefully represents the best qualities of historical archeology, i.e., it should be flexible enough to stretch but holds together under considerable scrutiny.

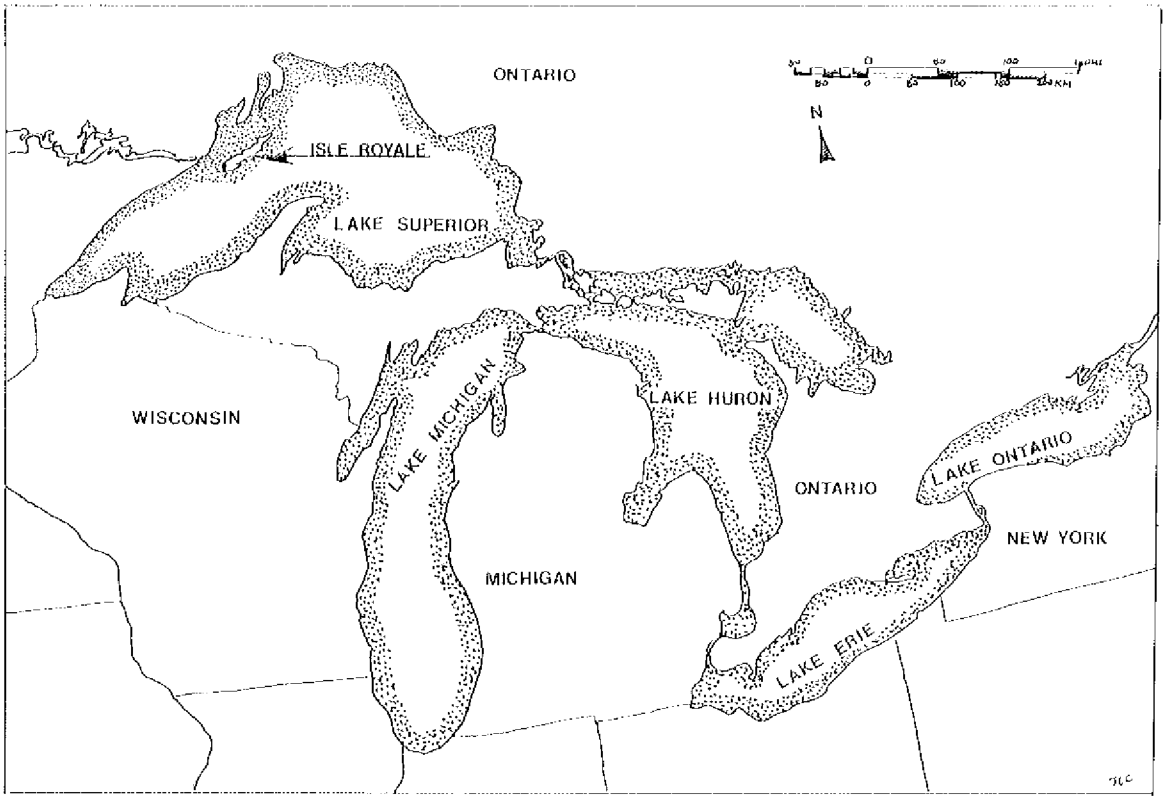


Fig. 1.1. Isle Royale in the context of the Great Lakes Region.

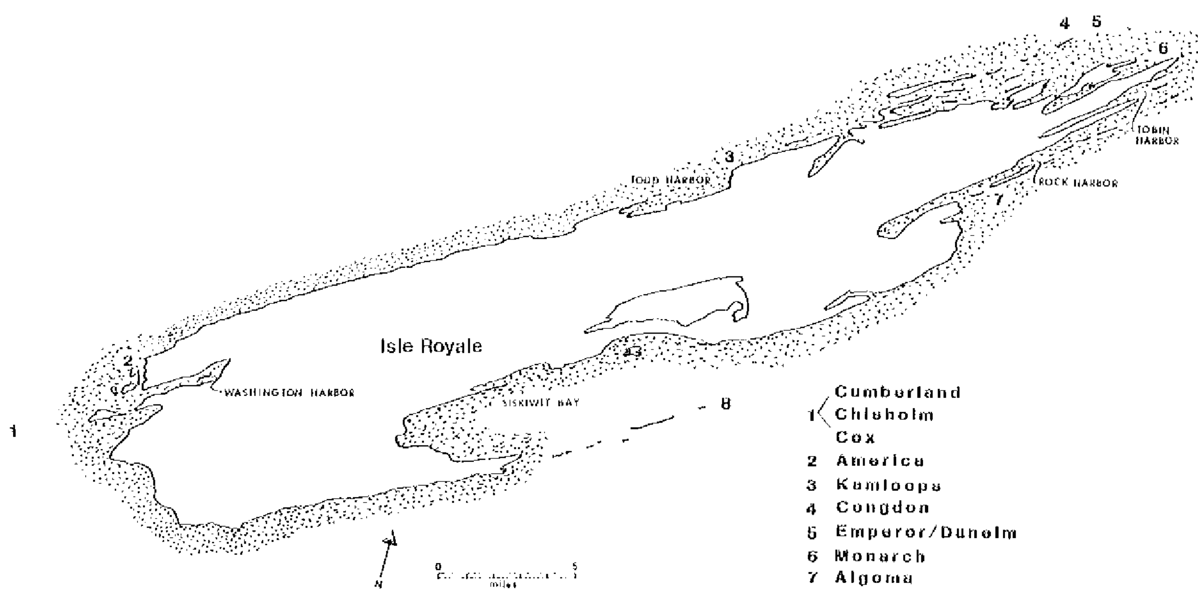


Fig. 1.2. Isle Royale shipwrecks

Since American archeologists have their roots entwined more in anthropology than in history, we have consistently examined our subject matter from a social scientific perspective. In those cases in which we felt Isle Royale shipwrecks and other submerged sites were most productively viewed against a backdrop of regional or extra-regional behavioral patterns, we strived to present them in just that way. In most cases this occurred during the data evaluation process between field seasons. Cerebrating about the anthropological implications of information gleaned from the archives or from the lake bottom resulted in conclusions that are offered in the text, particularly in Chapters II and III. There is no presentation of hypotheses and test implications because it was felt that a hypothetico-deductive approach was not appropriate to this inventory. The research design formulated is a problem oriented one, however, and it represents an attempt to accommodate the best from history and social science in a cultural resources management framework. We will endeavor to make that thought process explicit for the benefit of those investigators who may follow at Isle Royale or those who have interest in similar research problems.

General Problem Statement

The objective of the field research was to obtain as much descriptive data on the underwater archeological residues as possible with given equipment, time, and personnel resources. This was to be accomplished using non-destructive methodology emphasizing mapping of exposed wreckage, photography, artistic perspective drawings and videotape footage. Archival work was also initiated to obtain primary source references on each vessel being investigated in the field. The literature base of the social sciences, particularly anthropology, was utilized to identify a range of broad behaviorial issues that would be addressed in both the field and library components of the research activity. Following are the social, economic, and technological questions that were addressed as thematic issues throughout the field research and writing of this report:

I. What are the major environmental, social and economic attributes of the Great Lakes region that would affect the material record at Isle Royale, i.e., nature and distribution of shipwreck remains?

A. Natural Factors: Does operation in small water bodies with the potential for severe weather influence maritime adaptive behavior? Do short wave periods, lack of sea room for maneuvering in storms, inland fog conditions and icing-over create situations that demand significantly different responses than do seaboard environments in North America? What role does Isle Royale play as a natural obstacle to shipping in Lake Superior?

B. Cultural Factors: What effects in Great Lakes maritime activity devolve from the demands to operate in a small, highly-contained shipping universe? Was the shipping activity in the Lakes notably more intensive than in the rest of the Nation during the steam age, and how did the demands for moving large amounts of bulk cargo, e.g., iron and grain affect developments in ship architecture and motive technology? How do the shipwrecks of Isle Royale and associated submerged historic sites reflect any of these influences?

II. What elements of Great Lakes maritime culture represent an extension of ocean going traditions?

A. Do technological responses to economic pressures on the Great Lakes replicate developments on the Atlantic seaboard, western rivers or post gold-rush shipbuilding activity on the west coast?

B. Is there a cross-fertilization of ideas, traits, and behavior that can be identified between the Great Lakes, western rivers, and the Atlantic seaboard?

C. Can the technological attributes of the Isle Royale shipwreck population be used as an indicator to gauge diversity, borrowing or independent invention when compared to other ship and shipwreck studies?

III. Are there any unique characteristics to the subculture of seamen on the Great Lakes?

A. Did the seamen on Great Lakes vessels derive from local populations that had no prior seafaring traditions, or did they tend to be imports from the coast who were specifically emigrating west for jobs on the Lakes? How did these trends vary over time?

B. What effects, if any, did short voyages and frequent turnarounds have on Great Lakes crews? Did the development of technological advances, such as faster loading and unloading systems for bulk cargos, have any bearing on the life of the common seaman?

C. How did Great Lakes seamen perceive the environment in which they were working? Was it considered more desirable, less dangerous, or more lucrative than working on the coast or rivers? Did Lake Superior or Isle Royale hold any special significance to these people?

IV. Did the dynamics of social adjustment to the Industrial Age differ on the Great Lakes?

A. Was it a more intense industrial environment in terms of greater capital investment for high-yield returns and did technological advances create a more or less stressful milieu for developing lifeways in the region?

B. Was there a tendency to push limits on Lakes navigation in response to heavier capital investment? Was there really a "one-last-voyage syndrome" as identified by Murphy (1984), which resulted in a greater frequency of late-season disasters on Lake Superior? Does the shipwreck population at Isle Royale support this contention?

A separate research strategy statement was developed for each phase of the multi-year project before entering the field. These statements of objectives and proposed methodology were discussed in interim reports on the Isle Royale research that were distributed to park managers and to the profession for peer review.

There were also specific questions about vessel construction, architectural elements, etc., that were formulated after analysis of each season's field work that were targeted as research problems for both the archives and the field. It quickly became apparent that there were many questions more effectively answered in the field in some instances and the archives in others. Combining the archeologist's method with the historian's resulted in a final product which, it is hoped, adds up to more than the sum of the parts.

Specific Field Objectives

I. CUMBERLAND/CHISHOLM Wreck Site

A. Develop a planimetric map of the wreckage field of CUMBERLAND and HENRY CHISHOLM and determine what percentage of each vessel's hull and superstructure is represented on the site.

B. Identify diagnostic architectural features of both vessels that would permit distinguishing the intermingled remains and assigning major structural elements to the correct ship.

C. Collect data on the environmental context of the wreckage so that conclusions could be drawn regarding the wreck event and post-depositional processes on the site.

D. Develop an artist's perspective drawing of the CHISHOLM engine in place on the bottom. This is a museum quality piece of Nineteenth Century technology which needed documenting in detail.

E. Determine means of longitudinal and transverse structural support in both vessel's remains.

F. Obtain sufficient data to create a cross section view of the vessel's hull construction.

G. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

II. MONARCH Wreck Site

A. Develop a planimetric map of the wreckage field of MONARCH and determine what percentage of the original ship is represented in the material record.

B. Identify means of structural support for the deck, since no hanging or lodging knees are evident on the site.

C. Collect data on the environmental context of the wreckage so that conclusions could be drawn regarding the wreck event and post-depositional processes.

D. Obtain sufficient data for a cross section view of the vessel's hull construction.

E. Obtain photograph and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

F. Identify the location of the remainder of the ship. (After the project was underway, it became apparent that a significant portion of the original ship was not represented in the known wreckage field; consequently, another objective was targeted.)

III. GEORGE M. COX Wreck Site

A. Develop a planimetric map of the wreckage field and determine what percentage of the vessel's hull and superstructure is represented within the known confines of the site area.

B. Collect data on the environmental context of the wreckage field so that conclusions could be drawn regarding the wreck event and post-depositional processes on the site.

C. Develop an artist's drawing of the relatively intact stern section of wreckage from an oblique perspective.

D. Obtain sufficient data to create a cross section view of the vessel's hull construction.

E. Determine if there was additional significant wreckage scatter heading aft from the shallow bow section material. A deep drop-off was noted by the team in 1982, and examination of this area became a field objective for 1983.

IV. Rock of Ages Area

A. Determine the interrelationship of the three major shipwrecks in this area and how they relate to their environmental context; i.e., reef lines, drop-offs, etc.

V. ALGOMA Wreck Site

A. Develop rough planimetric sketch map of known wreckage field of ALGOMA.

B. Collect data on the environmental context of the wreckage so that conclusions could be drawn regarding the wreck event and post-depositional processes on the site.

C. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

VI. GLENLYON Wreck Site

A. Develop a planimetric map of the wreckage field of the vessel and determine what major elements of the vessel's hull and superstructure are represented.

B. Collect data on the environmental context of the wreckage so that conclusions could be drawn regarding the wreck event and post-depositional processes on the site.

C. Obtain sufficient data to create a cross section view of the vessel's hull construction.

D. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

VII. KAMLOOPS Wreck Site

A. Generate artist's perspective drawing of vessel in environmental context from on-site observations.

B. After consulting all that is known from historic record, make series of on-site observations designed to answer specific questions about wreck event and post-wreck site formation processes. Very little is known from historic record regarding what happened to this particular vessel because there were no survivors.

C. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

VIII. AMERICA Wreck Site

A. Generate data for artist's perspective drawing of America in its resting place.

B. Collect data on the environmental context of the wreckage so that conclusions can be drawn regarding the wreck event and post-depositional processes.

C. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

IX. CONGDON Wreck Site

A. Generate data for artist's perspective drawing of CONGDON in its resting place.

B. Collect data on the environmental context of the wreckage so that conclusions can be drawn regarding the wreck event and post-depositional processes.

C. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

X. EMPEROR and DUNELM

A. Generate artist's perspective drawing of EMPEROR in environmental context.

B. Obtain information about environmental context to allow conclusions to be drawn regarding post-depositional processes.

C. Photograph anchors lying next to EMPEROR, which likely belong to DUNELM.

D. Obtain photographic and videotape coverage of the site for general site documentation purposes and for use in interpreting the site to the general public.

XI. Non-shipwreck Sites (submerged components of terrestrial sites and small craft remains).

A. Examine a representative sample of the full range of archeological sites on the island which comprise residues of past maritime oriented behavior. Concentrate on lighthouses, fish camps and other shore facilities in which a full understanding of the site could only result from using a combination of terrestrial and underwater archeological techniques.

B. Obtain information on vernacular marine architecture as evidenced in small craft remains which are found both on the lake bottom and shoreline of Isle Royale.

Methodology

Logistic considerations significantly influenced the overall research approach. Isle Royale is remote by any standard; has difficult access for heavy equipment, and the underwater environment of the sites is cold and usually deep. Water temperatures rarely exceeded 39 degrees Farenheit on any of the sites, and air temperatures in June were often below freezing. Visibility was usually quite good, 20-50 feet, but low light-levels and a high concentration of coarse particulate matter suspended in the water made certain photographic tasks more difficult than might be expected.

The research approach emphasized short, intense field sessions each year (usually lasting about 3 weeks) that were carefully planned and oriented toward maximum data recovery for every moment in the field. Researchers (usually 5 or 6 in number) lived on a 38-foot boat and dived in shifts during a twelve-hour day, every day, for the 3-week hitch. This proved very cost-effective, but by 1984 the procedure was modified to include a couple of rest days because of possible safety problems developing from diver exhaustion and a growing concern that residual nitrogen factors were stretching the recommended limits of the U.S. Navy decompression tables after weeks of repetitive diving.

Mapping methodology, in most instances, consisted of laying a small-gauge nylon baseline through major wreckage fields and building a map using the baseline as a backbone. In those cases where limited detail could be rendered due to the size of the site, team archeologists selected features most crucial to a useful interpretation of the remains. These were marked with survey clips made of clothespins and flagging tape. Angles were turned with a large protractor whenever the baseline touched or went over an object. Large pieces of hull, superstructure or machinery were labeled as specific site components and trilaterated from the baseline with measuring tapes after they had been drawn in detail by a mapping team.

Fig. 1.3. Generation of line drawings was a major documentation method used on the shipwreck sites. Photo by Mitch Kezar.

Fig. 1.4. NPS scientific illustrator Jerry Livingston shows sketch to be incorporated into GLENLYON site documentation. Photo by Mitch Kezar.

Fig. 1.5. Video documentation was used extensively during the project. This self-contained color unit took the place of tethered black and white units used at the beginning of the project. NPS photo by Joe Strykowski.

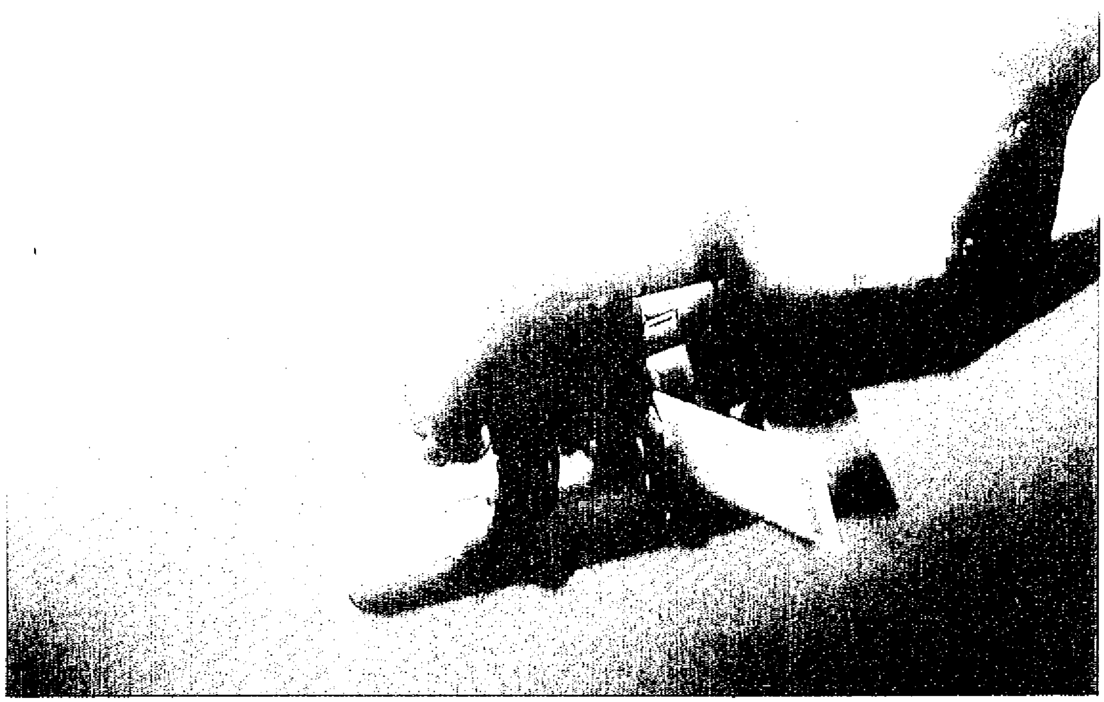


Fig. 1.6. Diver propulsion vehicles were used to survey the area surrounding the more scattered sites. NPS photo by Joe Strykowski.

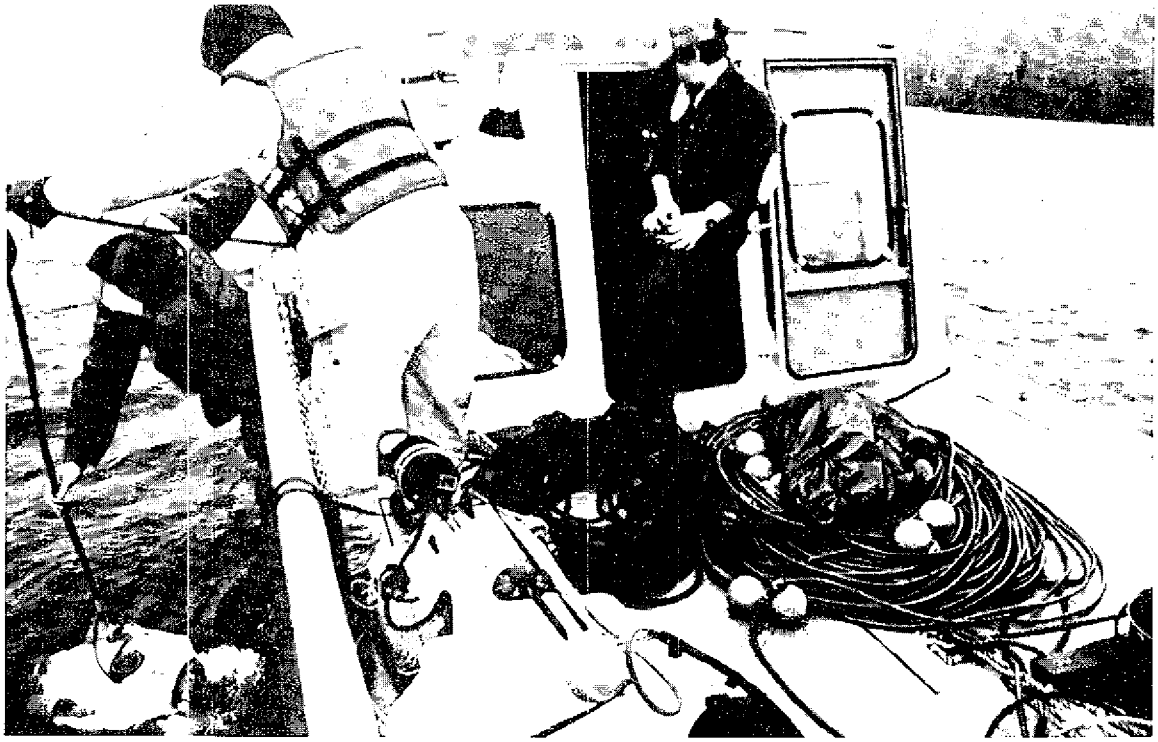


Fig. 1.7. Two remote operated vehicles (ROV) deployed from NPS patrol boat proved very effective in studying the KAMLOOPS site. ROV photo by Emory Kristof courtesy of National Geographic Society.

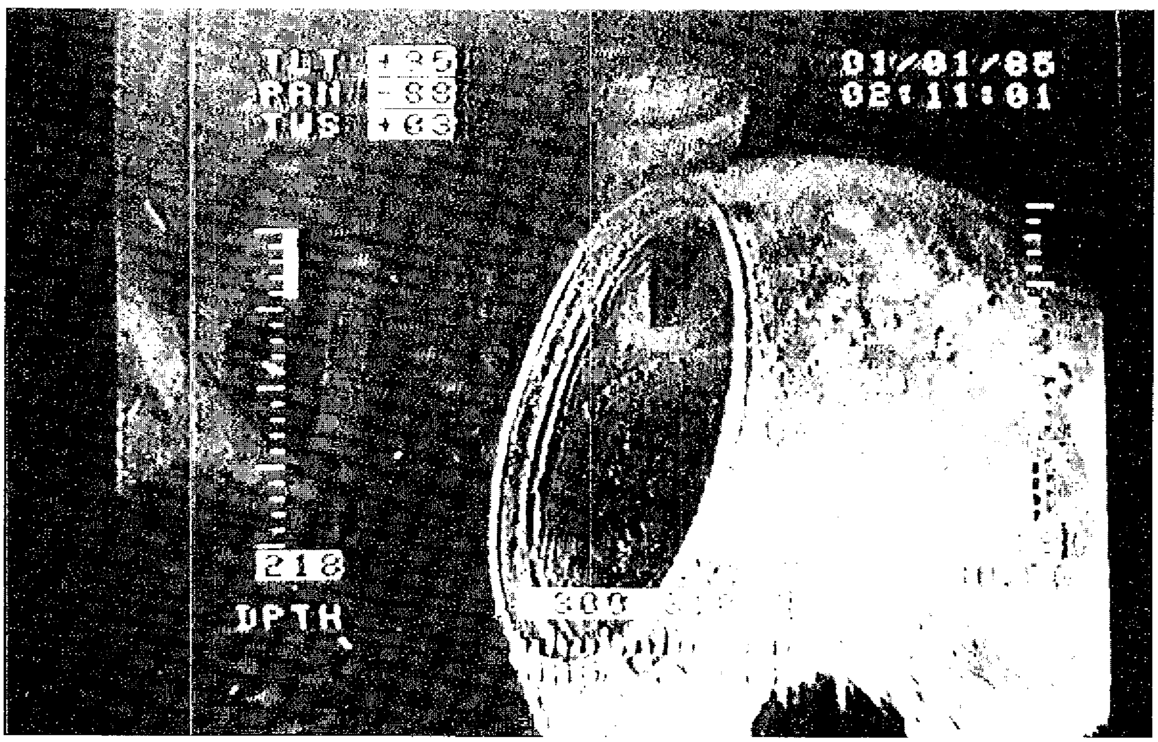


Fig. 1.8. An electronic image of the Sea-rover video display taken from video tape. ROV photo and electronic image by Emory Kristof courtesy of National Geographic Society.

Fig. 1.9. RV SEWARD JOHNSON was available to project investigators for a brief period in 1985 as a part of a NOAA-sponsored data collection project on the Great Lakes. NPS Photo by Joe Strykowski.

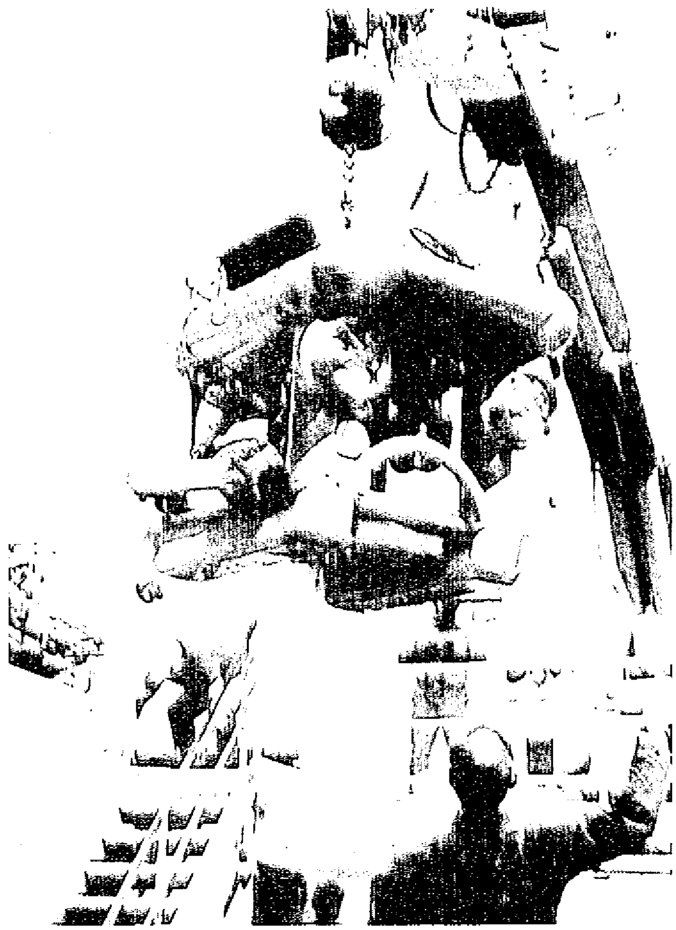


Fig. 1.10. CORD ROV aboard SEWARD JOHNSON used to search deep areas for additional wreckage near ALGOMA. NPS photo by Joe Strykowski.

The level of detail and accuracy of the maps and other graphic representations of the shipwrecks in this report varies somewhat from site to site. The major wrecks at the Park derive from the late Nineteenth and early Twentieth Centuries, and for some of them partial construction plans were extant. It would obviously not be necessary or desirable to map them to the degree of detail necessary in documenting, for instance, a classical period vessel in the Mediterranean. Other factors that influenced decisions on the level of detail were: extent of scatter material at individual sites; nature of construction (wood or metal); and logistical considerations such as ease of access, depth of water, and water temperature. To convey a general idea of the nature of these problems, consider that just the major concentrations of wreckage at Isle Royale, if gathered together, would cover an area more than 1 million square feet. That is approximately 100 to 1,000 times the site area of most early wooden vessels that are being investigated by our colleagues. On several sites at Isle Royale, baselines of marked string were laid over continuous wreckage for 1/3 mile. Water depths over the sites ranged from 3 feet to 270 feet.

Consequently, the following general guidelines were adopted. Wooden wrecks (CUMBERLAND, CHISHOLM and MONARCH), which incidentally, were also the earliest built vessels in this shipwreck population, were mapped to the highest degree of accuracy. In most cases, each individual timber was counted and measured, e.g., the number and size of the limber boards on the section of CHISHOLM's hull bottom depicted in Figure 5.1 is not an approximation; it is a precise drawing. In other places some license has been taken to sketch or omit detail, e.g., on large sections of metal hull in the case of GLENLYON or COX. The pieces are where they should be, but specific details of construction such as fittings, rivets, etc., may be approximated or omitted. Since metal curves and twists as a result of underwater dynamics, its exact replication on paper does not convey enough information to warrant time expenditure past identifying its basic nature, i.e., hull pieces, superstructure, etc. Wood, on the other hand, breaks in discrete units, whether large or small, and it is useful to document in detail where possible. A decision was also made to limit any serious recording activities by divers to depths less than 150 feet for reasons of safety and cost efficiency. Remote Operated Vehicles (ROVs) were used in 1985 and 1986 to obtain additional information on the ALGOMA and KAMLOOPS wreck sites, which had components well beyond 150 feet in depth.

This was the general philosophy that conditioned the level of detail and accuracy that was strived for on the scattered wreckage fields. In the case of the intact vessels (AMERICA, CONGDON, EMPEROR, KAMLOOPS), the approach used was that of developing a perspective drawing in association with photography to convey an impressionist view of the site.

The artist's perspective drawings are just that, but they are drawn by illustrators who have spent many years doing precise mapping work underwater, and accuracy has been emphasized in all cases when it conflicted with artistic preference. Drawings of this sort in association with photographs were determined to be the best method for portraying the present condition of a large intact vessel in deep water. It is a dramatic example of a situation in which graphic recording skills still serve a purpose that cannot be effectively duplicated by technology.

The question might be asked: Why not photogrammetry? The answer is that given problems of limited visibility and light penetration and the very high relief of both the topography and the sites themselves, this technique could not be effectively employed, using any technology available to the researchers.

The highest level of technology used in what was, for the most part, a very "low tech" operation was the aforementioned ROVs. An ROV was deployed in 1985 from RV SEWARD JOHNSON to search in deep water for bow structure of ALGOMA. The research vessel and submersible operators had made a decision not to attempt dives on KAMLOOPS or the stern of CONGDON because of proximity of reefs and fear of entanglement in wreckage. Using two miniaturized units from a 32-foot Park patrol boat in 1986 seemed by ar the most effective approach. These units were provided by the National Geographic Society, and their skilled operators were able even to penetrate the engine room of KAMLOOPS using two ROVs in a "buddy system."

Shipwrecks vs. Submerged Components of Land Sites

The majority of time and energy spent during this inventory effort was on shipwrecks, rather than underwater components of terrestrial sites, e.g., fish camps, mines, historic landings, etc. This is not due to a value judgment regarding relative significance of the shipwrecks, but for two unrelated reasons. First, the shipwrecks are, by far, receiving the greatest visitor pressure at Isle Royale, and second, shipwrecks are the type of resource that is most effectively dealt with by nautical specialists. Terrestrial archeologists familiar with the local prehistory and history are better qualified to direct work on land-based activity areas with the Submerged Cultural Resources Unit playing a supportive, rather than lead role. We have included a representative sample of land-based sites in this report (see Chapter VI), but it is not meant to be as comprehensive as the work done on the shipwrecks. Because the inland waterways of Isle Royale tend to be siltier, and much of the midden material and other cultural manifestations are covered by overburden, investigation of land-based sites demands a more high-impact archeological methodology. Consequently, in those areas investigated that involved any bottom disturbance, the NPS Midwest Regional Archeologist or his designate was in attendance.

This Report

As the title states, this is a report on the submerged cultural resources, i.e., underwater archeological record, of Isle Royale National Park. As such, the "fabric" (submerged archeological sites) has determined the "form" (manner of research and presentation) in this publication. History, in this context, serves in a support role to archeology.

The historical document research for Chapters IV and VI included extensive examination of primary sources. Searches were conducted in the archives of the Institute for Great Lakes Research at Bowling Green University, U.S. National Archives in Washington D.C., Canadian Archives in Ottawa, J. Porter Shaw Library, National Maritime Museum, San Francisco, privately developed collections, and at the Canal Park Museum in Duluth.

Chapter III on vessel typology of Lake Superior develops a technological context for understanding the significance and relevance of the shipwreck component of the submerged archeological resources at Isle Royale. The cross section of vessel types in the Park is used as a springboard for a discussion of processual trends in maritime architecture in the Great Lakes Region. A contemporary backdrop of vessel design and socioeconomic dynamics is interwoven in the chapter to enhance the social scientific perspective from which we have chosen to view the Park's shipwreck population.

Chapter II attempts to move one more step away from the particular toward the general. In this case, the intent has been to identify patterns in the maritime behavior of the region that have relevance to the shipwrecks at Isle Royale. This is not intended to be another history of the Lake Superior region, but a discussion of the broader social processes that in combination comprise the maritime interactive sphere of shipping activity on the Great Lakes.

Chapter VII is an experiment in cultural resources management reporting. The intent is to document the complex decision-making processes that took place in order to achieve the present management philosophy at Isle Royale. The present-day approach is then discussed in detail so that other marine park managers can have one comprehensive real-world model to consider as they address similar issues. Chapter VII also serves as a form of institutional memory.

Chapter VIII, the conclusion of this report, is composed of a series of afterthoughts, management recommendations and a statement of future research potential. The Management Recommendations section is what it purports to be with the following qualifier. In most cases, according to National Park Service policy, the cultural resources management specialists are expected to make a series of recommendations to the line managers who have responsibility for running the Park and the Region. There has been so much interchange of ideas and cross fertilization between the researchers and management in this particular case that this final statement of "recommendations" is largely an expression of a joint conceptual effort. As always, however, recommendations are to be viewed as suggestions and are not binding on future managers in any sense.

Finally, this report is the product of a labor of love. It is offered to those who manage, those who protect, and to those who look and enjoy, by a team of researchers who feel fortunate to have been involved in some small way with the future of this Park.

CHAPTER II. LAKE SUPERIOR MARITIME TRADITION, SOCIOECONOMIC CONTEXT

Introduction

It is noteworthy that writers and historians are comfortable using the terms "maritime" and "marine" when discussing the Great Lakes. The "of and pertaining to the sea" connotations of those terms seem appropriate. The reason is that most people regard those bodies of water, located hundreds of miles from any ocean, as seas and not lakes. Although due consideration will be given in this study to the differences between ocean and Great Lakes, it is significant that the commonalities in their nature have had the greatest effects on common linguistic usage. A regional periodical popular with many nautical buffs is entitled Inland Seas, and a book dealing with the history of the Coast Guard on the Great Lakes is entitled Guardians of the Eighth Sea (O'Brien 1976). There are no such marine metaphors evident upon examining the equally rich and technologically developed riverine traditions. Riverboats are not ships, and they are not run by sailors; riverboats are riverboats, and they are operated by rivermen. They have traditionally stopped at river landings, not at ports of call.

To a lesser degree, Long Island Sound and Chesapeake Bay share some of the same attributes associated with large semi-contained bodies of navigable water. Puget Sound is also occasionally referred to as an "Inland Sea," and there are, in fact, some interesting aspects of ship design in that region that parallel vessel architectural adaptations in the Lakes.

There is a danger, however, in trying to look at any of these confined maritime spheres (lakes, sounds, or rivers) in a vacuum. None of them were really closed systems, especially after the building of networks of canals in the Nineteenth Century. Maritime innovation on the western rivers, for example, did not go long unnoticed by Lakes seamen and traders, and Atlantic coast trade had a particularly strong influence on the Lakes.

Although the Lakes have their own unique maritime heritage, it is clear that the traditions of those sailors that plied the Lakes are closely tied to the blue water sailor. The major difference is the size of the respective spheres of maritime interaction. Most sailors on Lake Superior never interact with populations other than those found in a handful of ports in the heartland of the United States of America. Their saltwater brethren have rubbed shoulders with every race and nationality on the planet and engage in journeys of much greater duration.

The collective self image, which is perpetuated in stories and songs of Great Lakes navigation, is one that combines respect and fear of the Lakes' moods with an interesting combination of grim determination and fatalism. The sense of community among Lakes sailors was reinforced by their comparative ease of maintaining family ties in their smaller interactive spheres, a fact that additionally helped them develop greater networks of community support and empathy in time of conflict.

Some of the earliest inroads of trade unionism were made among the more stable Great Lakes seamen community. The Lakes' Seamen's Union was organized in 1878, although it had antecedents as far back as 1863 (Standard 1979:25). Associations of owners such as Lakes Carriers' Association and Cleveland Vessel Owners Association became the nemesis of the unions, and the level of bitterness never lessened as the pendulum of success swung between labor and management through the turn of the century. A heavy concentration of capital in fewer hands in the iron and steel industry, subsequent economic depressions and booms and wars all influenced the lot of the Great Lakes seamen in this volatile industrial environment.

As navigational entities, the bodies of water on which Lakes seamen work comprise one of the most dangerous shipping environments in the world. The diminutive size of the Lakes compared to that of the oceans offers little in the way of comfort to the captains or crews of Great Lakes vessels. With little warning, all five Lakes can change their demeanor from flat calm and peaceful to ominous and violent. The shallowest, Lake Erie, is the most susceptible to these volatile shifts in temperament. Lake Superior, the largest and deepest, can generate waves that compare in height to those found in major ocean storms. The smaller wave lengths and periods associated with Lakes storms also offer no solace because the stress factor they place on ship hulls is sometimes a magnitude greater than those inflicted by ocean swells.

An additional curse of the comparatively small size of the Great Lakes' environment is the lack of sea room available for maneuvering, which offers a slim margin of grace for navigational errors. The option of heading out to open sea to ride out a storm is not a viable one, and in the days preceding the development of sophisticated electronic positioning equipment, lack of sea room was a critical issue for Lake skippers. These inland water bodies are also subject to pervasive heavy fogs, which cause aggravated difficulties in narrow waterways. Many of the vessels lying at the bottom of the Great Lakes came to grief on quiet water, victims of shoals or collisions with other vessels in thick fog.

Additionally, air temperature variations are extreme. Portions of the upper Lakes straits and waterways have frozen solid occasionally trapping entire fleets of vessels for the remainder of winter.

It is understandable, therefore, the impulse of Great Lakes historians to focus on the violence of the Lakes environment, if for no other reason than to ensure that the uninitiated reader will grasp the fact that an inland body of water can hold the awe and menace of an ocean.

A factor of equal importance in identifying the Lakes as a major maritime entity is sheer socioeconomic intensity. By the end of the Nineteenth Century the Great Lakes had more tonnage being moved from place to place and more vessels plying each square mile of water area than all the rest of the United States, Atlantic and Pacific seaboards combined. The Lakes vessels were, at their peak, also the most prosperous ship tonnage in the world. Bulk freighters, for example, loaded and unloaded quicker and moved a ton of cargo a mile for less cost than any other vessels on earth (Ashburn 1925:81). It should also be noted that these superlatives occurred in a season duration of 8 or 9 months a year.

Waves of immigrants filled the passenger vessels heading west. Ore from the Misabi and other iron ranges surrounding Duluth comprised some of the largest bulk freight shipments ever moved by man. Coal destined for the upper Lakes passed the downbound shipments of iron. Grain flourished, faltered, and restarted at other points in the Great Lakes region during the 50 years following the Civil War.

This small but environmentally severe and socioeconomically intense maritime environment provided all the ingredients necessary for a high occurrence of shipwrecks. Capital investment in the movement of these vessels was heavy, as was the promise of high profits; factors that encouraged attempts at one more voyage well after seasonal changes would indicate the rational decision to winter in.

Demographic changes during the period of development of Lakes navigation reflected the economic dynamics and what were to become the most densely populated cities in the Nation began their almost exponential rate of growth in the Nineteenth Century. The remainder of this chapter will be focused on the various socioeconomic processes that influenced the development of shipping on the Great Lakes. It will begin with general trends and narrow to the particulars of Great Lakes maritime activity. Where appropriate, comparisons to western rivers, Atlantic, and Pacific trades will be made to establish a meaningful context for understanding the Great Lakes.

One may ask why such a discussion of socioeconomic context is relevant. The collection of ships at Isle Royale was part of a complex cultural system. An understanding of these shipwrecks could only be realized from a consideration of the behavioral patterns and processes that were responsible for their existence, the physical form, cargo and location of their demise. It is clear that the wrecks are not totally random, although their specific loss resulted from an accident. These vessels were parts of the large national economic, political, demographic structure influenced by technological and ecological constraints. This chapter describes the patterned behavior that surrounded and resulted in the collection of shipwrecks at Isle Royale National Park. We see this discussion as a necessary step to the eventual understanding and explanation of the collection of Great Lakes shipwrecks and the cultural processes they represent.

Socioeconomic Processes Affecting Lakes Navigation

The American Revolution ended British mercantilism and unleashed the economic potential of a new nation. The restrictive policies of mercantilism had been designed to increase the wealth of Great Britain by controlling the market economy of the colonies. The newly independent colonies could now enact policies that would further their own interests.

Population and trade, both internal and foreign, grew rapidly, and transportation needs expanded along with them. The interaction of watercraft with railroads, canals and roads combined to form a national transportation system. Watercraft offered the cheapest and, in many cases, the only means of transportation of raw materials, goods and people. The changes in the number of commercial watercraft, and in their form and function, reflected the trends of economic development.

Sectional differences in production and consumption appeared early in the Nineteenth Century. The Northeast rapidly industrialized, forming a manufacturing belt centering on New York that ultimately reached the Great Lakes and contained 65 percent of the manufacturing capacity for the country (Pred 1970:274).

The South developed a dependence on a few staple crops, and the West produced the majority of agricultural products, transported down the Mississippi, for the other regions. The Middle Atlantic and New England states developed financial structure and marketing for foreign trade, as well as the shipping and ports.

The early south-northeast trade was primarily coastal, due to the Appalachian Mountains, a formidable obstacle to the trade between the East Coast and the interior. After penetration of the mountains, first by canals and later by railroads, inter-regional trade shifted. Goods could go more directly between the West and East. Regional specialization became more entrenched. The rise of East-West trade was implemented by the Great Lakes and the canals connecting the East with the Mississippi River system (North 1961:105).

The main early port cities were New York, Philadelphia, Boston and Baltimore. After the War of 1812, New York became the principal port and controlled both coastal and European trade. Charleston and New Orleans became the primary southern ports, as a result of the increasing focus on cotton production. Southern cotton was the main export and foreign exchange after 1815 and into the 1830s and 1840s. Later, Western grain would supersede cotton in importance, a change reflected in the shift of predominate vessel traffic from the western rivers to the Great Lakes.

During the first quarter of the Nineteenth Century, population growth in the U.S. was primarily the result of the fecundity of the inhabitants. Immigration did not become a significant contributor until about 1825, the year that the total immigrants passed the 10,000 mark. The 20,000 mark was reached in 1828. Regular passenger service was established on Lake Erie in 1830 (Havighurst 1944:124).

By 1832 there were 60,000 new immigrants, and in the decade of the 1840s, yearly totals sometimes exceeded 100,000 even 200,000, with 369,000 immigrants entering the country in 1850 (US Dept. of Commerce 1960:57). Before the Civil War, the majority of the immigrants came from the countries of Ireland, Great Britain, Germany and Scandinavia.

The shift in population distribution clearly represents a westward movement. In 1810, 54 percent of the population lived in the Northeast and 13 percent were in the West. By 1860 the relative population in the Northeast was 36.5 percent, the West, 37.8 percent (North 1961:257).

Many immigrants stayed in the East, but the majority composed the great westward expansion, at first into the contemporary Midwest areas surrounding the Lakes. The United States population grew nearly eight-fold before the Civil War. Although laborers comprised the largest single occupational category of immigrants, farmers, skilled workers and merchants together formed the majority (US Dept. of Commerce 1960:60-61).

The immigrants brought capital, and agricultural and industrial skills, as well as an economic and technological orientation, particularly newcomers from Great Britain, which led the world in technology. The skilled and technologically sophisticated immigrant was in large measure responsible for the predisposition of the United States to accept, revise and rapidly transfer new technologies, whether of foreign or national origin. In general, immigrants seeking American opportunities for advancement were highly motivated and economically oriented.

There was sufficient land available for the new population influx. The land area of the country had been nearly doubled by the Louisiana Purchase, which also gave the U.S. control of the mouth of the Mississippi. The Florida territory was added in 1821, providing virtually complete control of the Mississippi. The acquisition of Texas, the Oregon Territory, California and the Gadsden Purchase soon followed. The continental U.S. land acquisition was completed during the 1850s.

The Midwest, particularly around the Great Lakes, was extremely productive under European agricultural practices. New resources and raw materials became available with the opening of each new territory. The demand of the swelling Western populations fueled the industries of the manufacturing and capitalizing East, and strengthened the developing market economy.

Eastern investment capital spread west. Economic growth was predicated on the system of transportation and attracted eastern investments (see Neu 1953). The economic potential of the rich farmlands and mineral deposits of the Midwest could not be fully realized until it was possible to transport the products to market. The canal system, begun with the opening of the Erie in 1825, was necessary for exploitation of agricultural and mineral resources of the new country, along with the growth of vessel transport and the development of the rail system.

The growing economy and the influx of immigrants quickly taxed the obsolete transportation system. The War of 1812, with its naval blockade, prompted the development of inland roads and private turnpikes in the absence of a federal road system. However, the cost of moving materials over roads was very high. Water transportation remained the primary mode of inland travel until the expansion of the railroads and development of the automobile. This period is often referred to as the Canal Age by historians.

Exploration usually followed river systems, and the first settlements and first population centers were invariably near rivers and other bodies of water. Agricultural expansion occurred in areas with access to waterways. This pattern is still reflected today: of the 150 U.S. cities with populations of 100,000 or more, more than 130 are directly served by the inland waterway system.

The Nineteenth Century can be characterized by rapid industrial growth and expansion. By the end of the century, annual iron production exceeded 15 million tons (US Dept. of Commerce 1960:365-6). Prior to the Civil War, the new acquired territory and its settlement gave agriculture the major role in economic development. After the war, industry came to be of greater importance to economic growth. In 1860 more than 60 percent of the workers were engaged in agriculture, but by 1910, it was reduced to 30 percent (Fite and Reese 1965:310).

The growth of the U.S. economy was not a steady incline, but a series of fluctuations punctuated by booms and economic recessions, aptly termed "panics." The principal panics, those of 1819, 1837, and particularly 1857, 1873 and 1893, affected industrial production and population movements. Lakes navigation, like that of the western rivers, coast and oceans, was altered significantly by each panic, as well as by the general trends of economic growth.

Development of Inland Transportation

The Mississippi River system and Great Lakes became the primary inland routes of commerce. The chain of Lakes formed a natural east-west route, and the Mississippi River provided a north-to-south route. Because of the natural barrier of the Appalachians, prior to mid-century agricultural products were shipped downriver and transferred to coastal craft for delivery to the busy northeast ports. Agricultural and raw materials moved eastward through the Great Lakes for distribution to the North and East, and south through the Mississippi River system. Manufactured goods moved west and south on these waterways from the populous manufacturing centers of the East.

America led the world in the development of inland steam navigation, a phenomenon largely a result of geographical conditions. Great Britain and Europe, which lacked the extensive inland waterways but had accessible coastlines, lagged behind in the application of steam to inland navigation, although they led in ocean steam. Conversely, Great Britain utilized many more stationary steam engines for motive power in manufacturing. America had the benefit of many flowing streams and rivers appropriate for water-powered machinery.

River Steamboats: Prior to the advent of steam, there was only wind, current and muscle to move the vessels of commerce. Smaller sailing vessels could enter the mouths of the larger rivers and could meet the early post-Revolution transportation needs. As the population moved across the Appalachian Mountains and into the Ohio Valley, western river navigation became more important.

Boats could easily float down the inland rivers, taking advantage of the current, and flatboats were one type specifically designed to do so. The downriver advantage was offset by the necessity of relying on muscle power to ascend the great rivers in keel boats.

The need and profit potential for vessels capable of upbound navigation on the western rivers was realized early in the experimental stages of applying steam to ships. Although the early experiments of steam navigation were carried out on the eastern rivers near the more populated cities, they were directed toward developing boats for western river navigation. The experiments of James Rumsey, John Fitch, John Stevens, Oliver Evans and Robert Fulton were focused on western river navigation.

As early as 1785 Rumsey wrote to George Washington regarding the feasibility of upstream western river navigation. Evans recognized the potential of high-pressure steam engines for western rivers, and worked on their refinement. The early steam pioneers attempted to monopolize steam on the western rivers, but in 1817 all monopoly claims to western river navigation were nullified.

Fulton reportedly designed CLERMONT for navigation on the Mississippi (from contemporary newspaper account of the maiden voyage quoted in Hunter 1949:8). The concept may have originated with his partner and financial supporter, Chancellor Robert Livingston, who had been instrumental in the negotiation of the Louisiana Purchase and had floated down the Mississippi. Fulton had written to Livingston: "Whatever may be the fate of steamboats for the Hudson, everything is completely proved for the Mississippi, and the object is immense" (Ibid.)

Western river steam navigation was initiated in 1811 with the maiden voyage of the 371-ton NEW ORLEANS from Pittsburgh to New Orleans. In the first year of operation, the owners realized a $20,000 profit on an investment of $40,000 (Fite and Reese 1965:190). The ascendency of the steamboat was rapid on the western rivers, and by 1830 the steamboat was the dominant mode of transportation, a status that remained unthreatened until the growth of railroads in the late 1850s.

The western river steamboat soon became a unique craft particularly well-adapted to the seasonal environment of the rivers. Flat-bottomed, shallow draft and powered by high-pressure steam, it soon lost any resemblance to eastern river steamboats. The critical factors in the design of western river vessels were the necessity for shallow draft, sediment and mineral-loaded feed water, maximum reliability and quick handling, minimum machinery space, low fuel costs and low first-cost because of short average use-life (Bryan 1896:387-8).

In 1842, total western river steam tonnage was 126,278 tons, a figure that would double by 1846 (Abert 1848:12). The number of steamboats would increase to 557 in 1845 and 727 in 1855, the latter year representing a tonnage of 173,000 (Hunter 1949:33).

Unlike the western river vessels, which were equally adapted to both passengers and freight, the eastern river steamboats were primarily passenger vessels, and more closely reflected their heritage from CLERMONT. They retained a deep-draft hull similar to sailing vessels, and the often palatial craft were invariably low-pressure side-wheelers. Because of competition among steamboat lines, the eastern vessels emphasized luxury and speed.

Many eastern steamboats were organized into more capitalized shipping lines that maintained regular schedules of sailing, quite unlike the western river steamboats that were mostly tramps, picking up passengers and cargo wherever possible, and keeping quite irregular schedules, if any at all. Most western river vessels were owned by individuals or small partnerships.

The development of steam navigation on the Great Lakes was not nearly as rapid as on western rivers. The use of sail was much more advantageous on the Lakes, a factor that retarded the adoption of steam navigation in the region.

Canals: The completion of the Erie Canal in 1825 was the initiation of the American canal building effort. The construction of the 363-mile Erie Canal from Albany to Buffalo was begun in 1818. The original canal measured 4 feet deep and 28 feet wide at the bottom.

The canal was an immediate economic success. The cost for transporting a ton of freight from Buffalo to Albany dropped from $90.00 to less than $8.00, including toll charges. In the first year of operation, $750,000 in tolls were collected (Fite and Reese 1965:193).

The western terminus of the canal was Buffalo, which was victorious over the village of Black Rock for the honor (Hatcher 1945). Soon other canals were dug in Pennsylvania and through Ohio to link Lake Erie with the Ohio River. Toledo, Cleveland and Detroit became important port cities and grew rapidly as a result of the increased commerce from the canal. Along with the commerce, capital moved west. New York businessmen sent representatives to the western cities, particularly

Detroit. The cooperative association between the growing western markets and New York City secured its the status as the primary eastern port in North America.

The Erie Canal shifted the principal routes of the immigrants northward from the western rivers. More than half of the arriving immigrants traveled through the newly completed Erie Canal on their way west (Mansfield:1:1899:183-4). By 1836 there were 3,000 canal boats operating on the Erie Canal in the lucrative immigrant passenger business (Havighurst 1944:127).

There were 4,027 miles of canals built in the United States by 1840, almost half in New York and Pennsylvania, (computed from Tanner 1840:223-234). Most canals were built in the 1830s, but their total mileage (reached in 1851) was eclipsed by the construction of railroads, which reached 5,132 miles by 1840 (Ibid.).

Railroads: From a historical perspective, the growth of railroads in America was not systematic, but a seemingly haphazard linkage of towns and production centers with waterways. At first, the railroads were welcomed by those with vested interests in shipping, but as the rail system grew, the competitive transportation threat was realized. Rail transportation was not competitive in cost, but had the advantages of speed, reliable schedules, direct routes and, especially, year-round operation. These attributes, coupled with trans-shipment between lines, specialization of freight and passenger express lines, government subsidies and the formation of large corporations, cut deeply into the canal and river commerce.

Railroad mileage expanded rapidly after 1840. By 1860 there were more than 30,000 miles of tracks operational; that amount tripled by 1880; ten years later there were more than 200,000 miles of track in operation (US Bureau of the Census 1960:427).

The mid-century railroads came into direct competition with the western river steamboat. Rail lines extending south from Lake Erie ports shifted passenger and freight from the western river-coastal route. Soon the railroads connected the major riverport cities of the Mississippi and Ohio Rivers, and the competition became direct with the mainline steamboat.

The western river steamboats lost in the competition with the railroads, and was only able to temporarily maintain or increase business in the far West and northwest territories. The situation was somewhat different in the East and on the Great Lakes.

In some areas (for example, Long Island Sound), steamboats were able to increase business when they managed to connect with major railroads. Steamboat passenger lines, especially those owned by railroad companies, continued to grow until the advent of private transportation in the form of the automobile. On the Lakes, the ability to move bulk freight at a cost far below the railroads has allowed the continued existence of waterborne transportation to the present.

Growth of Great Lakes Navigation

Early Lakes navigation can be divided into stages marked by the completion of two important canals: the opening of the Erie Canal in 1825 and the opening of the St. Marys Falls Canal at Sault Ste. Marie in 1855. Both had tremendous impact on Great Lakes navigation and initiated new stages of regional growth.

The Erie Canal opened the western lands for migration, and marked the end of the exploration and fur trade that was characteristic of the earliest period. Populations and development spread west, and followed a similar pattern for each Lake. The Sault Ste. Marie Canal gave ready access to the area around Lake Superior and opened the entire Great Lakes system to navigation.

The early period of the eastern Lakes was devoted to the fur trade. Trade with the Indians and shipment of supplies to the remote military posts on the frontier became important elements of commerce after the War of 1812.

The opening of the Erie Canal brought large numbers of immigrants and additional commercial trade to support the westward expansion. The new canal had the effect of shifting the main transportation route north from the Ohio River. Detroit and Buffalo became principal ports; Chicago was a developing outpost. In 1830 the articles of shipment to Buffalo were corn, fish, furs, whiskey, lumber and shingles with return cargos of merchandise and passengers. Small cargos of flour, whiskey, beef and merchandise were transported to the far Western port of Chicago (Mansfield 1899:1:182-3).

Michigan's development did not begin until after the opening of the Erie Canal. By 1836 there were about 3,000 canal boats in operation carrying the growing numbers of immigrants. The Black Hawk War of 1832 ended the Indian threat and brought knowledge of the rich soil of northern Illinois, Indiana and Wisconsin. Speculation fueled the land boom in progress. Chicago became a growing commercial port serving the new territoriês; its population grew from 150 to 2,000 in 1832. Twenty thousand passed through town the same year on their way into Illinois. In 1835, 255 sailing ships arrived in Chicago; a thousand schooners and 990 steamer arrivals were recorded for Cleveland the next year. Chicago and Toledo were incorporated in 1837; Chicago had a population of 8,000 and Detroit had 10,000 (Hatcher 1944:207).

The vessels prior to 1816 were all sail craft, locally built on the shores of Ontario and Erie. The number of sailing vessels grew yearly to meet demands of the growing trade. Steamboats had proven reliable on the western rivers and the Hudson, and in both cases the cost of passage and shipping had been reduced. The advantages of steam were realized, and both Canadians and Americans began the construction of steamboats for service on Lake Ontario.

Steam navigation on the Lakes was initiated in 1816 by the Canadians, closely followed by the Americans. In 1820 there were only four steamers on the Lakes compared with 71 on the western rivers and 52 on the Atlantic. By 1830 there were 296 western river steamboats, 183 eastern river steamers and only 11 Lake steamboats in operation (Purdy 1880:5). In the summer of 1833, those 11 Lake steamboats carried 61,000 passengers west (Mansfield 1899:1:185,394).

The first two steamboats were built by groups of merchants in partnership. The third vessel, WALK-IN-THE-WATER, was built by the newly formed Lake Erie Steamboat Company of Buffalo in n818 (Hatcher 1944:178).

The formation of a company with the capital and means for steamboat construction and operation represents the organizational form that steam navigation would take on the Lakes. Most sailing vessels, considerably cheaper to build and operate, were owned by single owners or a very few partners. The eastern river steamboats were owned by corporations, and were organized early into transportation lines, supported by the investment of eastern capital. This is in contrast to vessel operation on the western rivers, where ownership patterns resembled the ownership of sail vessel on the Lakes -- single owners or limited partnerships.

The concentration of capital and the power it represented markedly affected the development of Lakes navigation, particularly in obtaining government subsidies for navigation improvement. The American canal-building era resulted directly from corporate interests obtaining government support for continued navigation and harbor improvements, on a scale that would be impossible by any other means. Continued navigation improvements reduced risk and allowed the use of ever larger vessels that could benefit from the economies of scale, reducing transportation costs and boosting profits.

The Canadians were similarly organized in business corporations. They observed that the Erie Canal would draw trade from their St. Lawrence River ports, particularly Montreal, to New York. Before the completion of the Erie Canal, the Welland Canal Company was formed, and construction was begun on the canal around Niagara Falls. The completion of the Welland Canal in 1829 brought about the development of the first vessels specifically designed for the limitations of the Great Lakes: the canallers -- sailing ships built to pass through the canal locks.

The first Great Lakes steam vessels were influenced in a more direct way by Eastern steamship developments. The early Lake steamers were constructed by Eastern builders; again, the result of capital and expertise being centered in New York. For example, Noah Brown of New York was responsible for the design and construction of WALK-IN-THE-WATER (Walker 1902:315; Hatcher 1944:178). FRONTENAC, the first steamer on the Lakes, was built by two ship carpenters from Long Island (Cuthbertson 1931:215). A number of the early steamboats for the Lakes were built at Sacketts Harbor, New York; for example, ONTARIO 1817, SOPHIA 1818, and QUEEN CHARLOTTE 1818 (Croil 1898:248-9).

The success of the Erie and Welland Canals and the explosive growth of trade prompted the construction of other canals. By 1848 there were seven major outlets available to the Great Lakes, six of which tapped into Lake Erie (Hatcher 1944:190). The port cities of Lake Erie became centers of commerce tying the expanding west to the industrial east.

In mid-century the railroads came into importance. Buffalo became a rail center greatly augmenting its position as a prime port. Fourteen freight and 300 passenger trains entered and left the lake port every 24 hours; Buffalo's population grew from 42,000 to 74,000 between 1850 and 1855 (Hatcher 1944:231). At first, most railroads were not in direct competition with vessels and served as connecting lines for passenger steamers. However, some railroads went into the steamship business to capitalize on the growing demand for passenger vessels. Package freight commerce on the Lakes was taken over by the rail companies, who ultimately owned almost all the package freighters (Ericson 1962:15).

The 1850s represented a high-point in passenger steamboat development on the Lakes. The growing demand supported 3 lines of steamboats between Buffalo and Chicago operating 16 steamboats (side-wheelers) and 20 propellers (Mills 1910:123;145). The completion of east-west trunk line railroads cut deeply into the passenger trade, and the appearance of screw freighters, which were cheaper to operate and build, cut into the freight business (Mansfield:1:190-191).

Later, the railroads, unhampered by the seasonality of the Lakes, cut deeper yet into the freight trade and precipitated a general decline in Lakes navigation that was only relieved by the opening of the Sault canal. Railroad tonnage carried was about equal to that carried eastward on the Erie Canal in the late 1850s, but it was much more valuable. The railroads tended to carry the more valuable commerce leaving the heavier and bulkier products for the Lake and canal carriers.

An example of the tendency for rails to cut disproportionately into the more valuable cargos is Chicago, which had both railroads and Lakers available for transportation. The 1859 Chicago data indicate that corn, wheat, and lead moved predominantly by water, whereas hides, livestock, and general merchandise moved by rail (Taylor 1951:167).

The exploration and, soon, the population pushed farther westward. The canal system had opened the whole of the Great Lakes to navigation, except for Lake Superior. The falls in the Saint Mary's River blocked vessel access.

Growth of Lake Superior Navigation

Resource extraction was a prime motivating factor in European incursion into the Lake Superior area, as it was into the Great Lakes region in general. The economic development and exploitation of the Lake Superior region lagged behind the other Lakes, retarded primarily by the St. Marys Falls at Sault Ste. Marie, which impeded navigation into the lake. There were only two options for operating a vessel on Lake Superior: portage around the falls or construction on the lake.

Earliest commerce revolved around the fur trade. The panic of 1837 brought about a contraction in economic activity that seriously debilitated the fur and fishing trades. The American Fur Company failed in 1842 (Nute 1944:180), ending the early period of commerce of the region.

The discovery of copper in 1843, 1844 and 1845 generated increased interest in the Lake Superior region. Most navigation on the lake prior to this time, except for six schooners, was conducted in birch bark canoes, bateaux, or Mackinaw boats.

Prior to the start of construction on the locks around the St. Mary's River Falls at Sault Ste. Marie, 15 vessels had been laboriously hauled across the overland portage. Their total displacement was 3,000 tons, and apparently all were eventually wrecked (Havighurst 1944:165).

Although side-wheel steamers began plying the lower Lakes in 1816 with the launch of FRONTENAC, it was not until 1845 that the first steamer appeared on Lake Superior (Mansfield 1899:1:197; Barry 1973:38). The propeller INDEPENDENCE, rigged as a fore-and-aft schooner, was hauled over the portage at Sault Ste. Marie to meet the increasing demand for passenger service resulting from the mineral discoveries. In 1846 the side-wheeler JULIA PALMER was also brought over the portage, and became the first steamer to ply the North Shore (Croil 1898:257).

The question of a canal at Sault Ste. Marie was raised even before the time of the copper discoveries. The financial success of the Erie and Welland Canals, and the growing canal system in the East piqued the interest of the commercial firms of the new state of Michigan. The opening of the Sault Canal in 1855 initiated large scale navigation and exploitation of the Lake Superior region.

As originally proposed in 1837, the lock of the canal would be 100 feet long, 32 feet wide by 10 feet deep (Williams 1907:118). Much discussion surrounded the ideal size for the system. In April 1855, when the work on the canal and locks was completed, the final measurements were: 100 feet wide at the water surface, 64 feet wide at the bottom, with a depth of 13 feet. The locks were 70 feet wide, 12 feet deep, and 350 feet long (Mansfield 1899:1:243; Williams 1907:133). The canal was deepened in 1870 to 16 feet. In 1881, the sides were straightened and a single lock installed measuring 515 x 80 feet. Further growth in commerce demanded more improvements, and in August 1886 the new canal was opened with 21 feet of depth and a lock 800 feet by 100 feet (Mansfield 1899:1:244).

By 1887, it was apparent that the Sault Canal, even with its many improvements, was not sufficient for shipping demands. Vessels often had to wait 12 to 36 hours to pass through. In 1895, the Canadian Sault Ste. Marie Canal, with a lock size of 900 feet by 60 feet and 22 feet deep, was opened. The first vessels through were American (Mansfield 1899:1:244). The U.S. canal and lock alterations and introduction of the Canadian canal are indications of the rapid growth of commerce and shipping in the Lake Superior region.

The establishment and improvements of Lake Superior ports also reflect the rapid development of regional commerce. The nature and extent of the trades of each harbor affect the establishment of routes and the characteristics of vessels engaged in those trades in certain areas of the lake. Analysis of data such as these can lead to the understanding of the socioeconomic factors that influence specific wreck depositions over time, leading to the development of a predictive model for shipwreck location (see Hulse 1981).

Pattern of Harbor Establishment and Development: Some of the principal harbors of Lake Superior and their development as noted by Mansfield (l899:1:354-364) and others follow. The pattern of development and the increasing scale of growth and decline closely reflect the trends of Lake Superior commerce and demographic shifts. The dates the harbors formed and entered into the transportation network of Lake Superior and the nature and extent of shipping are key factors for the generation of a predictive model of the nature and locations of shipwrecks.

Marquette: Primarily involved with iron ore since the 1840s, the port was developed to transport ore from the Marquette Range, the oldest on Lake Superior. Iron Mountain Railroad was completed from the mines to the harbor in 1856. In the fiscal year ending June 30, 1872, there were 390 arrivals of vessels at the port with a tonnage of 185,000; by 1896 more than 1,032 vessels arrived with a tonnage of 793,092, which generally indicates imported coal. There were 2,292,556 tons of iron ore exported from this port in 1897, with the total shipped consistently above 3 million tons well into the 1940s. Marquette is the third largest city on Lake Superior (Skillings Mining Review, Duluth Aug. 20, 1949).

Ashland: Established 1854, little activity occurred until the 1870s. Increased from 898 arrivals with 1,400,000 tons of cargo in 1887 to 5,164 arrivals with a cargo tonnage of 2.4 million in 1896. Ashland exported 1.5 million tons of iron ore that year. Very little activity since World War II.

Duluth: A main port of Lake Superior settled in 1854, it became a port of entry in 1871. Prior to completion of the Lake Superior Railroad, the population was 100. Four years after completion of the railroad, the population reached 4,000. The principal exports were grain and iron ore. The first ore docks were completed in

1893. In 1897 the harbor received 885,623 tons (more than half was coal), and shipped out 2.3 million tons of ore, 1 million tons of flour and grain, and 454,000 tons of lumber. By the turn of the twentieth century, Duluth would rank as one of the major ports of the world in terms of tonnage handled. By 1913 it ranked second only to New York, a position it would hold for decades (Hall 1976:99). The combined ports of Duluth-Superior are included in the top ten in the US in terms of tonnage handled.

Superior: Settled in 1853; its first ore docks were completed in 1892. Unified with Duluth in 1896. Had traffic of 8.4 million aggregate tons in 1897.

Two Harbors: One of the largest ore ports on Lake Superior, and the first in Minnesota. Opened in 1864, natural harbor dredged in 1886. Growth from 174 vessels arriving with aggregate tonnage of 295,800 in 1885 to the 1897 total of 2,064 vessels with 6.2 million tons. First steel ore dock on the Lakes built in 1909 with a storage capacity of 44,000 tons. Peak ore record was 1953 when more than 21 million tons of ore were shipped. The harbor declined after that period. Three-quarters of a billion tons of ore shipped through this harbor from the Mesabi Range in its 100 years of operation (King 1984:1-4). Considerable forest products shipped between 1904-1931. Depletion of high grade ore shut down port in 1963 (US Army Corps of Engineers 1975:11).

Port Arthur: Most important Canadian port on Superior, and known as the Canadian Lakehead. Terminal for Canadian Pacific Railroad. Exporter of lumber, grain, and later, iron ore. The first grain was shipped in 1883. Combined with Fort William in 1906. The port now contains the largest water shipping grain elevator in the world. Canadian Pacific has one of the largest coal docks in the world. In the early 1970s and average of 3 million tons of cargo handled a month, making it the largest of all Canadian ports (Hatcher and Walter 1963:154).

Iron ore shipping began at Port Arthur after the discovery of the Steep Rock Mine. Mining operations began in 1942 (Nute 1944:155-6).

As the ports of Lake Superior developed, they influenced the routes of the various types of vessels carrying certain cargos. The main commerce on Lake Superior was the transportation of passengers, grain, iron ore, coal, package freight and lumber. As each of the trades expanded, larger vessels were produced to accommodate that growth commensurate with physical navigation limitations.

At the turn of the century, there was more freight being carried on the Great Lakes in an 8-month season than all other nations combined using the Suez canal in 12 months (Curwood 1909:13). The development of the trades that made up the bulk of Great Lakes freight will be briefly discussed, before presenting a general view of the growth of navigation.

Principal Products in Lake Superior Navigation: Lake Superior experienced a tremendous growth of commerce beginning with the opening of the Sault Canal. One of the most remarkable aspects of overall Great Lakes navigation is the increasing percentage of the total commerce that Lake Superior navigation represented. In 1870 Lake Superior shipping tonnage was about 6 percent of the total for the Great Lakes; by 1911 it was more than 55 percent (Williamson 1977:179). The majority of Lake Superior's tonnage is represented by iron ore, always making up two-thirds of the total tonnage, and sometimes 90 percent.

Iron Ore: The first major shipments began in 1856 from Marquette to Ohio (Mansfield 1899:1:584). By 1899 iron ore comprised 1/3 of all the trade on the Great Lakes. By 1911 iron ore shipments comprised more than 50 percent of the commerce on the Great Lakes (Williamson 1977:175). This tremendous growth of percentage took place as the overall trade on the Lakes swelled from 6 million tons in 1870 to more than 80 million in 1911 -- a growth of 1300 percent.

Experiments in producing pig iron in the Superior region were unsuccessful. Companies attempting to manufacture iron failed to produce the expected profits. The rapidly disappearing hardwoods necessary for the production of charcoal iron were a major factor in the failure. Coke, a coal product, became the fuel for iron production, making it cheaper to move the ore to the blast furnaces and manufacturing centers in the East, rather than build furnaces in the iron ore regions and transfer the coke to them (Hatcher 1950:96-105).

Four major ranges were opened up in the Superior region from 1854 to 1884. The demand for the ore was from the iron and steel mills in the East, and the cheapest transportation was over water. From the opening of the Sault Canal to 1930, more than 150 billion tons of ore were sent down the Lakes from the Superior ranges.

The increased volumes resulting from improvements in mining techniques and the refinement of shore facilities around 1880 put mounting pressure on shipping capabilities. These pressures, coupled with the progress of ship design, materials, and building techniques led to the launch of the iron, lake-built ONOKO in 1882. This vessel incorporated some of the attributes of the wooden R.J. HACKETT, which had been built in 1869 for the ore trade and dimensioned to the contemporary Sault locks, as well as to the ore docks at Marquette.

The basic characteristics of the Lake bulk-freighter were full body (high block-coefficient), high ratio of length to breadth, clear decks with hatches spaced to align with loading docks, and deck structures only on the bow and stern. The bulk carrier continued to increase in size as the demand for ore grew, the navigation channels deepened, the locks enlarged, and the shore facilities were refined to handle the immense quantities of ore pouring down the Lakes from Superior.

Ownership and utilization of the ore carriers is best characterized as that of increasing concentration of capital, particularly involving eastern financiers. Beginning in the 1880s, mergers consolidated interests into large corporate organizations that absorbed smaller firms, or simply put them out of business. The Panic of 1893 helped to eliminate the smaller corporations. Ore, pig iron, coal and limestone transportation and production became interlinked.

Political power was wielded from both a corporate and personal position by company executive officers. Company officials were active in government on a national and state level. Ultimately, the varied interests of Carnegie and Rockefeller, including the fleets of ships used for ore transport, consolidated under U.S. Steel in 1901, which directly controlled over half of the known iron ore resources in the United States (Hatcher 1950:181).

The formation of company-owned fleets of freighters, begun by the Rockefeller-owned Bessemer fleet in 1895, altered the social organization aboard the ships. The captain, once master of the ship in every way, became a company employee answerable to managers for all details of operation from strict schedules to fuel consumption. The old tradition of hiring crews for each voyage was replaced with inducements to motivate and maintain a permanent crew. Captains were shuffled from boat to boat, and all the crew was hired by the company (Hoagland 1917:24-26, 40). The days of owner-operator shipmasters and vagabond crews on the Lakes was over in the bulk freighter business in the last decade of the Nineteenth Century.

The contribution to the total U.S. production of iron ore from the Great Lakes grew from 5 percent in 1860 (Mansfield 1899:1:566) to almost twice as much as all the other parts of the country combined in less than 15 years (Tunell 1898:63).3

The rapid increases of the iron ore and grain commerce of the Lake Superior region created the need to handle both cargo types quickly. In the early period the cargo was loaded and unloaded by hand with buckets. The advent of grain elevators speeded the process for grain, and special loading docks and unloading equipment did the same for ore.

Ore docks developed unprecedented loading and unloading capabilities in the Great Lakes region. Elevated tramways that took advantage of the cliffs on the south shore of Superior were used for loading ore at Marquette in 1858. The size of the "pocket" docks continued to grow until the Northern Docks at Superior in the twentieth century had 1,352 pockets capable of loading 16 600-foot vessels simultaneously.

Prior to the application of steam, all unloading of ore was done by hand, a process that took a week for a cargo of 300 tons. Unloading technology development began with the use of steam winches in 1867. In 1880 the first improvements appeared. A movable tram was put in operation by Brown that allowed the unloader to move along the dock to work above the hatches without moving the ore boat. Self-filling grab buckets soon appeared and design modifications quickly followed until 1899 when the first Hulett unloaders were installed on the Conneaut docks by Carnegie Steel Company. The Hulett unloaders were rigid affairs that significantly reduced the interior hull damage of the earlier cable operated grab buckets.

The rigid Hulett design became the standard, and they soon began to grow in size, influencing bulk ore carrier hull design. The first Huletts were steam operated and carried 5-ton buckets. These would grow to the contemporary 50-ton unloaders. Soon after the Huletts were adopted the 540-foot, 30-hatch ore boats appeared. These vessels had no interior stanchions or bulkheads, and hatches on 12-foot centers to match the ore dock spouts (Burke 1975:275). The result was that a vessel of these dimensions could discharge 10,000 tons of ore in 4 1/2 hours, or less. An ore unloading record was established in 1930 when WM. G. McCONAGLE discharged 11,445 gross tons of ore at the Pittsburgh and Conneaut Dock in 2 hours and 20 minutes (U.S. Board of Engineers 1930:30).

Ore loading capabilities of the Superior ports developed similar capabilities as the unloading docks of the lower Lakes. The Lake steamer D.G. KERR on September 7, 1921 loaded 12,508 tons of ore in 16 1/2 minutes at the Duluth and Iron Range Railroad ore dock at Two Harbors. This was a rate of 758 tons a minute (U.S. Board of Engineers 1930:29).

Coal Trade: Coal was an upbound cargo imported into the Superior region. The mineral was brought into the major ports by vessels that received grain or iron ore for the downbound journey. Duluth and Superior were primary ports for the regional distribution of coal for the West and Northwest in the late 1890s (Mansfield

1899:1:551). The first shipments of coal arrived in Duluth in 1871 (Hutchinson 1914:282). Most of the coal, approximately 80 percent, was shipped out of Lake Erie Ports, with Toledo the major exporter. Coal as the upbound cargo contributed significantly to the early financial success of the large bulk freighter system on the Lakes.

There was a demand for coal in any of the population centers or ports for use as fuel for homes, industry and steam vessels by the early 1850s (Buffalo Morning Express March 2, 1852). Wood was the chief fuel in the early period of development for the region. Movement of coal through the Sault Ste. Marie Canal in 1855 was 1414 tons; in 1875 100,000 tons; 1,000,000 in 1886; 10 million in 1898 (Mansfield 1899:1:547) to more than 20 million tons by 1911 (Williamson 1977:178).

Coal, like iron ore, was handled in quantities that soon demanded automation. Bituminous coal is easily broken and must be loaded more carefully than ore. Hulett railroad dumpers appeared in 1892. These and later revisions such as telescoping chutes were used to keep breakage at a minimum.

Prior to 1876 coal was unloaded by horse operated bucket lifts. A vessel carrying 500 tons or so took about a week to unload. Tramways and, later, clamshells were introduced in the late 1890s, and electric power was introduced in 1901 at the Lakehead. The electric clamshell system could unload a 5,000-ton boat in 10 hours in 1902 (Hutchinson 1914:297-303). By 1928, the coal unloading record had halved: The ELBERT H. GRAY discharged 9,336 tons of bituminous coal at the Duluth, Missabe and Northern Dock in 6 hours and 5 minutes (U.S. Board of Engineers 1930:30).

Grain: The opening of the Erie Canal made grain transportation practical. The earliest traffic in grain on the Great Lakes was westward. The demand resulted from a rapidly increasing population and a growing foreign export market. Soon after the opening of the Erie Canal, principal grain movement shifted as Western agriculture developed. By 1835 all the grain arriving at Buffalo was from Ohio, and amounted to 112,000 bushels (Mansfield 1899:1:526).

After the development of grain cultivation in the new territories, the eastward flow of grain increased to meet the demand from the rapidly growing and industrializing East. The production of wheat began in the Superior region as the grain belt of the country moved toward the Northwest (Tunell 1898:41). After 1848 corn became more important. By 1860, Chicago export of grain totaled about 3/4 of the output of the top seven ports of Europe (Mansfield 1899:1:530). By 1871, the 10 states bordering the Great Lakes produced more than half of the grain crop of the U.S. (Andrews 1910:11).

The principal grain ports were Buffalo, Chicago, and Duluth-Superior. In both receipts and shipping, Chicago was far in advance of the others. Duluth-Superior was ranked second in amount shipped, and third in amount received (Andrews 1910:15).

The initiation of grain commerce occurred on Lake Superior about 1870. The total shipped eastward from the Lakehead that year was 49,700 bushels (Andrews 1910:34). Duluth became a grain depot, with its first elevator constructed in 1870, the second in 1872.

The Northern Pacific Railway reached 150 miles west of Duluth, and in 1878 the prairie market began delivering grain for eastward shipment from Duluth-Superior. By 1881, the grain trade of Duluth compared favorably to the long-established market of Chicago, which at the time had a population of a half-million more people (Hall 1976:67-68).

Grain shipments from the Superior ports reached 124 million bushels by 1905. From 1905-1909, shipments through the Sault Canal increased from 176 million to 192 million bushels (Andrews 1910:35). Two million bushels of grain, if all wheat, would produce about 12 billion 1-pound loaves of bread (Curwood 1909:50).

Canadian grain production grew as a result of westward expansion. After railroad connections were established, Canada shipped its grain through the Duluth-Superior Harbor; there was not an important port on the Canadian side until the Canadian railroad connection between Winnipeg and Port Arthur resulted in the creation of a harbor. From 1883 to 1920 Port Arthur and Ft. Williams were the main grain- and flour-shipping cities for the Canadian trade.

Grain commerce through St. Mary's Falls Canal at Sault Ste. Marie expanded from 353,777 bushels in 1870 to 88,418,380 bushels in 1898 (Mansfield 1899:1:193). By 1911 grain had declined from 25 percent of the total tonnage on the Lakes in 1870, to about 10 percent. The value of the shipped grain and flour amounted to 25-37 percent of the total value during 1901-1910 (Williamson 1977:175; Andrews 1910:35).

Lumber: The lumber trades moved westward in a similar manner to grain production. The exploitable forests of the eastern Lakes territory were cleared in the 1870s, and commerce soon became reliant on those of the Superior region. The Duluth area became a mainstay in the 1890s, at the same time Canadian exports were rising.

The Chicago receipts of lumber moved by lake carrier indicate about one billion board feet a year from 1868 to 1897. During this period, rail receipts were rarely half the Lake total (Mansfield 1899:1:521).

The lumber trade entered a general decline in the 1880s as a result of the depletion of forests. The railroads became more competitive as the exhaustion of desirable timber close to the lake shores and logging streams progressed, and it became necessary to push farther into the interior to reach exploitable stands of timber. In 1891 rail and lake shipments out of Michigan were about equal for the first time (Mansfield 1899:1:519). The same general pattern of development continued to move west. Many people involved in the Lakes' lumber trade moved to the Pacific Northwest and continued much as they had done in the Lakes region.

The unique practice of towing vessels developed in Lakes navigation as a result of the lumber trade. Small vessels predominated in the trade because they could navigate farther up the rivers than the larger craft. The move to towing barges was influenced by the falling freight rates after the 1873 panic. A Chicago city ordinance of 1875 requiring noncombustible materials for building, a result of the disastrous fire of 1871, further reduced lumber demand and freight rates. Railway competition was also instrumental in reducing freight rates (Gjerset 1928:88-93).

The falling freight rates made the general competitive disadvantages of sail apparent and heralded the demise of sail on the Lakes. Small schooners operating singly were not profitable, but three or four vessels towed by a steamer were. Many older schooners were transformed into barges by cutting down the masts and removing the bowsprit. They were taken into the lumber trade.

These barges were towed by a side-wheel tug, replaced in the later 1870s by a propeller, called a steam barge, which also carried a cargo (see Tuttle 1873). The towed barge system, which came to be known as the "consort system," was developed by John S. Noyes, of Buffalo, in 1861 (Mansfield 1899:1:520) and was common in the bulk and lumber trades on the Lakes in the 1870s and 1880s. The practice of multiple barges powered by a single steamer appeared in the coal trade on the Mississippi River about the same time (Hunter 1949:210). They were called tows, but were actually pushed.

Towing vanished on the Lakes when navigation, progressive shipbuilding technology, and advanced loading and unloading machinery in the bulk trades made larger vessels more profitable. A large cargo could produce a profit even with low rates, since a larger freighter could be unloaded or loaded and underway while a smaller propeller waited for its consorts to be handled.

The south shore of Superior was logged principally between 1880 and 1900, the north shore in the 1890s, with the last major shipments leaving in 1924. Shipments out of Duluth fell from 174 million board feet in 1894 to 11 million in 1924, when only one mill was operating (Nute 1944:195, 201). Between the years of 1870 and 1911, the annual percentage of the total commerce moved on the Great Lakes represented by lumber fell from over 50 percent to 3 percent (Williamson 1977:175).

A perspective of the immense quantity of lumber that was removed from the Great Lakes region can be gained from a consideration of the 1.5 billion board feet that was carried by lake ships in the 1909 season. Assuming it takes about 20,000 board feet of lumber to make an eight-room house, the total 1909 cargo could have built 75,000 houses, enough for a city of about 400,000 people, roughly the population of Detroit at that time (Curwood 1909:48).

Passenger Service and Package Freight: The rapid migration west to the Superior region began soon after the mineral discoveries of 1843 and 1844. The population of Michigan increased from 31,639 to 212,269 between 1830 and 1840, then nearly doubled by 1850. The population growth of Wisconsin paralleled that of Michigan a decade later (Havighurst 1944:129), and created a keen demand for freight and passenger service.

The introduction of packet line systems in the trans-Atlantic trade was an innovation that affected most American vessel organizations. There had previously been ships that sailed a specific route but followed no set schedule. The operation of ships on definite routes and preset schedules was initiated in the Atlantic trade soon after the War of 1812, closely followed by the Hudson River and Long Island Sound steamboats. The dependable schedules were a boon to shippers and passengers alike (see Albion 1938).

Increasing demand for passage instigated the steady increase in size and numbers of side-wheel passenger steamers. After the initial surge of immigrants, the demand for first-class accommodations grew. The 1840s and 1850s were particularly good for the passenger trade, and Great Lakes passenger traffic in 1845 was about 250,000 (Mansfield 1899:1:188-189).

In the 1850s, railroad construction grew competitive with steamers, as railroad companies began to buy vessels and enter into the steamship business. The railroad steamers were palatial, representing a new era in passenger service; some vessels reached 2,000 tons. The era was short-lived, however. The Panic of 1857 and the depression following it curtailed luxury travel, and many of the larger side-wheelers were permanently docked (Havighurst 1944:232).

The high point of passenger travel of the 1840s and 1850s was not approached again until the 1870s and 1880s. Buffalo was a pioneer in the reintroduction of the short-run passenger vessel, while the Canadians led in the recovery of the long-run trade.

As in the early era, railroad companies were the capital formation under which the luxury steamship prospered. Northern Steamship Company, Canada Steamship Lines, and the Canadian Pacific Railway were particularly notable in their introduction of ocean-going type vessels in the long distance runs. The newer vessels were not side-wheelers, but propellers of iron and steel, although there were a few large side-wheelers built after the turn of the century. As the railroad and automobile, and later the airplane, siphoned off passengers from the longer distance passenger service, the trade was reduced to short-run excursions. Lake Erie was the last Lake to have significant passenger traffic.

Package freight, a term that may be peculiar to the Great Lakes, is used to differentiate general merchandise from bulk cargos. In the early periods vessels carried both package freight and passengers, and those specializing in either were often owned by the same companies. Later, the passenger trade was secondary to the package freight business.

The primary flow of freight traffic was east-west. The primary eastern ports were Buffalo, Cleveland and Detroit; the western termini were Chicago, Milwaukee and Duluth-Superior. The majority of the freight was eastbound, consisting primarily of agricultural products, particularly flour.

Railroad companies usually dominated the package freight business. The Pennsylvania Railroad led the way by acquiring the control of the Anchor Line, the largest package freight line on the Lakes. By World War I, railroads controlled all major lines. The Interstate Commerce Commission forced a reorganization of the package freight lines in 1916, and made the rail companies divest their holdings of Great Lakes vessels. A new company was formed, the Great Lakes Transit Corporation, which controlled 85 percent of the passenger and package freight on the Great Lakes (Ibid. 1960:9-13).

1934, a depression year, was the first year the package freight lines suffered a deficit. The start of World War II marks the end of the package freight fleet on the Great Lakes (Fletcher 1960:30-31). The National Park Service vessel RANGER III is the last package freighter operating on the Lakes.

Basic Trends: There are two basic trends that are apparent in Great Lakes navigation. Although there was a wide range of commodities carried by Great Lakes ships over time, the general tendency was an overall decrease in the number of commodities being shipped by the end of the century. The second general trend was the growth in importance of bulk products.

The ranking of relative importance of bulk products shifted over time. Prior to the 1880s, lumber comprised the largest bulk cargo on the Lakes, with grain a close second. By the 1890s, iron ore had assumed primacy over all other bulk products. As iron ore became the dominant cargo, a shift in the northern trade terminus from Lake Michigan to Lake Superior was evident.

Growth of Shipping and Navigation Improvements

At the close of the eighteenth century there were fewer than 20 sailing vessels on the Great Lakes, with only one on Lake Superior (Mansfield 1899:1:132). Throughout the nineteenth century the vessels grew in number and size commensurate with the rapidly growing transportation requirements of regional commerce. New vessel types were developed to fit specific regional needs. As commerce grew, the demand for improved navigation increased.

Navigation improvements have been critical to the expansion of Great Lakes waterborne commerce. Harbor improvements were necessary at most major ports on the Lakes before vessels could approach the docks. Typically, the ports were on rivers that had formed offshore bars at the mouth. It was necessary to dredge a channel through the bars to overcome the costly inconvenience of lightering vessels offshore (Walker 1902:291).

Dredging and harbor improvements began in Buffalo as early as 1819. Buffalo came to be a major port as a result of the Erie Canal commerce. As Chicago became a major port, the trade between the two cities increased, until a regular route was established by the 1840s.

The four main obstacles to Great Lakes navigation were: the St. Clair Flats in Lake St. Clair; the Lime Kiln Shoals in the Detroit River; Niagara Falls (Welland Canal); and the St. Mary's Falls at the Sault, which have been discussed. Canals were constructed around the falls, and channels were dredged through the flats and shoals. Each, at different times, became a critical factor in lake navigation. The Sault Canal governed the Superior trade, the St. Clair Flats and the Lime Kiln Shoals together restricted the trade between the upper Lakes and the lower. These channels were essential to all east-west commerce on the Great Lakes.

Various changes in critical depths as represented by the four principal navigation impediments are listed below. Harbor improvements had to keep up with channel improvements to benefit from the larger ships and cargoes. Other improvements, such as the placement of lighthouses and channel markers, were constructed concurrently to reduce shipping risks.

Table 2.1 Critical Navigation Improvements

1855- Sault Locks- 350x70x11.5
1860- St. Clair Flats 10 ft
1869- 10.5 feet over sill at the Sault. 60 ft width at bottom.
1872- St. Clair Flats 13 ft.
1881- Weitzel Lock at Soo. 515x80x17
1884- St. Marys channel deepened to 16 ft.
1892- Lime Kiln 20 ft.
1895- Canadian Lock at Sault 900x60x22.

1896- Poe Lock at Sault 800x100x21.
1898- St. Clair Flats 20 ft.
1903- St. Mary's Canal deepened to 25 ft.
1908- West Neebish Channel in St. Mary's River 300x21
1912- Livingstone Channel in Detroit River 300x22
1914- Davis Lock at Sault 1350x80x24.5.
1919- Sabin Lock at Sault 1350x80x24.5
1936- Livingstone Channel 450x26 downbound

The dimensions of the locks and the depth of the channel have imposed limits on the size and depth of vessels that could be employed in interlake shipping. The controlling depth for maximum vessel drafts were 12 feet to 1871; 13-16 feet to 1891; 18 feet to 1897; 20-21 feet until 1911, when a 23-foot channel was maintained (Mansfield 1899:1:253-4), and 27 feet since 1958.

Major channel and lock dimension changes were directly reflected in shipbuilding and operation practices. Vessel types and sizes came and went as the restrictions changed. Vessel types often represented compromises between the imposed size restrictions and maximum cargo-carrying requirements. As a result of increased carrying capacity and efficiency, transportation costs on the Lakes fell from .23 cents per ton mile to .13 cents between 1887 and 1890. Railroad costs were .974 and .941 per ton per mile for the same years (Pankhurst 1893:256). It was noted in 1907 that a 10 percent increase in freight capacity was gained (with no additional operation cost) with each additional foot of draft (Annual Report of the Chief of Engineers 1907:846). In 1930, each inch of draft lost below 20 feet represented a loss of 90 to 100 tons of cargo capacity (U.S. Engineer Dept. 1930:32).

Evidence from the last half of the Nineteenth Century indicates that the largest vessels in use could load to deeper drafts than could be accommodated by the contemporary harbor and channel depths (Tunell 1898:38). For example, the largest vessels of 1876 loaded only to a depth of 15 feet because of the channels and harbor depths, but could safely load to a depth of 17 feet (Laurent 1983:11). Apparently, vessel designers and builders anticipated deeper channels and did not just respond to their increases, whereas vessels built to exploit changes in critical lock size appeared only after the locks were constructed.

Technological and operational developments also influenced vessel attributes. For example, the appearance of the steam tug in the 1860s allowed vessels to be towed through the channels and in harbors, particularly through the Detroit River and across the St. Clair Flats. The towing business flourished mid-century at Detroit, when there were more than 50 tugs employed (Mansfield 1899:1:503; Hatcher 1945:144).

The steam tug was at least indirectly responsible for the increase in size of the sailing ships in the 1860s and early 1870s, the peak years of sail on the Lakes. In this period the barks (actually barkentines, a term that was shortened on the Lakes to "bark") and schooners, by then dominated the freight trades and reached a length of 200 feet with a displacement of 700 or 800 tons (Barkhausen 1947:1). The growing numbers of propellers that increased in size to exceed each navigation improvement and the short-lived consort system put the steam tugs out of business by the end of the century.

One of the best indicators of the intensity of navigation on Lake Superior is the data from the canals at Sault Ste. Marie. Comprehensive data have been collected for both the American and Canadian canals since the initial opening in 1855 and are presented in Figure 2.1 (computed from U.S. Board of Engineers 1930:60-61).

The growth of shipbuilding kept pace with the burgeoning demand for lake transportation. In 1908 it was estimated that 3/5 of the total ship tonnage in the U.S. was constructed on the Lakes. The graph in Figure 2.2 depicts a comparison of the yearly tonnage of documented U.S. merchant sail and steam vessels in the country as a whole and on the Great Lakes. The graph shows that Lakes vessels were the largest category of merchant vessels documented in the U.S. Also shown is the date that documented steam tonnage superseded sailing tonnage. Steam tonnage superseded sail on the Lakes almost a decade earlier than in the rest of the U.S., an indication of the advanced technological development of Lakes vessels. The number of steam vessels passing through the Canadian and U.S. locks to Lake Superior exceeded the number of sailing vessels in 1874 (U.S. Board of Engineers 1930:60), a reflection of the heavy, early capitalization of the Lake Superior trades.

The collection of commercial steam vessels currently known within the waters of Isle Royale comprise a remarkable cross section of the trades and vessel types of Lake Superior navigation as reflected by the socioeconomic context. The archeological analysis and interpretation of the Isle Royale shipwrecks in Chapter V of this report was heavily influenced by the context as discussed above. This brief study has reinforced the necessity of interpreting and understanding shipwrecks from a regional perspective within a cultural cultural context, rather than as discrete, disparate elements.

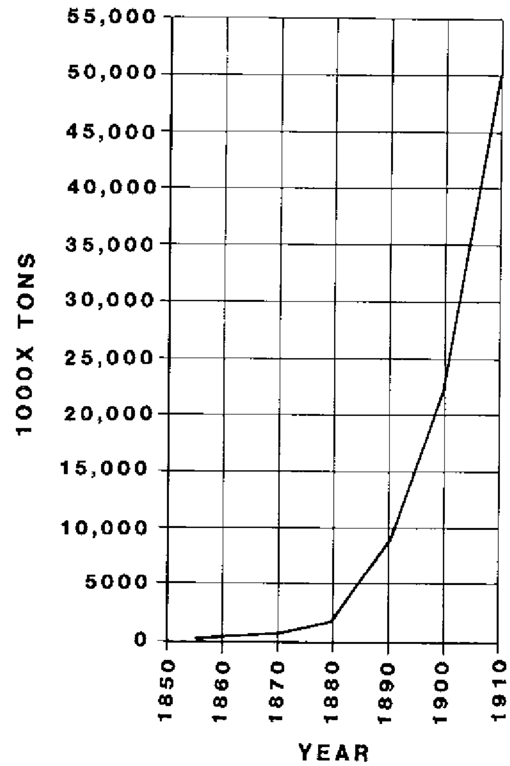


Fig. 2.1. Freight Through the Sault Ste. Marie Canal (from U.S. Engineer Dept. 1930:60).

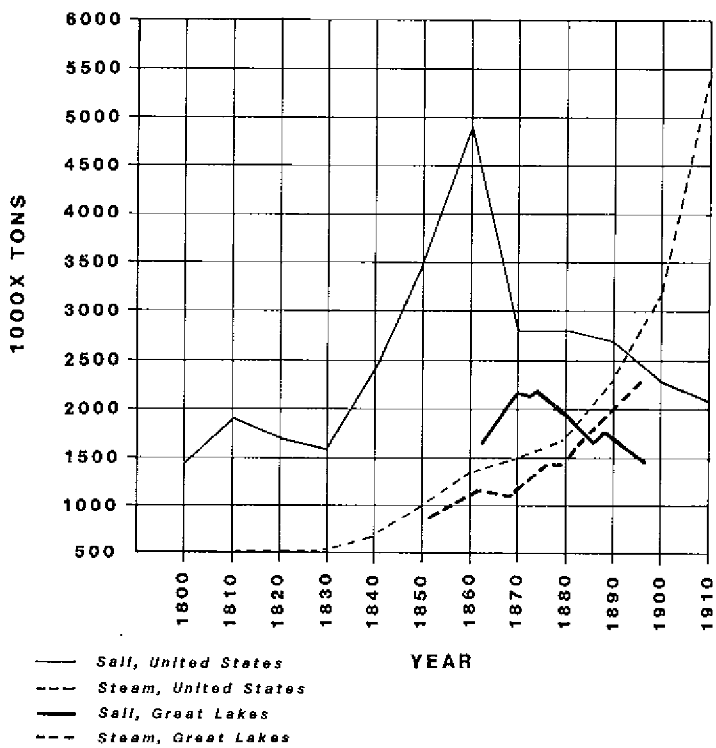


Fig. 2.2. U.S. Documented Merchant Vessels, Sail/Steam (U.S. Bureau of the Census 1960:444–446).

CHAPTER III. MAJOR VESSEL TYPES ON LAKE SUPERIOR: SAIL TO STEAM

The first vessels constructed on the Great Lakes were built and rigged with the environmental peculiarities and sailing conditions of Great Lakes navigation in mind, and such has been the case with thousands of vessels that followed. Shallow water combined with twisting channels and limited maneuvering room, imposed special considerations on vessel designers and builders. The builders and designers of Lakes vessels have been forced to experiment, adapt, refine, and develop particular answers to the problems posed by the unique environment of the Inland Seas.

GRIFFON, one of the first ships to be built on the Great Lakes, was constructed in 1679 and modelled on the lines of a Dutch galliot. The galliot was capable of carrying large cargoes in a beamy shallow-draft hull, which was useful for the shallow open-sea conditions found in the Netherlands and surrounding North Sea. GRIFFON's hull, about 70 feet long, probably carried a high stern. The vessel, sometimes referred to as a "barque," probably carried three masts typical of the ship-rig of that period, with two masts square-rigged and the mizzen lateen-rigged (Barry 1973:15).

The first decked-vessel built on Lake Superior was the 25-ton ship built by the Frenchman Sieur de la Ronde, who is considered to be the first practical miner on Lake Superior (Nute 1944:161-162). This little craft was built at Sault Ste. Marie in 1735 to remove copper from the mines of the Superior region. This enterprise can be considered the forerunner to the tremendous extractive industry that would cause the generation of a huge fleet of ships of Lake Superior to carry the ores.

In 1755 there were four French ships on Lake Ontario. War between France and Great Britain prompted the construction of British vessels. A shipyard was established at Oswego on Lake Ontario. The first British vessel, a schooner named OSWEGO, was built, soon followed by the sloop-rigged ONTARIO. Both ships were about 43 feet in length and measured about 100 tons (Barry 1973:17).

By 1762, when the British had two vessels on Lake Erie, a schooner and a sloop, they had already reached the conclusion that fore-and-aft rigged vessels were the most suitable for all classes of naval and commercial vessels on the Lakes (Cuthbertson 1931:227). Most ships built and used were fore-and-aft rigged and were operated by the British Provincial Marine; there would be no privately owned commercial vessels on the Great Lakes for another 20 years.

The first commercial vessel built on the Great Lakes was constructed in 1785 by the large Montreal trading concern, the North West Company. The company sent a group of men to the head of the Sault Ste. Marie to build a vessel. The 75-ton sloop OTTER was the result. The same company soon constructed another ship, also a sloop, in Detroit (Barry 1973:24).

In 1810, the trade on Lake Ontario exceeded that of the four upper Lakes. There were many vessels employed in the Indian and fur trade, in supplying military posts and Western settlements, and providing fish, lumber, and salt for the Pittsburgh, Pennsylvania market. This growing Lakes trade produced a demand for new ships to be built (Mansfield 1899:1:128). The first regular commercial transport line on the American side of the Great Lakes was formed in 1806 to portage and forward freight around Niagara Falls.

Although the U.S. government built a 100-ton brig in 1802 (ADAMS), it primarily purchased and built schooners or sloops. The Provincial government of Canada built the 86-ton brig CALEDONIA in 1807, and an armed brig, QUEEN CHARLOTTE, in 1809. The 97-ton brig LADY PREVOST was built in 1810.

The War of 1812 provided impetus for the design and construction of sailing vessels on the Lakes. Competition between Britain and the U.S. in the Lakes region prompted a vigorous shipbuilding program by both sides (Barry 1973:33). During the winter of 1812-13 the American government decided that a fleet of at least six ships was needed for naval operations on Lake Erie. These ships were to be constructed near Erie in a virtual wilderness. Captain Dobbins, the officer who had been put in charge of the project, brought in a naval architect and a master builder from New York (Mansfield 1899:1:155). The vessels that resulted included two 20-gun brigs, three gunboats, and a "clipper" schooner which was apparently the first of its type on the Great Lakes.

The principal fighting ships of the war were square riggers. The main reason for the military preference of the square rig over the fore-and-aft rig was that the square rig was simply more difficult to put out of commission during sea battles. The more numerous square sails offered smaller targets to the enemy's cannon and when a shot did strike true, it did less damage to the square sail's rigging than to the fore-and-aft. During the exchange of broadsides the fore-and-aft sails set parallel to the keel offered large, vulnerable targets compared to the square sails, which were set at right angles to the centerline. The military advantage becomes a liability when considering the square rig for merchant service. The square rig vessel required large crews to handle the many sails, a serious concern to merchants seeking the lowest cost when transporting cargoes.

Some sailing characteristics of the square rig, however, were desirable in commercial transport. Square rigs sail fast before the wind. The prevailing westerly winds of the Lakes allowed for fast downbound passages for these ships. The geographic constraints of the Lakes require frequent course changes, especially in the rivers and narrow channels. Fore-and-aft rigs allow quicker course changes with only a fraction of the crew required for effecting the same maneuver on a square rigged vessel. It was probably realized early that combination rigs were the most desirable for commercial uses on the Great Lakes, because they contained advantages of both rigs.

Many of the vessels that survived the naval battles of the War of 1812 were bought or salvaged for use in commercial transportation (Mansfield 1899:1:172). Agreements entered into by both the British and American governments in 1817 stipulating that only one warship of not more than 100 tons and armed with one 18-pounder gun would be allowed on the Lakes contributed to the availability of the naval vessels. An act passed in 1824 required that all public vessels be sold (Mansfield 1899:1:181).

Many lessons were learned during the War of 1812. It was noted that a two-decked frigate could carry more guns than a comparable ship in salt water service. The Lakes craft did not have to carry fresh water or provisions for a long voyage as did the ocean going warship. British Lakes vessels were also more narrow of beam and had less displacement than comparable ocean ships, making them faster and more able to beat to windward -- two desirable qualities for Lakes vessels (Barry 1973:35). One of the most important lessons was that the larger ships sailed well, in spite of their shallow draft. In fact, the vessels used during the war were the shallowest draft square-riggers in the history of naval architecture (Cuthbertson 1931:229).

Barkentines and brigantines became popular on the Lakes with their combination of square and fore-and-aft sails, deriving some of the benefits of both arrangements. Often these vessels were simply (and inaccurately) called "barks" or sometimes "barques" or "brigs" in historical accounts of the Lakes.

The word "brig" originally was an abbreviation for "brigantine." The origins of this rig are to be found in the Mediterranean where it referred to a small lateen-rigged vessel meant for rowing. In Northern Europe during the Sixteenth Century, the rig developed into the familiar two-masted rig with square sails on the foremast and a gaff-sail with a boom on the main mast. Ocean sailors would probably consider the Lakes brigs "hermaphrodite brigs," technically a combination of the brig and the schooner. Lakes brigs carried staysails and jibs on their foremasts in addition to the square sails and staysails on the mainmast with the gaff-top spanker. On the Lakes the brigantines ranged in size from 80 or 90 tons to 500 tons (Cuthbertson 1931:230).

The barkentine is a more modern development in sailing rigs. The bark rig, which preceded the barkentine, is a three-masted vessel with square sails on the foremast and mainmast and fore-and-aft sails on the mizzen. This can be considered the ship rig of the Sixteenth Century brought up to date. In somewhat the same way the barkentine rig, with square sails only on the foremast and gaff sails on the other masts, can be considered the modern revival of the Sixteenth Century caravel rig with its square-rigged foremast and lateen-rigged main- and mizzenmasts (Anderson and Anderson 1963:192-193). Apparently, there were very few true barks ever operating on the Lakes.

Basically, the barkentine is a brigantine with additional fore-and-aft rigged masts. The sails carried on the foremasts of both these rigs were: square foresail, topsail, topgallantsail, and one royal, with rarely a small skysail (Cuthbertson 1931:231-232). There are some records of studding sails. Fore-and-aft canvas consisted of a staysail and two jibs set forward on the bowsprit and jibboom, fore-and-aft sails set aft and two, or sometimes three, staysails set between the fore- and mainmasts. After 1820, nearly all vessels lowered their gaffs when furling sails instead of taking them up to the gaff by hand (brailing). The custom of brailing was, however, still evident on some steam vessels much later, such as ALGOMA, which wrecked at Isle Royale in 1885.

Some writers have asserted that the barkentine rig was a Lakes innovation. This is a doubtful contention and difficult to substantiate. It is clear, however, that there were few appearances of either the barkentine or brigantine rig on salt water until after 1835, some years after they appeared on the Great Lakes (Cuthbertson 1931:231).

Merchants and sailors determined very quickly the most profitable rigs for navigation of the Great Lakes. Although there were some variations, primarily in small craft, the sailing vessels of the Lakes are notable for their similarity. All were combination rigs designed for quick voyages carrying heavy cargoes in favorable winds (characteristics of square rigs) and maneuverability with only small crews necessary to change sails, coupled with the ability to sail close to windward to make quick passages upbound (characteristics of fore-and-aft rigs). The rig of choice on the Lakes early became the schooner, at first with topsails and later, when competition with steamers made minimum operating costs important for survival, without. Because of the numerical superiority of schooners and their role in Great Lakes navigation, they will be considered separately.

Schooner Development

Schooner development can be reasonably traced to old northern European two-mast shallop traditions. There may have been two separate sources of development: one for schooners with square topsails on the foremast, and another for those without (Greenhill 1980:19). Schooners with square topsails may have developed from small square rig vessels that continued to add ever larger fore-and-aft sails as technological developments progressed until they became the main part of the sail area. The other line of development may have been from the two-masted shallops carrying only sprit sails, gaff sails, or triangular sails. The sprit sail apparently grew larger first, becoming quite large in Classical times, and from it developed the standing gaff with brailing sail. The brailing sail is taken up or let out from the yard from which it is suspended on square-rigged vessels or the mast in fore-and-aft rigs. From this rig the lowering gaff developed. The origin of the gaff sail is obscure, but it was common in northern Europe in the 1600s (Greenhill 1980:18-19).

The gaff schooner without topsails began to appear in illustrations in the early 1600s and was probably in existence in the late 1500s (Greenhill 1980:19). Both types of schooner, with and without topsails, appeared in Colonial America in the early 1700s. There were generally 7 types of vessels classified in Colonial records: ships, sloops, pinks, brigantines, shallops, ketches, and barks. Schooners were listed for the first time around 1717 (Chapelle 1935:11). During this period, vessels were classed more by the hull than by the particular rig carried. For example, "bark" was used generically, much like "ship" is today.

The first schooner appeared on the Great Lakes in 1804 and the rig was the most seen on the Lakes until the end of the days of sail. The 25-ton SURPRISE was built at Buffalo that year and was soon followed by MARY, built at Erie. The 45-ton ZEPHYR, one of the first ships launched at Cleveland, was hauled down the ways in 1808 by oxen and was of the size found to be the best suited to the Lakes trade during the first decades of the Nineteenth Century (Hatcher 1945:138).

The 132-ton schooner MICHIGAN was the largest American merchant vessel on the Lakes in 1817. The ship was built by a shipwright from the East and was rigged as a double-topsail schooner, "resembling in most particulars the down-easters that ply upon the Atlantic coast" (Walker 1902:293). This vessel represents one of the major lines of influence in the development of Great Lakes schooners — that of the Atlantic coastal trade in the east. As stated above, the first "clipper" schooner on the Lakes was built for naval service on Lake Erie in the winter of 1812-13, also by an eastern builder. It is clear that eastern builders and their designs were present at an early date in the Lakes area. This line of development led to the sharp-model schooner on the Lakes. There can be little question as to the flow of information from the East. Before 1820 not only shipwrights, but most of the commanders and seamen were from the seaboard (Walker 1902:296).

The "clipper"-model hull, with its fine lines and great speed, was a development of southern builders that grew out of the demands of the Atlantic smuggling trade of the first half of the Eighteenth Century. It is not possible to establish the exact date for the beginning of the evolution that produced the well known "Baltimore Clipper," but it was probably around 1730 (Chapelle 1935:31). In these early days, the schooner rig demonstrated its superiority over the sloop rig. The schooner was very weatherly and could be handled by a smaller crew. It was also learned that the schooner rig could be used in a longer and narrower hull than a sloop. This was an advantage for the design of hulls, because it became known during this period that when two vessels had the same capacity or displacement, the one with the narrower hull would be the faster (Chapelle 1935:32).

Large American schooners developed a remarkable degree of sharpness before the War of 1812 and the fore-topsail schooner rig was very popular in the first half the the Nineteenth Century for ocean vessels (Chapelle 1935:234). The addition of the square topsails on the fore, and sometimes on both masts gave excellent speed when running before the wind. This characteristic was desired by Lakes mariners when taking advantage of the prevailing westerly winds of the Lakes on their downbound travels.

The second line of influence for Lakes schooner development can be found in the establishment of packet lines in the East soon after 1800. It was in the packet trade where vessels began to carry freight for hire rather than only the cargo of the owner. Regularly scheduled departures were set up between certain ports. The first vessels employed in this innovative trade were large sloops capable of carrying cargo and passengers. Leeboards were in use as early as 1812 on the Hudson River where shallow draft hulls were necessary, and centerboards were common by 1825 at the latest. (Chapelle 1967:164). In the areas where the distance between ports was not great, schooners and brigs were employed. The requirements for vessels in the packet trade were speed, capacity, seaworthiness, and the ability to sail on schedule year-round with any available cargo. To meet these requirements, sturdy vessels were designed on a rather full model with flat floors for maximum capacity (Ibid:271). The results of this influence on the Lakes schooners were in the full hull-models that were to become the common carrier of the Great Lakes.

The available depth in the rivers and harbors has imposed limitations on the practical draft of Great Lakes vessels to the present day. The early vessels were often abominable sailors. The flat-bottomed vessels in operation before 1820 were characterized by a contemporary captain as "dull sailors, some of them could hardly claw offshore under canvas" (Walker 1902:291). This was a particular disadvantage because ships had to be lightered of cargo and passengers by small craft due to the shallow conditions of most harbors and an onshore breeze could result in disaster. Structural features were incorporated into these early vessels to overcome the limitations of extremely shallow draft. Before the adoption of Dutch leeboards, slip keels, drop keels, or centerboards, it was almost impossible to design shoal-draft vessels that could take advantage of the schooner rig and sail close to windward.

RED JACKET, a 53-ton schooner, was apparently one of the first on the Lakes to be fitted with leeboards, although they had been successfully used earlier in the east. One leeboard would be in the water at a time to aid in sailing by preventing leeway, much the same way as the keel of a deep-hulled sailing ship. The board could be raised in shallow water (Walker 1902:301). Leeboards never became popular devices on the Lakes, although they were occasionally used. One reason for their unpopularity may have been that the leeboards were easily damaged by the Lakes waves.

The centerboard was the method of choice to meet the limitations of shallow draft and the poor sailing qualities of flat-bottomed hulls. The centerboard protruded through the bottom of the hull within a watertight case to prevent leeway. The centerboard could be raised or lowered from inside the hull.

The invention of the centerboard is usually attributed to a British naval officer, Capt. Shank. Like many "inventions," it is more accurately an adaptation. The sliding keel as originally proposed by Shank was a board about three-quarters of the length of the keel that was lowered by tackles through a case. He later tried three smaller separate boards that proved easier to handle and took up less room in the hold. There was a 65-foot cutter built to his specifications in 1790 in Plymouth, England, and a few other vessels were also built with drop keels. They did not prove satisfactory due to the tendency of the cases to leak. Shank found it difficult to convince the Admiralty that his idea was practical, and the idea was dropped by the British (Chapelle 1935:169).

The interest in centerboards shifted to the United States. In 1810, there were a large number of leeboards in use in the Hudson River, but a less cumbersome arrangement was sought. A number of patents were granted for types of centerboards. The centerboard differed from the drop or sliding keels by being attached on the forward edge by a pivot, with the lifting tackle on the after end of the board. After the War of 1812, a number of large sloops were built with centerboards and they were used in schooners on the Chesapeake Bay by 1821, and perhaps in the Great Lakes by 1828, though this early date may be doubtful (Ibid. 1935:169, 268.) Slip or sliding keels may have been in use on the Lakes before 1820. Capt. Augustus Walker, a contemporary, recorded in his observations that vessels varied between 18 and 65 tons burden, and for the most part were built with slip keeps between 1817 and 1820 (Walker 1902:300). Centerboards were to become the rule for Great Lakes sailing ships and were placed in brigs and barks as well as schooners.

Two man-made canals affected early Nineteenth Century Lakes schooner development. The opening of the Erie Canal from the Hudson River to Lake Erie in 1825 created a rapidly expanding market for the transportation of passengers and cargo (for a more detailed discussion, see Chapter II). Prior to its opening, most sail craft were put out of commission for two months or more during the summer due to the lack of upbound freight (Walker 1902:304). The Welland Canal, constructed at the Niagara Falls portage, was opened by the Canadians in 1829 and allowed trade between Lake Ontario and the upper Lakes. Four of the five Lakes were then opened to trade. The locks of the Welland Canal could accommodate a vessel no larger than 100 feet long, 26 1/2 feet of beam, and a draft of 11 feet (Barry 1973:123). Any merchant who wished to trade directly with the ports of Lake Ontario had to use vessels that could pass through the canal locks. The limitations of the locks produced a vessel unique to the Great Lakes — the "canaler."

In the 1840s, canalers that were built as large as possible to take optimum advantage of the economies of scale in the growing demand for transportation and intended for Lake Ontario trade, became noticeably similar in hull shape. Typical characteristics were a plumb bow, relatively narrow beam for the vessel length, and flat sides as far fore and aft as possible to allow for the largest cargo capacity (Barry 1973:124). The hull form was described as "heavy, stubby, and square Hollander-type" (Hatcher 1944:210). The stern was square with little overhang aft. The canalers also had their moveable bowsprits tilted upward almost to vertical when clearing the locks. As their size grew beyond 100 feet in length, it may be assumed that some sort of longitudinal reinforcing was used. The canaler was the first distinctly Lakes vessel type, a product of the environmental and economic conditions of the Lakes and developed from revised technology specially adapted from the eastern shipbuilders.

Development of Structural Support Systems

Intense competition in the eastern packet trades fueled the design of larger ships on the Lakes. These ships were required to carry heavy cargoes, often in bulk, and sail well in any weather to meet their schedules. There is a structural problem, however, when wooden ships that are required to carry heavy loads are lengthened. The ends of the hull tend to droop and cause the keel to arch. This condition, known as hogging, compresses the bottom planks and puts the deck planks in tension, weakening and changing the hull form enough to open up serious leaks. This problem especially plagues vessels with narrow beams and fine bows and sterns due to the relative decrease in buoyancy in these areas when compared to the midsection.

The French were probably the first to attempt the prevention of hogging by the addition of longitudinal members and stanchions set on the keelson. In 1746, they built a vessel with diagonally-planked ceiling (Chapelle 1967:207, 269). The British studied the problem in the latter part of the Eighteenth Century, and again after the War of 1812. A series of reforms in vessel construction was carried out by Sir Robert Seppings. These reforms became known as the "Seppings System" and included the addition of internal diagonal bracing and filling in the spaces between the floor frames in the ships of the Admiralty (Lavery 1984:43). During the British investigations into the problem it was discovered that the more flat sided ships tended not to hog because the hull planks provided additional longitudinal support, a condition that may have benefited the early canalers.

Hogging frames and trusses of wood were used in the eastern river steamboats as early as 1820, and by 1837 experiments were being made with diagonal wood planking placed inside the frames with no additional ceiling in order to save weight. Diagonal iron strapping was begun by the British who first placed iron straps across the inside of the frames and partially covered them by ceiling planks (Chapelle 1967:270).

Other methods to increase longitudinal strength were tried. Improved scarphs, edge fastened hull and ceiling planks, and the caulking of the ceiling planks all met with some success.

Developments in Form and Technology

Between 1817 and 1820 sail vessels grew in number, but not in size. These vessels varied from 18 to 65 tons burden and most contained a slip keel (Walker (1902:300). The shallow draft hull had a lot of deadrise and during this period rarely exceeded 5 feet; that was the depth of water on the St. Clair Flats in the Detroit River. The 53-ton RED JACKET was built in 1820 and was the first merchant vessel on the Lakes with bulwarks; all previous vessels were built with rails and stanchions and were wet sailors. Solid bulwarks were necessary because RED JACKET had little freeboard when loaded (Walker 1902:295, 301–302).

The typical sail arrangement for schooners was with one or two square sails on the foremast and gaff topsail on the main. The square sails would be placed above the crosstrees. Another arrangement was to hang a large square sail from a yard placed at the hounds (just below the crosstrees). This sail hung down almost to the deck and was called a runner (Cuthbertson 1931:233).

After 1820, most vessels furled their sails by lowering the gaff rather than by brailing. The loosely woven flax sailcloth began to be replaced by the tighter and more uniform loom-woven cotton-duck cloth. This hard and durable sailcloth was developed in Massachusetts and became standard after the War of 1812 (Chapelle 1967:211).

There were many technical developments in addition to those of sails. In 1823, the first chains were employed as anchor cables. They were introduced on the schooners MICHIGAN, RED JACKET and ERIE (Walker 1902:302). Between the years 1820 and 1845 many new innovations appeared. Rod rigging and turnbuckles came into general use in the 1820s and 1830s. Geared capstans and windlasses, iron-strapped blocks, geared steering, hold ventilators, geared winches, new mast and spar ironwork, improved marine stoves, and water closets appeared during this period (Chapelle 1967:279).

The demand for transportation on the Lakes was limited before the completion of the Erie Canal. There was little advantage to larger vessels before 1825–1830. An 1810 96-ton schooner CHARLES AND ANN built in Oswego attracted much attention because of its large size (Mansfield 1899:129). The economic pressures for the increase of navigation continued into the mid-Twentieth century. Ever larger vessels would be required to meet the huge demand that was initiated with the opening of the Erie Canal.

By 1846, the registered U.S. Lake tonnage had reached 106,836 tons. This was a remarkable growth from the 56,252 tons registered in 1841. The number of mariners also increased accordingly from 3,750 in 1841 to 6,972 in 1846. There were 59 barks and brigs with an average tonnage of 230. The number of schooners in the same year was 319 with an average tonnage of 152. Sloops and scows averaged 46 tons (compiled from Abert 1848:8,24). The growth of tonnage of both sail and steam vessels on the Lakes and in the US is depicted in Figure 2.2 in Chapter II.

Steam Vessels

In 1840 there were more than 100 side-wheel steamers operating on the Lakes, most of them built within eight years of that date. (There are no records of experimentation with stern-wheels on the Lakes.) About 40 of them served as ferries or ran short, local routes out of the larger ports, while the remainder, mostly the larger boats, ran from Buffalo to Upper Lakes ports or from Niagara and Toronto to Lower Lakes destinations. Most of the boats ran independently, although "combinations" and "opposition lines" resulted in some cooperative scheduling by various owners and tended to stabilize rates (Mansfield 1899:1:185ff). A decade later, several lines dominated the steamboat business and managed most of the steamers then in service. Immigration had begun its boom with the opening of the Erie Canal in 1825, and by 1840 it brought tens of thousands of settlers to Buffalo each year, seeking passage to the American West. The total population of cities bordering the Upper Lakes was said to have quadrupled in the eight years previous to 1840 (Mansfield 1899:1:634) as a result of that influx. The Lakes steamers ranged from about 85 feet (150 tons) to nearly 185 feet (800 tons). The steamers ILLINOIS (1837) and GREAT WESTERN (1838) were the largest and finest of the steamboat fleet. ("Steamboat" on the Lakes invariably meant side-wheelers.)

While steamboats demonstrated many advantages over their sailing contemporaries, they could not navigate between the Upper Lakes and the Lower because of the bottleneck effect of the Welland Canal. Any steamer that was large enough to battle the elements and capacious enough to make a profit in the competition for cargoes was much too large for the 100-foot locks (Hatcher 1945:121). Even after the canal was enlarged in 1845, it would only accommodate vessels 145 feet long and 26 feet wide. As a result of this impediment, all of the freight bound for Oswego, Toronto, or Montreal was necessarily carried in schooners. It was in this setting that several Lake Ontario vessel owners began to experiment in 1840 and 1841 with a brand new steamboat technology that might enable them to compete more effectively with Buffalo for the trade of the West. They built the first "steam schooners," adopting the efficient new machinery recently developed by Swedish inventor John Ericsson (Barry 1973:52) with screw propellers. The first screw-powered commercial craft in the United States 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 and Raritan Canal (Baker and Tryckare 1965:42). Although a small screw steamer called ERICSON (Registry of Merchant Shipping, Montreal District, Book 175:102) was built at Brockville, Canada, in 1840, the 138-ton VANDALIA is usually credited with being the Lakes' first "propeller," as that class came to be known. It was built at Oswego, New York in 1841, and was the first such craft in the Lakes above Niagara. Three other "propellers" were built that year in Canada, and two more on each side of Lake Ontario in 1842.

Contemporary newspaper accounts describe VANDALIA as a sloop, and several other of the first propellers as "steam schooners." It is clear that they were all built as sailing craft, with boilers, engines, and screw-propellers introduced after their completion, sometimes at ports quite distant from the shipyards where they were constructed (Cobourg Star May,4 1842). It appears that the Ericsson wheels were intended to be the primary means of propulsion even in the first of these vessels, rather than an alternative to sail power or for use as auxiliaries. In the case of STOCKTON, the ship was sailed across the ocean without its propellers, and then fitted out to operate under steam only after arriving in the sheltered waters of the American canals. In spite of the owners' evident confidence in the new technology, all of the early propellers carried sail rig, and indeed most of them were capable of sailing faster than the five to eight miles an hour they ran under steam (Finn 1979:100), though at no predictable or consistent rate, because of their dependence on wind conditions.

VANDALIA and its contemporaries on the Great Lakes were all built to carry passengers and freight, while the pioneer screw-powered craft built in England were, almost without exception, towing steamers (Baker 1965:41ff). VANDALIA was designed to trade through the Welland Ship Canal and to divert some of the lucrative Lake Michigan trade from Buffalo to Lake Ontario ports (Finn 1976:96). It demonstrated that propellers could pass easily through the narrow locks, while side-wheelers could not. Thus the advent of the propellers was a turning point in the economic history of Lake Ontario and St. Lawrence River ports. The propellers helped diminish the Buffalo trade monopoly. When the St. Lawrence Canals were completed all the way to tidewater in 1847 and 1848, propellers could run 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 of the Lakes was guardedly optimistic. The ships' owners and investors, on the other hand, expressed boundless confidence. The Kingston Gazette & Chronicle said of the propeller LONDON in June 1842, "these vessels fitted with the Ericsson propellers ... will form a new era in the history of navigation." The Oswego Palladium (Dec. 1, 1841) said of VANDALIA, "We are firmly persuaded that this enterprise marks an epoch in the progress of the Western trade!" In fact, the propellers seem to have performed admirably, and the whole industry was quick to acknowledge their advantages over both sailing craft and side-wheel steamers.

The sailing craft of the Lakes fleet were all functionally general-cargo carriers. Whether they were sloops, schooners, brigs, or barkentines, all carried whatever commodities were offered for trade. Their cargoes included passengers, livestock, bulk and package cargoes, or even such specialized payloads as small buildings, locomotives, and rolling stock. Few of the ships were adapted for specific cargoes, although that would change to some small degree in the last days of the Age of Sail, when every effort would be made to compete for cargoes with the mushrooming numbers of steam freighters.

When side-wheelers were introduced to the commercial trades, they functioned largely as cargo carriers, although their particular suitability as passenger conveyances soon became obvious. Fast, comfortable and dependable transportation were prerequisites for the passenger trade, and it was also desirable for livestock and the more valuable package cargoes such as perishable foods, liquors, furniture, mail, and precious metals like copper and silver ore. For this reason, side-wheel steamers tended to carry certain cargoes more than others. With the exception of passengers, it was not so much because they were designed to accommodate those cargoes, but simply because they could move them expeditiously. The cargo spaces were generic, just as they were in schooners of the time. The advantages offered by a steamboat operator was fast, efficient and predictable delivery, but it was at considerable cost, because steamers were much more expensive to build and to operate than sailing ships.

Steamers usually cost several times as much as sailing ships, both in initial investment and operation. Propulsion machinery, in particular, was expensive. The steamer CLEVELAND, for instance, was built in 1837 for $22,500, but its machinery cost another $50,000 (Detroit Daily Advertiser Sept. 21, 1840). Because the engines and boilers were so costly, they were often used in more than one ship before they were discarded as scrap, sometimes serving in three or more different hulls before they were worn out and useless. A classic example was the engine of the steamer CANADA, built in 1846, which was used afterward in the side-wheelers CASPIAN (1851), E. K. COLLINS (1853), and NORTH WEST (1867). The engine was finally junked in 1876 after surviving several wrecks and fires (Heyl 1969:106). Steamers also required cordwood for fuel, usually consuming two or three cords per hour at the cost of $80 to $125 per day (Mills 1910:130). They employed larger crews than schooners did, as well. A large steamer required up to forty in the crew, while the largest Great Lakes sailing craft, even with square rig, carried only twelve. Because of the difference in resulting freight rates, steamers came to dominate the passenger trades and to carry selected cargoes, but other less valuable commodities were transported in the more numerous sailing craft, and predictably they took two or three times as long to reach their destinations, albeit at more modest costs.

Screw steamers or "propellers" served exactly the same purposes as did side-wheelers. They were built with the same general configuration as their paddle wheel predecessors, most frequently being double-deckers with main and spar deck and a passenger cabin on top. They carried their cargo between decks and in the hold beneath the main deck. Their 'tween-decks cargo space was served by a series of freight openings or gangways in the side of the ship, usually several to each side. The freight was carried in packages such as barrels, boxes, bags, or bales, and it was referred to as "package freight." It was loaded by gangs of longshoremen using hand-trucks or dollies, brought aboard through the gangways, and either stowed on deck or lowered into the hold through deck hatches, using overhead tackles or winches. "Bulk freight" like coal or grain was simply poured into the holds and removed by buckets. Loading was a very labor-intensive process, often involving dozens of dock workers under the supervision of the ship's officers. The process was similar in both side-wheelers and propellers.

Propellers were soon found to be very economical ships. They were much cheaper to build and outfit than side-wheelers. Their machinery was simpler and far less expensive. They also proved to be more economical to operate. They burned about one-fourth the fuel of steamboats (Mills 1910:130), and required about half the crew. Moreover, a propeller could carry far more freight than a side-wheeler of comparable tonnage, because its machinery was so much more compact. The engines and boilers in a side-wheel steamer had to be located nearly amidships, where they often occupied a major portion of the hull. Propeller engines and boilers were placed far in the stern where they displaced little cargo and occupied much less space (Mills 1910:129). All of these factors made it possible for propellers to offer freight rates somewhere between those of sailing craft and side-wheelers, and this meant that propellers could compete for much of the less valuable cargo that had previously been carried economically only in sailing ships. 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 as the vessels demonstrated their strengths as efficient, economical carriers. Several companies organized around 1850 to carry freight in connection with the Erie Canal or with the various railroads running to the eastern end of the Lakes from the coast. Among the new firms were the American, Lake, Western, and Northern Transportation Companies, the New York and Erie Railroad Line, and others. Each of these companies built fleets of screw steamers. Between 1840 and 1849, 81 propellers were built at Lakes shipyards; during the next ten years 133 more were added; and during the 1860s another 88 were built, not including screw tugs (Labadie 1981). The journalists in 1841 and 1842 had correctly predicted that propellers would revolutionize the carrying trades.

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, and it is not surprising that the type was readily adopted on the Inland Seas as well. The first screw steamer on the Lakes known to have been built for towing was the 111-ton CLIFTON, built at Dexter, New York in 1847.

Several suspiciously small screw steamers were registered at St. Lawrence River ports in 1843 and 1844, and as side-wheel tugs were known to be employed in the same district, there was a demonstrated need for towing craft. Buffalo newspapers indicate that several side-wheelers were in use as towboats on the Niagara River and the Erie Canal by the mid-forties, too. There can be little doubt that there was a tremendous demand for towing vessels, and literally hundreds of them were built during the next decades. At least two screw tugs were built before 1850, more than a hundred during the fifties, and nearly 400 in the sixties (Labadie 1981). They were the first diversions from the passenger and freight style of screw steamer on the Lakes. In later years, other types of tugs were also introduced for specialized uses. When the trade in lumber grew after the Civil War, log rafts were often floated long distances to lumber mills; rafting or "outside" tugs were developed at that time. Unlike the common "inside" (harbor) tugs, the raft tugs were large double-deckers with very powerful engines. Their bows were enclosed or "housed-in" so that they could operate safely on the open Lakes. Some of these rugged craft measured 160 feet in length, although 120 feet was average. "Inside" tugs were usually 60 to 80 feet long.

Within a few years of the introduction of the propellers, the first all-freight screw steamer was built. It was the 250-ton SAMPSON, built in 1843, a 135-foot craft with the capacity for 300 tons of cargo. It carried package freight or livestock and was the forerunner of the "package freighters." Package freighters were screw steamers with double decks and gangways just like propellers, but without passenger cabins on the spar decks. Because there was so little difference between the two types, many ships were changed from package boats to propellers or vice versa by the addition or removal of cabins. Changes of this nature were common during the days of wooden ships, when cabins could be added or dismantled at modest cost as changes in the market required, or deterioration of the ship dictated. This was most common during the 1860s and 1870s. As the tide of immigration and settlement slowed in the region, the proportion of passenger-carrying propellers dwindled and more of the propeller-type vessels were simply built without cabins. During the 1840s there were 79 propellers built and only two package freighters. In the sixties there were 72 propellers and 16 package freighters. In the seventies there were 56 propellers and 31 package-boats built. After 1880, few passenger and freight propellers were built, although more package freighters were added until after the turn of the century. The propellers were largely supplanted by cruise ships and excursion boats.

Screw steamers in general, including package freighters, propellers, and later variants, tended to grow in size much like sailing craft. All were influenced by the same factors. The largest ships would carry their cargo at the cheapest rates, but their growth was limited by canal systems, shallow connecting channels, and shipbuilding technology, all of which improved as time passed. 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 in length, because the Welland had been enlarged and improved with 150-foot locks. Most of the propellers built during and after the 1850s were not required to pass through the Welland at all, and so many of them were built larger than 150 feet. In spite of the canals, the average size of new propellers grew from 141 feet (337 tons) in 1845 to 182 feet (641 tons) in 1862, and to 220 feet (1,300 tons) in 1877 (Labadie 1981). Because the Welland system was not enlarged again until 1884, it can be inferred that this progression reflects the fact that most of the latter day propellers and package freighters were "Upper Lakes" craft that operated above Lake Ontario; i.e. from Buffalo to Lake Michigan or Lake Superior ports. Relatively few ran through the Welland to ports farther east. 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.

Wooden screw steamers, like side-wheelers, required extraordinary means of strengthening their hulls as their dimensions grew beyond 150 feet; when their lengths surpassed that figure it was necessary to add to the hull structure some form of a truss to provide longitudinal strength and rigidity. The technology was borrowed from the side-wheelers of the Hudson River, and arches, trusses, or hogging chains were built into the fabric of the propellers. The most common form of strengthening propellers became the "Bishop arch" or crown arch, a simple curved arch extending from the deadwood at the stern to a point high over the rail amidships and then back down to the deadwood at the bow (for an example see Fig. 4.2, Chapter IV). The chord or arch was supported by a series of parallel, vertical stanchions that were tied into the vertical frames of the ships on each side. These powerful structural elements towered over the cabins in many propellers and package boats, and they were the hallmark of Lakes craft for many years. Such structures were not necessary in ocean vessels because of their deeper, more rigid hulls. The few wooden propellers which were built on the Lakes after 1880 often employed internal arches of iron in their construction, so that they were able to eliminate the distinctive external arches, and many earlier propellers that were fitted with arches eventually had them cut down or truncated by using iron or steel straps along the sheer strake or rail to replace the arch. An example of various types of structural support systems see the discussion of CUMBERLAND, CHISHOLM and MONARCH in Chapter V.

With the Civil War years came the beginning of a shift in the commerce of the Great Lakes. Railroads had penetrated into the West, cutting into the lucrative package-freight business. There were still enormous quantities of foodstuffs and manufactured goods to be transported by ships, but less and less was the profitable package cargo, and more and more each decade was bulk material such as salt, grain, coal, or lumber, all of which generated smaller profits for vessel operators. The Civil War years were "flush times." They marked the slow, steady recovery from the terrible effects of the 1857 Panic, but they went far beyond recovery to a real boom like that of the late 1840s. Immigrants and pensioned-off Union veterans swarmed into Minnesota and the Dakotas and began tilling the rich Red River Valley soil. Immense quantities of grain began to flow from the West across the Lakes and into the East. Enormous markets for building materials were generated by Reconstruction in the South. Coal was delivered to Lake Michigan and Lake Superior docks for distribution by rail to a great Western hinterland. Demands for lumber could scarcely be met in spite of prodigious output from the Saginaw Valley in Michigan, and hundreds of Lakes craft turned to that trade. For several seasons, not enough ships could be found to meet the demand. The Detroit Free Press (March 31, 1864) observed,

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

Because of the weakening traffic in package goods, many propellers and package freighters were idle, and so they turned to the bulky unremunerative lumber cargoes, but their profits were small because few of the ships were really suited for that commodity.

One prominent vessel owner found a practical solution for the scarcity of lumber carriers. He purchased two of the great passenger side-wheelers which had been retired at the time of the 1857 Panic a few years earlier. Several of the craft were idle and rotting in Buffalo and Cleveland, and they were offered for sale at a fraction of their original value. He dismantled them and made barges of them, employing powerful tugs to tow the mammoth barges to the Saginaw River to load pine lumber. Each of the craft was found to have enormous capacity: up to five times that of contemporary propellers. By towing two or more of the barges, the operator found a cheap means to move the bulky cargo to market, and make the lumber trade profitable for the first time (Mansfield 1899:1:414). This was the start of what was known as the "consort system," which revolutionized the carriage of bulk cargo on the Lakes. The system was employed in all of the bulk trades until the turn of the century, and it resulted in sharp decreases in shipping costs not only for lumber, but for every other bulk commodity as well.

Between 1861 and 1870, dozens of superannuated passenger craft were made into lumber barges, and other ships were built from the keel up as barges. In addition, a new class of steamers appeared. These new vessels were screw steamers with schooner-built wooden hulls. They were built without enclosed freight decks, but rather were single-decked with small, compact cabins at the stern. This pattern was said to have been introduced in 1848 in a little screw steamer called PETREL, which was built to haul lumber (Detroit Free Press (May 13, 1873), but there was too little demand for lumber then, and the ship was not profitable. "Steambarges" were introduced again in 1865 with the construction of the 115-foot TRADER in Marine City on the St. Clair River, and they were an immediate success this time, partly because of the newly adopted consort system. The Detroit Free Press (June 26, 1866) commented:

> A new arrangement is being inaugurated for the transportation of lumber, consisting of the use of propellers especially adapted for the purpose. They have no upper works forward of the engine room, which gives space for additional cargo. Several are now running.

These efficient little ships were designed to tow barges, but also to carry lumber themselves. Every effort was made to maximize the capacity for lumber, and because the vessels were patterned after their consort barges, they were known as "steambarges."

A handful of small side-wheel-powered lumber steamers were built in the mid-sixties to carry cordwood and lumber in shallow rivers tributary to the Lakes. At least fifteen or twenty were built around Toledo and Sandusky, or at Detroit, Port Huron, or Saginaw. It was not until the first screw-powered steambarges were constructed, however, that lumber steamers were really adapted to towing barges and to operating on the exposed waters of the open Lakes. These vessels moved very slowly when towing a string of loaded barges, often no more than five or six miles an hour, and they were susceptible to heavy weather damage. Side-wheel steambarges, as a result, proved impractical except for the sheltered waters of rivers and bays.

The typical steambarge measured 145 feet in length and carried about 350,000 feet of lumber, although ships of that class ranged from 80 or 90 feet to fully 200, and some hauledmore than a million board feet. All steambarges were single-decked craft like their schooner forebears. Most had raised poopdecks. 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. Most steambarges were fitted with a tall mast near the bow where they usually spread a single gaff-rigged sail and a jib. The larger boats built after 1880 often had two or even three masts, and because they carried working sails, most had centerboards (another link to their schooner-rigged cousins). A prominent structural feature of the early steambarges was the hogging arch, that same bridge-like truss used in larger Lakes propellers that towered high above the rails at either side. Because the steambarges were smaller vessels with a lower silhouette, the arches appeared larger than they did on the passenger and freight propellers, looking all out of proportion to the small steamers. Some builders substituted hogging-chains or iron rods with a single Sampson-post near the after end, but it was not until internal bracing was perfected around 1880 that the steambarges could dispense with some sort of very visible external reinforcing. In the older steambarges the arches so complicated the loading of lumber that dock gangs were paid a premium to load them.

Steambarges, some of which were called "lumber hookers" or "rabbits," carried their lumber cargoes in the hold and stacked high on deck. Some carried square timber or logs as well as "deals" (cut lumber), shingles, cedar posts, or railroad ties. The cargo was usually piled on deck to heights of twelve or fourteen feet, and the consort barges carried similar loads. Most tows consisted of three or four barges, but some of the more powerful steambarges were known to tow up to eight or nine at a time. ANTELOPE, a former passenger and freight propeller, regularly towed eight loaded barges extending more than a mile from the steamer to the last of its consorts (Mansfield 1899:1:517). Like most of its contemporaries, ANTELOPE traded from Saginaw Valley ports all the way to Buffalo and Tonawanda, New York. The huge lumber cargoes were all loaded and unloaded entirely by hand.

The consort system and the steambarges caught on very quickly. Forty-five were built before 1870, and a number of passenger and freight propellers were also converted for the same use when their cabins were removed and their spar decks cut down to accommodate lumber. More than 20 were rebuilt in this way by 1870, and dozens more were made lumber steamers in the next decade. Nearly 600 steambarges are estimated to have been built during the thirty years between 1870 and 1900 (Labadie 1982). The lumber business moved to the Pacific Coast around 1905, and the use of steambarges on the Lakes declined sharply after that. Some were employed carrying salt, coal, sand, iron ore, and some lumber for a few years more.

The practicality of the consort system was not strictly limited to the lumber trade. Some of the first steambarges were occasionally used to haul grain and ore cargoes when the rates were right. The little steamers and their barges were not entirely suited for these cargoes, but what they lacked in capacity they made up for in efficiency. They ordinarily had too little capacity below deck and were usually fitted with rather small deck hatches. Iron ore and grain had to be kept dry during transportation, and so had to be carried below deck where the cargo could be entirely enclosed and protected from the elements. Both ore and grain were loaded by the gravity system, and in vessels with small hatches it was necessary to do a great deal of costly trimming of the cargo, redistributing it in the hold so that the ship rode on an even keel. Small hatches also made unloading difficult.

Capt. Elihu M. Peck of Cleveland devised a ship in 1869 that would meet all of the demands of the ore and grain trades. It was to be double-decked, with plenty of space below decks for dry bulk cargo, fitted with wide hatches evenly spaced to match the 24-foot spacing of the loading chutes at Marquette's ore docks. It would have the capacity for 1,200 tons of ore and be provided with engines powerful enough to tow one or two barges as large as the steamer. The result was the

210-foot bulk freighter R. J. HACKETT (True 1956:3). Bulk freighters had their pilothouses far forward to improve visibility, and their machinery, like that of steambarges, was placed in the stern. They usually had three or four tall masts with sails to steady them and help power them. This practice of carrying sails was abandoned around 1890 because of improvements in steam engines, and the construction of bridges in many of the Lake Erie harbors made tall spars impractical.

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. They were only competitive if they were large, and so they have always been built as large as technology and sailing conditions would allow. The construction of these long, narrow shoal-draft steamers was characterized by very heavy longitudinal framing. Huge oak keelsons, parallel to the ships' centerline keels, were laid on top of the floor timbers, which were the lower portion of the transverse frames in the ships' bottoms. These keelsons, termed side or floor keelsons, usually measured from 12 to 18 inches square and ran the length of the bottoms of the vessels, spaced at intervals of about three feet. No other Lakes vessel type used these long, heavy members (True 1956:30). In addition to the rugged keelsons, the wooden bulk freighters were reinforced with iron straps that criss-crossed the frames every four feet, and a heavy band of 3/4-inch iron ran the length of the ship just under the rail as well (see discussion of CHISHOLM in Chapter V for an example of this reinforcing system). Little of this strengthening would have been required in a deeper ocean-going hull, but Lakes channels have always kept hull depth to a minimum. Ocean ships of the same era seldom required extraordinary reinforcing because their hulls were much deeper in proportion to their lengths.

From the time R. J. HACKETT was christened in 1869 until shipbuilding was suspended in the 1873 Panic, 47 bulk freighters were constructed averaging just over 1,000 gross tons. V. H. KETCHUM, built in 1874, was 1,661 gross tons and the largest in the fleet. When vessel construction resumed again in 1880, still larger bulk freighters were launched: 170 of them were built during the 1880s alone, and almost without exception, each had at least one consort barge built to run with it, usually of similar tonnage and dimension. The typical bulk freighter built in 1890 was 2,200 gross tons and averaged 260 feet in length. The growth in vessel size was made possible in this case not so much because of shipbuilding technique as improvements in connecting channels such as the St. Marys River, the St. Clair Flats, and the Detroit River. Greater depths made it possible to build longer, larger ships.

The next significant event in the evolution of the bulk freighters was the introduction of iron and steel to shipbuilding. Iron ships had been built in Scotland and England since before 1800 (Morrison 1945:2). Several iron vessels were built in the United Kingdom during the 1850s and 1860s for Canadian owners on the St. Lawrence River and Lake Ontario. The iron steamers ABERT and MICHIGAN were built for the American government on the Lakes in 1843, and the 200-foot iron propeller MERCHANT was built at Buffalo in 1862, the first commercial craft of iron built entirely on the Great Lakes. After the Civil War, some iron-hulled blockade runners, for example SOUTHERN BELLE (ROTHESAY CASTLE) and CHICORA, both side-wheelers of over 200-feet in length, were brought into the Lakes. During the 1870s, several propellers and package freighters of iron were built at Buffalo, and all were highly successful craft, most with long, profitable careers (Barry 1973:110).

The first bulk freighter built of iron was the "monster" steamer ONOKO, a 287-foot giant, almost 30 feet longer than the largest wooden craft then afloat. It was built by the Globe Iron Works at Cleveland, and was a sensation. It had double bottoms with water-ballast tanks, and was designed to carry 3,000 tons of ore on a 14-foot draft. It was said that ONOKO made money when few other craft in the industry could generate profits, averaging from $25,000 to $40,000 annually (Detroit Free Press Nov. 23, 1898). For nearly ten years, ONOKO carried the biggest cargoes on the Lakes.

The principal advantage in the use of metals for shipbuilding is their 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 l/2 inch thick and roughly one-tenth as heavy. Iron ships drew so little water that they had to carry ballast to keep their propellers below the surface when they were without cargo. Double bottoms and water ballast systems were developed to satisfy that need and to provide for safety in case the outer shell was punctured. Indications are that water ballast systems were developed on English colliers. Iron and later, steel ships had much greater longitudinal strength than their wooden counterparts, and that made it possible to build larger hulls. Although iron and steel shipbuilding plants required specialized equipment, it was also cheaper to build hulls of metal than of wood, and repairs were far simpler. Some shipbuilders persisted in the use of wood until the turn of the century. The famous Davidson and Wheeler yards at West Bay City, Michigan, built several wooden bulk freighters more than 300 feet long before they finally succumbed to progress and abandoned wood in 1902.

Several iron freighters were built in the 1880s, but steel was introduced in 1886 with the construction of the steamer SPOKANE, and it was almost universally adopted thereafter. Steel proved stronger and more flexible than iron, although not as resistant to oxidation. Some of the iron ships built on the Lakes were still in service a century after their construction. The famous gunboat USS MICHIGAN lasted for 104 years, and then was broken up for scrap, the hull still in sound shape.

Between 1869 and 1902 when the last were built, the largest wooden bulk freighters went from 210 to 310 feet. Steel freighters grew much more quickly, from the 287-foot ONOKO in 1882 to the 400-foot VICTORY in 1894, the 500-foot JOHN W. GATES in 1900 and to 600-footers by 1906 (True 1956:27). In steel freighters, the growth in size was not simply a process of enlarging the component parts of the ship, but resulted from several improvements in technology and changes in the arrangement of the vessels' framing. The earliest iron and steel ships had transverse frames patterned after wooden ships, but spaced at wider intervals. The arrangement of longitudinal keelsons was also similar to wooden bulk freighters in that the latter members were laid on top of the crosswise frames in the ships' bottoms (True 1956:31). Later steel hulls had combinations of transverse and longitudinal framing, and the standard after about 1920 has become a system of longitudinal framing on the deck and bottom, with transverse framing on the sides and ballast tanks extending well up the sides. This system, with its particular emphasis on longitudinal strength, has made possible recent construction of 800 and 1,000 foot superfreighters.

The consort system was largely abandoned after 1900, because the ships grew too large to tow barges safely, and they could carry sufficient cargo to dispense with the added capacity of a barge. The last barges still in service were not used after 1950. The consort system lasted for almost 100 years.

While bulk freighters became more numerous in the 1880s and 1890s, several other vessel types dwindled in numbers 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 tophampers cut away and their graceful bowsprits cut short. There were 1,699 sailing craft on the Lakes in 1870 (Mansfield 1899:1:439). After that date, sail craft began a slow decline, and relatively few were built to sustain their numbers after 1880 (see Fig. 2.2 Chapter II). In 1900 there were still 1,068 left (Blue Book of American Shipping 1900), many in the form of unrigged consort barges, and still others that had been idle for years. The last full-rigged schooner ended its career in 1933 with the burning of the 60-year-old LYMAN M. DAVIS in Toronto Harbor. The last schooner-barges were laid up and abandoned at the time of the Great Depression.

Steambarges lasted only as long as the lumber trade on the Lakes. When the forests had been stripped away in Michigan, Wisconsin, and Minnesota and the supply of lumber was gone, the industry moved to Washington and Oregon. Some of the lumber steamers also went to the West Coast to serve the industry there, 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 handful of steambarges remained, carrying coal or sand and gravel, or converted for dredging. Virtually none survived the Depression years except as moldering curiosities in a score of ship boneyards.

The development of side-wheel steamers was largely stemmed by the rapid ascendancy of screw steamers in the various Lakes trades, and although they remained popular in the passenger business for many decades, there would never again be the great numbers of side-wheelers built that there were in the 1830s and 1840s. Side-wheelers reached their zenith with the construction of the 300-foot "palace steamers" between 1848 and 1856. Twenty-two of the elegant craft were built, but their heyday was short-lived because of the 1853 Panic. Side-wheelers made something of a comeback following the Civil War, after which time the greatest concentrations of their numbers centered on Lake Erie and Lake Michigan, where the Detroit and Cleveland Steam Navigation Company, the Goodrich, and Graham and Morton fleets employed many of their finest examples. A few paddle wheel giants were constructed on the Lakes after 1900, including the largest side-wheelers ever built; SEEANDBEE in 1913 was 485 feet long, and the twin steamers GREATER DETROIT and GREATER BUFFALO in 1924 were 520-footers. The latter vessels were the last of their type. At the time they entered service, only 37 other side-wheelers were still left (International Shipmasters Association Directory 1925:170-181). After 1950, none were still in use.

Passenger and freight propellers, like their package-freight stepdaughters, were most successful when they were coupled with the railroad systems stretching to the East and West from the Lakes states. 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 earlier days. Some of the new propellers constructed after 1890 were exclusively passenger craft, with diminished freight capacity or no cargo space at all. A large proportion of the last propellers were "day boats," excursion steamers with neither overnight accommodations nor cargo space. Excursion vessels and ferries are very old types, and in the end, they outlasted all of the other passenger vessel types. A dozen passenger propellers survived the opening of America's highway networks in the 1930s, but the last of them succumbed to the economic pressures and regulatory requirements to lay up in the mid-sixties. The Georgian Bay Line steamer SOUTH AMERICAN was the last active representative of its type. She retired at the end of the 1967 season. Many consider the NPS vessel RANGER III, which regularly runs between Houghton and Isle Royale, the package freighter on the Lakes.

Package freighters numbered 116 in 1890, which was probably their peak; much package cargo was also carried in passenger and freight propellers, of course. The tonnage of package freight carried in Lakes craft, however, was reduced as the nation's railroads were extended, and the number of package boats and propellers shrunk in direct proportion. In 1900 there were 90 package freighters (Inland Lloyds Vessel Register 1890). In 1915, anti-trust legislation forced the disposal of most of the package freighters by the railroads, which were their operators; many of them never saw service on the Lakes again. Most of those which were left in service were requisitioned for coastal service during World War II, so that virtually no U.S. 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. Finally, in 1982, Canada Steamship Lines announced that it would discontinue service with its last five package freighters (Log Chips 10 #18). It was the end of a colorful era. At this writing, only the bulk freighters have survived in service on the Lakes. The only representatives of the many vessels that once plied the Great Lakes are the shipwrecks that lie beneath their surfaces.

CHAPTER IV. SHIPWRECKS OF ISLE ROYALE: THE HISTORICAL RECORD

Introduction

This chapter is a presentation of the results of a search of primary archival and secondary sources into the background history of the shipwrecks of Isle Royale. The site locations have become common knowledge to the diving public, and they are the focus of the Park's submerged cultural resources management activities.

Ten total vessel losses, in addition to the DUNELM stranding incident, have all left material residues in the archeological record that are discussed in detail in Chapter V of this report. Following are the contemporary notions of what transpired before and after the wreck event; a historical backdrop intended to complement the archeological investigations. The order of presentation is chronological according to year of construction.

History written for archeological purposes is somewhat different than normally encountered in popular periodicals or historical monographs. The attempt here is to use the historical record as one of several major links in an evidence chain that leads to an understanding of why certain material residues appear as they do in the archeological record. The most appropriate analogy would be to a medical examiner at a crime scene. That person may ask questions of witnesses or read their depositions, but always with the end in mind of understanding why there is a body on the living room floor. The authors of this section were instructed to seek facts relevant to the birth (construction), life (operational history), and death (wreck event) of the victims (shipwrecks) at Isle Royale. The degree to which this could be done through direct quotes from the contemporary accounts was encouraged. Although no particular effort was made to be entertaining, much in the way of new information on the ships has been included that might help establish vessel significance, historical context or eventually be of use for park interpreters. The "post-mortem," or archeological record section of the report, benefited much from this sort of approach, but the reader should be prepared for what may be viewed as a comparatively dry approach, rather than an attempt at telling a lively historical tale.

The amount of text devoted to each wreck is widely variable. This is somewhat a function of the disparity in what was available in the archives, but also reflects a conscious decision-making process. Ships that bore a special relationship to Isle Royale, such as AMERICA, or ships whose wreck events left many questions to be answered, such as KAMLOOPS, were discussed in greater detail than others. In addition, aspects of a wreck event or its aftermath that had implications for the general socioeconomic processes of the region were also stressed.

Table 4.1. Comparison of Ten Steam Vessel Wrecks: Isle Royale National Park.

VESSEL/DATES	POINT OF ORIGIN	DESTINATION	CARGO	PROPULSION/ CONSTRUCTION	WRECK LOCATION
CUMBERLAND (1871-1877)	Prince Arthur's Landing, Port Arthur, Ontario	Duluth, Minnesota	Passenger	Side wheeler Wood	SW end Rock of Ages Reef
CHISHOLM (1880-1898)	Duluth, Minnesota	Buffalo, New York	Barley	Single screw Wood	SW end Rock of Ages Reef
ALGOMA (1883-1885)	Owen Sound, Ontario	Port Arthur Ontario	Passenger	Single screw Steel	South side Greenstone Is.
MONARCH (1890-1906)	Port Arthur, Ontario	Sarnia, Ontario	Grain, canned salmon, flour.	Single screw Wood	NE tip Palisades
GLENLYON (1893-1924)	Ft. William, Ontario	Pt. Colborne Ontario	Wheat	Single screw Steel	South side Menangerie Is.
AMERICA (1898-1928)	Duluth, Minnesota	Northshore Route Fort William	Package freight and passengers	Single screw Steel	SE end North Gap
COX (1901-1933)	Houghton, Michigan	Ft. William, Ontario	Passengers	Single Screw Steel	SE end Rock of Ages
CONGDON (1907-1918)	Ft. William, Ontario	Pt.McNicholl Ontario	Wheat	Single screw Steel	NE end Congdon Shoal
EMPEROR (1910-1947)	Port Arthur, Ontario	Ashtabula, Ohio	Iron Ore	Single screw Steel	NE end Canoe Rocks
KAMLOOPS (1924-1927)	Sault St. Marie, Ontario	Port Arthur, Ontario	Package Freight	Single screw Steel	North side Kamloops Pt.

CUMBERLAND: HISTORY

Construction

The side-wheeler CUMBERLAND was built in 1871 at Port Robinson, Ontario, by Melanchthon Simpson for Charles Perry and Co. It was launched Wednesday August 9, 1871 (Detroit Telegram Aug. 15, 1871). The vessel was named for Fred W. Cumberland, general manager of the Northern Railway, parent company of the Toronto and Lake Superior Navigation Company, which had the ship designed and built to run the Duluth and Collingwood or Owen Sound route.

The railroad men who formed the navigation company were pioneers in the Lake Superior trade prior to the construction of the railroads in the area. The towns of Collingwood, and later Owen Sound and Midland, were the main points of rail connection between train and Lake boat. The Superior ports were all served by Lakes vessels at the time of formation of the new navigation company. CUMBERLAND, along with ALGOMA (previously named CITY OF TORONTO and RACINE) were the core of the new enterprise, which incorporated connections between the railroad and steamship line. Later, CHICORA would join the line (Williams 1909:43-47).

CUMBERLAND was a typical example of the Great Lakes sidewheel steamers built from the late 1840s through the 1880s. The first of the 200-foot steamers appeared on the Lakes in the early 1840s, and by the next decade had assumed the classic configuration as represented by CUMBERLAND and the dozens of other steamers produced for the passenger and package trade on the Lakes.

Ships of CUMBERLAND's type had overhanging guards the full length of the hull and freight space on the main deck. Usually, there were one or two cabin decks above the main deck. The number and size of accommodations are, as other details of construction, uncertain for CUMBERLAND. A steamer of comparable size would likely have about sixty cabins, plus parlors. The ladies' cabin would normally be aft, steerage and crew accommodations below (Labadie personal communication).

The ship was powered by a vertical "walking-beam" engine with one boiler and a single stack. No description of the boiler has been located in the historical material reviewed. The engines for the new ship had been in service before. Originally the 44-inch diameter engine, with a 132-inch (11-foot) stroke, was placed aboard CATARACT (Detroit Free Press May 11, 1871). U.S. CATARACT became the Canadian steamer COLUMBIA before it was broken up, and the engine transferred to CUMBERLAND. Information contained in the Lytle-Holdcamper List (Mitchell and Hall 1975:31) states CATARACT was 577 gross tons, built in Ogdensburg, New York in 1846 and sold foreign (Canadian) in 1867. The list also erroneously indicates CATARACT was a screw steamer.

CUMBERLAND was reported to be 208 feet on the keel and 214 feet overall with a beam of 28 feet, 43 feet 8 inches overall. The draft was 10 feet 6 in., and it was 229 tons burden, 750 tons gross measurement. The engine was rated at 400 horsepower (Detroit Free Press Oct. 1, 1871). The ship had a round fantail stern, and its cabins were warmed by steam. The steamer had paddle wheels 30 feet in diameter (Ibid. Oct. 4, 1871).

Operational History

The Collingwood Bulletin (May 9, 1872) reported that:

> the splendid new steamer CUMBERLAND will leave on her first trip to Fort William next Friday. She has been fitted up in the most elegant style and under the command of Captain Orr will meet the highest expectations of the travelling public.

CUMBERLAND's first full season of navigation was 1872, a year that initiated a series of incidents that were to afflict the steamer throughout its relatively short history of operation. CUMBERLAND carried about 600 passengers and a heavy load of freight, horses and cattle on its first 1872 trip (Toronto Mail May 11, 1872; Meaford Monitor May 16, 1872).

CUMBERLAND provided assistance to the steamer MANITOBA in July. The two steamers had been built at the same time in Port Robinson for competing owners (Detroit Free Press March 21, 1871). MANITOBA had run aground on Michipicoten Island in heavy fog. The ship had been in that position for nearly 24 hours when it was spotted by the crew of CUMBERLAND. It took nearly 30 hours more before the grounded steamer was again afloat (Meaford Monitor July 25, 1872).

September 1872 was a stormy month, and some vessels were lost. The schooner MAPLE LEAF was swamped near Isle Royale and eventually capsized in rough weather. The captain and crew were able to abandon ship and were taken to Silver Islet. During the wreck, the captain reported he had sighted CUMBERLAND, but it was not able to render assistance due to the heavy seas (Meaford Monitor Oct. 17, 1872).

In November of 1872, CUMBERLAND was frozen in the ice in Bear Lake in the St. Mary's River. Captain Orr, the chief engineer and four of the crew arrived on foot in Collingwood on December 27. Several days after them, 18 of the crew arrived after making the 20-day trek down the north shore of Georgian Bay. According to their reports, they suffered terrible weather and privation on their journey; all were frostbitten. Captain Orr had left CUMBERLAND in the charge of the first mate, with the steward, stewardess and two waiters left on board (Toronto Mail Dec. 27, 28, 1872; Marquette Daily Mining Journal January 4, 1873). There were also 50 passengers aboard (Toronto Mail Dec. 11, 1872).

The details of how CUMBERLAND was extracted from the ice, or how those remaining onboard were rescued have not been located. This suggests it apparently wintered in the ice. It is known CUMBERLAND was the first boat of the 1873 season to arrive in Collingwood, although there was still much ice present (Meaford Monitor May 8, 1873). The 1873 season was apparently without serious incident.

In early November 1874, nearly on the anniversary of being frozen in the ice, CUMBERLAND was caught in a storm between Sault Ste. Marie and Prince Arthur's Landing (renamed Port Arthur in 1884) and very nearly wrecked. CUMBERLAND may have been near Passage Island when it was caught (Meaford Monitor Nov. 10, 1874).

The caulking came out of the hold planks in several places and the ship began leaking badly. To keep from sinking, either 75 (Duluth Minnesotian Nov. 7, 1874) or 150 (Ashland Press Nov. 14, 1874) head of cattle and some freight were thrown overboard. It was reported that $3,000 worth of cattle, sheep and hogs belonging to Brown Bros. and all the deck cargo were dumped overboard (Meaford Monitor Nov.

10, 1874). CUMBERLAND arrived at Prince Arthur's Landing with 6 feet of water in the hold, and promptly sank (Duluth Minnesotian Nov. 7, 1874; Ashland Press Nov. 14, 1874).

The November 1875 newspapers reported CUMBERLAND was ashore and scuttled. The vessel was again caught in a late season storm and went ashore three miles from Silver Islet at Lee or T Harbor in a blinding snowstorm, with gale-force winds from the east (The Daily Globe Nov. 3, 1875; Cleveland Herald Nov. 5, 1875). There was little damage, and the steamer, with passengers and freight intact, arrived in Thunder Bay November 4, after being pulled free by tugs (Cleveland Herald Nov. 8, 1875; The Daily Globe Nov. 5, 1875). The freight carried by CUMBERLAND included "copper ore, fish, and fourteen span of horses, and about 100 passengers" (Chicago Inter Ocean Nov. 8, 1875).

On Sept. 15, 1876 CUMBERLAND ran aground at Owen Sound. While trying to get the vessel off by using a line wrapped on the shaft of the wheel, Capt. Orr was injured. The line snapped and broke both of the captain's legs. Captain Parsons took the command for the trip (Duluth Minnesotian Sept. 23, 1876).

Some of the marine notes of the Duluth Minnesotian of 1876 give insight into the nature of the cargo and passengers carried by CUMBERLAND this season.

> June 27, 1876: Arrived Duluth with 231 Mennonite emigrants and 10 other passengers.
> June 27: Cleared Duluth, cargo for Collingwood: 4 boxes of personal effects, 1 mower, 22 boxes of merchandise.
> July 10: Arrived Duluth. Cargo: 25 passengers, 17 packages household goods.
> July 10: Cleared Duluth Light.
> Aug. 7: Arrived Duluth. Cargo: 2 cabin passengers, 400 Icelandic emigrants and baggage, 2 cases furniture, all in transit to Manitoba.
> Aug. 7: Cleared Duluth. Cargo: 1 case hardware, 1 bale robes.

Wreck Event

CUMBERLAND was delayed for three days while enroute to Prince Arthur's Landing. The vessel had been grounded on a bar in Nipigon Harbor (Thunder Bay Sentinal July 26, 1877), arriving in Prince Arthur's on Tuesday (July 24). The ship probably cleared port the same day, as was its practice.

CUMBERLAND started taking on water, and its passengers were transferred to an upbound American boat she met. Later, on the 25th, CUMBERLAND struck Rock of Ages reef (Thunder Bay Sentinal July 26, 1877). The day was mild when CUMBERLAND struck. The weather was dry and clear, with a light southwest to south-southwest breeze blowing (Menagerie Isle Light Station Log July 23, 24, 1877).

CUMBERLAND struck the reef going at a speed sufficient to push its bow solidly aground. It was reported that all the forward half of the vessel was on the reef. Several tugs and steamers unsuccessfully attempted to pull it off. (It was also reported that had CUMBERLAND run 100 feet to either side, it would have missed the reef (Duluth Minnesotian Aug. 4, 1877). The steamers QUEBEC and FRANCIS SMITH worked on the stranded ship. These steamers parted all their lines in the unsuccessful attempt to remove the sidewheeler. CUMBERLAND was reported in bad shape, "lying 18 inches out amidships (Chicago Inter Ocean July 30, 1877).

Some of the freight was loaded onto FRANCIS SMITH, a ship owned by the same line (Chicago Inter Ocean Aug. 1, 1877).

JENNIE OLIVER was another vessel on hand to render aid along with insurance tugs from Prince Arthur's (Thunder Bay Sentinel Aug. 2, 1877). Wrecking tugs and apparatus were sent for from as far away as Detroit (Duluth Minnesotian Herald Aug. 4, 1877). The propellors ASIA and CITY OF OWEN SOUND may have also tried to pull CUMBERLAND off the reef (Chicago Inter Ocean Aug. 1, 1877).

The newspapers ran frequent reports on the progress of the attempts to save CUMBERLAND, and it was clear from the stories that the people of both Duluth and Prince Arthur's hoped she would be saved. The Duluth Tribune (Aug. 3, 1877), for instance, printed the comments: "We hope the fears entertained that she will go down before she reaches Collingwood will not be realized, for she is a trim, staunch and fast sailing craft, and would be greatly missed from our commerce."

A telegram sent on August 4 gave the condition of CUMBERLAND (Chicago Inter Ocean Aug. 8, 1877).

> Got to steamer CUMBERLAND this morning; find her shear planks broken, hull twisted, mast and a great part of upper works carried away. The captain of the tug will try to pull her off today if he can get her pumped out. They are afraid she will be a total loss if more bad weather sets in. Tug arrived twelve hours too late. Storm on Wednesday did all the damage.

Unfortunately the worst fears were realized. The wreck was abandoned August 12 (Chicago Inter Ocean Aug. 13, 1877). By August 18, it was rapidly going to pieces, and had broken entirely in two (The Marquette Mining Journal Aug. 18, 1877). The same newspaper reported it a total loss by August 25. The owners were already negotiating for the purchase of the Union Steamboat Company vessel ATLANTIC as a replacement. The loss of CUMBERLAND was put at $50,000. It had been insured for $34,000 (Duluth Minnesotian Herald Aug. 11, 1877).

Soon after the wreck, a rumor circulated in Canada that the master of the vessel (Capt. Parsons) had been relying on the charts of Lake Superior produced by the United States, and that the reef CUMBERLAND struck was not marked. The rumor reached H.M. Adams, Captain of Engineers, who wrote a letter to the Detroit Daily News in response (Portage Lake Mining Gazette Aug. 16, 1877). Enclosed with the letter was a copy of the U.S. chart that indicated 6 feet of depth and a rock bottom at the point CUMBERLAND hit the reef. It was the Canadian charts that were at fault.

CUMBERLAND remained visible until the end of August. The steamer FRANCIS SMITH, down bound from Duluth, reported the wreck was in the same position as when it was abandoned (Toronto Globe Aug. 31, 1877).

CUMBERLAND was entirely submerged by early September. The Duluth Minnesotian (Sept. 8, 1877) reported that "She is now quietly laying on the bed of Lake Superior. Some wreckers went to look for her lately, but could not find her."

Speculations as to the cause of the accidents must rely on the scant information appearing in contemporary newspapers, because records of any official inquiries have not been located. The captain of CUMBERLAND may have taken a short cut in an attempt to make up the time lost while aground at Nipigon Bay. The captain of the steamer ST. PAUL reported that CUMBERLAND's captain had hailed and transferred the passengers aboard his vessel because he did not want to be delayed by proceeding further on to Duluth. "After the transfer of passengers the CUMBERLAND started on her return, and taking a short cut ran hard on to the southwest part of Isle Royale (Chicago Inter Ocean Aug. 1, 1877).

Another possibility was raised -- CUMBERLAND may have been allowed to break up because of the insurance.

> The CUMBERLAND was insured for $35,000 or $40,000, and it is generally understood that although she was a fine boat, she is well sold, considering the depressed condition of the vessel interests. Whether this fact had anything to do with the "circumlocution office" way the affair was managed of course cannot be told, but people knowing the circumstances will talk, and such is the burden of the conclusions drawn (Cleveland Herald Aug. 25, 1877).

Apparently, some felt that the vessel could have been saved if those involved had dispatched wrecking tugs to the site earlier. A professional insurance agent had waited until he reached Collingwood to send out a hawser, rather than dispatch the wrecking tugs. The delay was fatal to CUMBERLAND, because of the storm that broke it up (Chicago Inter Ocean ran the above under the title "How Not To Do It" Aug. 24, 1877. The original appeared in the Cheboygan Tribune.)

Salvage

There was some salvage done on CUMBERLAND. The initial efforts were completed prior to September 1877. The following announcement of the sale of materials from the wreck appeared September 1, 1877 (Toronto Globe):

> Salvage Auction Sale of Effects
> Saved from the Wreck of the Steamer Cumberland
> on View Today at 56 Yonge Street
>
> The subscribers have received instructions to sell on behalf of the underwriter by public auction, at the warehouse, No. 56 Yonge St. the whole of the effects saved from the wreck of the Steamer CUMBERLAND, consisting of two metal lifeboats, two wooden yawl boats, two anchors and cable chains, about two tons Manilla rope, blocks, tackle, capstans, 130 life preservers, zinc pails, wheel and wheel stand, wire rope and rigging in large quantities, deck pumps, hoisting machinery, steam gauges, engine gong, pony engine, steam heater, tools etc., also the whole of the furniture saved, which is in excellent condition, consisting of 100 cane seat dining chairs and stools, 125 spring and mixed mattresses, 100 sponge and feather pillows, card and extension dining tables, gilt mirrors, 20 pieces velvet carpet, a large number of crimson and gold armchairs, sofas,and setees, superb rosewood Pianoforte, and many more articles, as well as the hull, engines and boilers of the steamer as she now lies off Isle Royale Island.

The sale took place September 5, and realized about $3,000 (Toronto Globe Sept. 6, 1877). The sale notice is a good indication of the extent of salvage that occurred on the vessel. Most of the material, except the machinery, was salvaged, to some extent.

There is, as yet, no record of hull or machinery salvage after the unsuccessful attempt by wreckers to locate the vessel in September 1877. Apparently, the machinery and boilers were not salvaged. There are, however, reports of additional wreckage attributed to CUMBERLAND being washed ashore on Isle Royale; the westernmost portion of Isle Royale has become locally known as Cumberland Point. Another point of land just inside Grace Harbor has also become locally known as "Inner Cumberland Point," another site of wreckage. There may also be some portions of the old Grace Harbor Lumber Company dock, located in the vicinity of CUMBERLAND. Bow wreckage was found and photographically documented by members of SCRU in 1984. Patrick Labadie and Monty Florentz returned in 1985 to map the area (see Chapter V, Fig. 5.11).

CUMBERLAND wreckage was reported in 1909 to be distributed along the entire south shore (Adams 1909:49), but that wreckage most likely belongs to CHISHOLM, lost in 1898. Arthur Veierthaler of Madison, Wisconsin reported ribs (frames) and planking in the waters off Cumberland Point in the mid-1960s (personal communication to Holden).

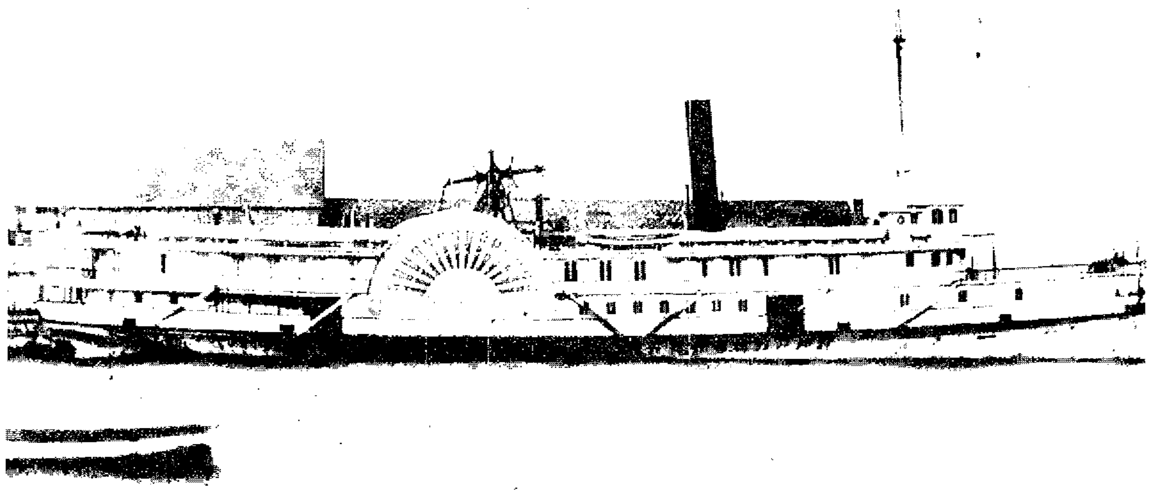


Fig. 4.1. Side-wheel steamer CUMBERLAND, built for the elegant passenger and package trade. The lack of visible hull support structures is evident in this photograph. U.S. Army Corps. of Engineers Canal Park Marine Museum Collection.

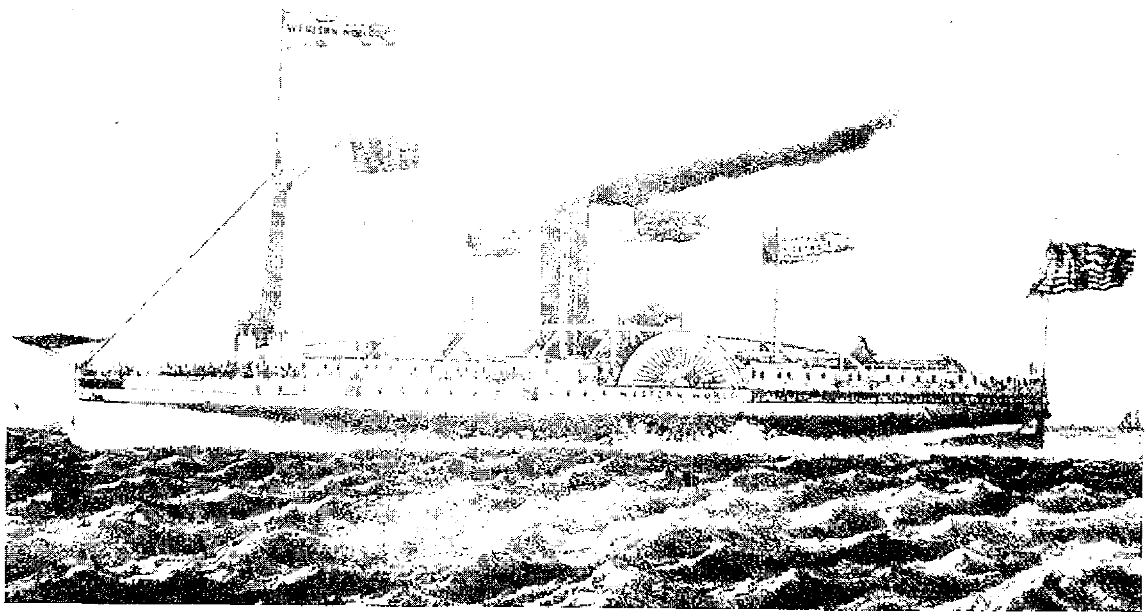


Fig. 4.2. Side-wheel steamer WESTERN WORLD, a larger vessel than CUMBERLAND built in 1854, shows a typical arched truss hull-support system to give longitudial strength to the hull. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

HENRY CHISHOLM: HISTORY

Construction

HENRY CHISHOLM was built in Cleveland by the firm Thomas Quayle's Sons, under the direction of master carpenter John Drackett (ship documents). The new bulk freighter, the largest steambarge on the Lakes, slipped down the ways August 28, 1880 (Chicago Inter Ocean Aug. 30, 1880).

The builder was an old, established firm well known for the high quality vessels they produced. The ship building company was founded by Thomas Quayle, whom some acknowledged as the father of Cleveland shipbuilders (Mansfield 1899:1:427).

Quayle was born in England and came to the United States at the age of 16 in 1827 and began work as a shipbuilder apprentice. After his apprenticeship was completed he started business in partnership with James Cody. The partnership lasted 3 years during which it built barks, brigs and schooners that were considered large craft for the time.

Soon after the partnership with Cody was dissolved, Quayle formed a partnership with Luther Moses, the new firm called Moses and Quayle under which the first Quayle steamers were built. The next partnership was with John Mart It lasted 20 years and together they constructed a large number of sailing vessels and steamers, reputed to be some of the finest on the Lakes. In one year, 13 vessels were built, including the bark WILLIAM T. GRAVES (1867), then the largest carrier on the Lakes (Mansfield 1899:2:692).

After John Martin's death in 1873, Quayle took his sons into the business and formed Thomas Quayle and Sons. During this company's operations it again produced the largest freshwater vessel of its time, COMMODORE, built in 1875 and of 2,082 gross tons (Mansfield 1879:2:692).

Thomas Quayle retired in 1879 (Mansfield 1899:2:692), and upon the entry of a third son his firm became Thomas Quayle's Sons. The sons of Thomas Quayle reaffirmed the company's reputation for building large, staunch, Great Lakes vessels; when HENRY CHISHOLM was launched it was the largest bulk freighter on the Lakes (Mansfield 1899:1:735).

HENRY CHISHOLM's Master Carpenter John Drackett, who was an English emigrant to Cleveland in 1851, had built many Lakes vessels. During most of his career he worked under contract for well-known Lakes shipbuilders' on both sailing craft and steamers. Drackett moved to Detroit in 1874 and in 1876 was employed for 4 years by Alva Bradley during which time he built HENRY CHISHOLM. In 1881 he moved to Toledo and built DAVID DOWS, the only five-masted schooner on the Lakes (Mansfield 1899:2:686). CHISHOLM's construction reflected the expertise of this master carpenter and was generally recognized as one of the finest steam barges on the Lakes. Captain George Stone was the superintendent of construction.

HENRY CHISHOLM was built for Alva Bradley and launched on August, 1880. The ship received its first inspection on September 16. It was painted the Bradley colors with a green hull and red stack. The vessel originally carried three masts. CHISHOLM was given U.S. Registry number 95610.

CHISHOLM was built as a wooden bulk freighter with a single screw. These vessels were commonly termed "steam barges." It was powered by a fore-and-aft compound steam engine, which produced 1,707 horsepower, fed by twin boilers. The compound engine, built by the Globe Iron Works of Cleveland, was reportedly of the "Randolph and Elder pattern, cylinders 30x56 inches, four feet stroke" (Chicago Inter Ocean Sept. 23, 1880). The speed of the loaded ship was about 9 knots.

CHISHOLM, considered a "leviathan" at the time of construction, was 270 feet of overall length and registered length of 256 5/10 feet, 39 3/10 feet in breadth and 20 3/10 feet in depth. The capacity under the tonnage deck was 1692 27/100 and the capacity of enclosures on the upper deck (poop) was 83 10/100 for a total of 1775 37/100 gross tons. Deductions allowed by the Act of August 5, 1882 totaled 443 19/100 for a total net tonnage of 1332 18/100. Permanent enrollment was dated at Cleveland, Ohio, September 18, 1880.

CHISHOLM was built just as shipbuilding was approaching the maximum sizes possible with wood as the principal material. Quayle's company had been experimenting with the construction of the largest of wooden hulls and their experience was incorporated into CHISHOLM. Iron, a recently introduced competitor, and later steel, would supersede wood for the construction of large hulls. The latter were more expensive when CHISHOLM was launched, which may account for the owners decision to build their hull with traditional materials. CHISHOLM cost $125,000. This may be compared with LEHIGH, an iron vessel of the dimensions of 240x35x17, which cost $140,000 (Chicago Inter Ocean Sept. 23, 1880).

CHISHOLM was a powerful towing vessel and was built with the intention of pulling one, and sometimes more, barges, as was the typical practice of the time. The barges were generally older schooners converted for towing, although some schooner barges were constructed specifically for the purpose.

The building of HENRY CHISHOLM was a matter of much interest and the contemporary press carried details of its construction:

> The Henry Chisholm, the largest steambarge ever built in Cleveland was launched yesterday in the presence of 2,000 people .... Fully 800,090 feet of lumber were consumed in her construction ... (Chicago Inter Ocean Aug. 30, 1880).
>
> Her strength is all that can be got with wood and iron. She has 150 tons of iron in her construction besides the engines and boilers. She has a wide, heavy band of iron running from bow to stern, her whole length, at the head of the frames, from which double diagonal heavy iron straps run down the sides and under the turn of the bilge, and fasten to the long frames under the bottom and bolt through the bands when they cross and outside of the frames under the planking. This is called iron strapping, and it entitles her to a rating of A 1* for ten years to A 1 1/2 for three years more, and A 2 for three years more, making sixteen years before she classes below A 2. She is expected to carry 2,000 gross tons of iron ore from Escanaba and also tow as many vessels as can get tow lines to hold them; 75,000 bushels of wheat, or 80,000 bushels of corn to Buffalo ... She came out of Cleveland without having tried her engines, and ran eight and a half miles an hour to Detroit with everything new and rough ... She is all right in every way. She steers well in rough weather, doesn't bend, or work, or give, or creak, or leak. She is as

strong as though she was all in one piece, and has power to steam almost any gale of wind ....

The iron beams under the boilers, and the iron house over and around the boiler, with the iron coal bunkers, are sure protection against fire. Her outfit includes all the new improvements and tried inventions of the steamboats of today. Her cabins and rooms are large, and are heated with steam, and she is well furnished. Without the least exaggeration it may be said that the Henry Chisholm is the peer of any craft afloat on salt water or fresh (Chicago Inter Ocean Sept. 24, 1880).

Operational History

During HENRY CHISHOLM's operational life it was involved in many accidents, some minor, some serious, which was not unusual for bulk freighters of the period. The high number of accidents was often a reflection of the operation of vessels built to the maximum dimensions of practical navigation. The long series of incidents began the day the ship was launched. Soon after the launch a sailor fell through the open hatchway and was severely injured (Chicago Inter Ocean Aug. 30, 1880).

Even the maiden voyage was not without incident. The new vessel ran aground twice. The first cargo CHISHOLM carried was 1800 tons of coal (Cleveland Herald Sept. 9, 27, 1880). The ship grounded in the west draw of the Chicago Avenue Bridge, blocking it overnight. The ship was wedged between the banks of the narrow channel. Six Union Tug Line tugs were unable to budge the freighter until 250 tons of coal were removed (Ibid. 27, 1880).

CHISHOLM was freed only to run aground again in the Ogden Canal "within a stone's throw" of the North Side Gas Company's dock (Cleveland Herald Sept. 28, 1880). Lightering operations were again carried out and the vessel finally made it to the dock. The reason for the grounding was a strong south wind that unexpectedly reduced the water in the Ogden Canal to 12 feet; CHISHOLM was drawing more than 13 feet (Ibid.Sept. 29, 1880).

During the maiden voyage the steam chest of CHISHOLM's engines needed adjustment. This was done in Detroit. During the adjustments many people visited the new steambarge (Cleveland Herald Sept. 22, 1880).

The operational history of HENRY CHISHOLM gives insight to the bulk freighter trade as it was carried out on the Great Lakes in the 1880s and '90s. This was a period of rapid change in navigation on the Lakes and it is informative to briefly present some of the highlights of CHISHOLM's history in this context.

- CHISHOLM chartered to carry corn at 4 1/2 cents a bushel from Chicago to Buffalo (Cleveland Herald Oct. 2, 1880).

- While carrying 79,600 bushels CHISHOLM drew but 14 feet 4 1/2 inches (Ibid. Oct. 6, 1880).

- CHISHOLM again ran aground, this time at the head of Bois Blanc Island on the Canadian side of the Detroit River. The vessel had to be lightered of 8,000 bushels of corn to get free (Ibid. Oct. 8, 9, 1880).

-CHISHOLM, near the end of its first trip had to again lighter 4500 bushels of grain before being able to enter Buffalo Harbor (Cleveland Herald Oct. 14, 1880).

- 1700 tons of coal were carried in November 1880 (Cleveland Herald Nov. 22, 23, 1880).

- HENRY CHISHOLM recovered the anchors of NEGAUNEE November 1880 (Ibid. Nov. 25, 1880). The steam barge wintered in Cleveland (Ibid. Dec. 4, 1880.

At the opening of the 1881 season, CHISHOLM ran aground at the head of Lime Kiln Crossing. "The accident was caused by the valve motion cutting the steam off and rendering the vessel helpless" (Cleveland Herald May 9, 1881).

The operational history of CHISHOLM continues on in much the same manner. CHISHOLM was primarily involved in the coal, iron ore and grain trades. CHISHOLM frequently set records for carrying capacity on the Lakes:

In May, 1881 CHISHOLM carried 1800 tons of iron ore from Escanaba. "This is the largest load any vessel has yet brought down" (Cleveland Herald May 24, 1881). The load brought down was actually 1911 tons (Ibid. May 30, 1881). CHISHOLM made the run from Cleveland to Escanaba in 62 hours with the schooner NEGAUNEE in tow. The ship had made the round trip with the record load of ore in six days (Ibid. June 7, 1881). In June CHISHOLM brought down 2,061 tons of ore, "the largest load ever carried in fresh water (Ibid. June 22, 1881).

The appearance of the iron ONÒKO forever surpassed the records of CHISHOLM and the other wooden ships. The new iron vessel could carry 115-120,000 bushels of wheat to the 82,000 bushels of corn of CHISHOLM (Ibid. April 28, 1882).

CHISHOLM would, however, still claim records of local note, and these seem to reflect a competition between vessels of large size. In May 1882, the freighter brought down 2,100 tons of ore from Escanaba, the biggest load to date (Ibid. May 13, 1882). This record did not last until the end of the month when CITY OF ROME, another Quayle ship, but a bit larger, brought down 2,180 tons of ore (Ibid. May 30, 1882). In June CHISHOLM loaded 2,184 tons of ore at Escanaba, reclaiming its record (Ibid. June 2, 1882).

"CHISHOLM brought in the largest cargo of ore of the season into Milwaukee July 5, 1884. It was 2,163 tons" (Cleveland Herald July 6, 1884).

CHISHOLM frequently towed schooners. For example, it had the schooners THOMAS QUAYLE, J.C. HARRISON and GODFREY in tow on a trip (Cleveland Herald Sept. 29, 1881). The schooners did not always accompany the steam barge for the entire trip, rather they were often picked up and delivered to different ports. In April 1882, CHISHOLM left Cleveland with the schooners THOMAS QUAYLE, and J.F. CARD in tow. S.J. TILDEN was picked up at Black River. CARD was left off at St. Clair while the others proceeded to Milwaukee with their loads of coal (Ibid. April 19, 1882). In 1885 CHISHOLM started the season with three schooners in tow loaded with coal, all four vessels had different destinations (Ibid. May 10, 1885).

An idea of the carrying capacity of steambarges and their tows is gained from August 1883 when CHISHOLM had CITY OF CLEVELAND, AHIRA COBB, and SCOTIA in tow. CITY OF CLEVELAND alone was loaded with 2,500 tons of ore (Ibid. Aug. 16, 1883).

Vessels unfortunate enough to come too close to HENRY CHISHOLM did not fare well. The canal boat TOM WOOD was struck by CHISHOLM and sank. There was no damage to CHISHOLM (Cleveland Herald June 8, 1881). The tug IDA M. SIMS had its whistle carried away during a close encounter with the huge steam barge (Ibid. Aug 15, 1881).

CHISHOLM and its tow AHIRA COBB both hit NORTH CAPE, a schooner down bound with a load of grain, in fog and nearly sank it. The stricken schooner was towed to Cleveland by CHISHOLM (Cleveland Herald June 25; July 3, 1884).

The only alteration noted in the first year of CHISHOLM's operation was the change of steering gear from wire to chain (Cleveland Herald June 11, 1881). In 1882 CHISHOLM ran aground in the river at Chicago and broke its wheel. It took five tugs and a locomotive to pull the ship through the Harrison Street Bridge (Ibid. Nov 4, 1882).

Repairs include a bent key connecting the piston with the crosshead in 1884 (Ibid. Aug 24, 1884). The stern bearings were repaired in 1886 (Detroit Free Press July 2, 1886).

In 1883 CHISHOLM towed the Bradley owned barges AHIRA COBB and CITY OF CLEVELAND. It was then rated A1* in the Inland Lloyd's Vessel Register 1890).

In 1883 CHISHOLM ran aground at the Willow Street bridge in Cleveland and had to lighter some ore to get off. The vessel was damaged and entered the Globe dry dock for repairs (Cleveland Herald Oct. 13, 16, 1883).

CHISHOLM had been recaulked in 1890 and received a Lloyd's rating of A2 with a value of $75,000. The rating and value were both raised in 1896 when the ship was reboilered with two new Scotch boilers.

Wreck Event

The last voyage of HENRY CHISHOLM began in Duluth on Sunday, October 16, 1898. CHISHOLM was loaded with 92,000 bushels of barley. The ship was downbound for Buffalo with the 220-foot schooner JOHN MARTIN in tow, carrying 1.2 million board feet of lumber. Captain P.H. Smith was master of HENRY CHISHOLM and the captain of JOHN MARTIN was James Lawless, second master of CHISHOLM. Both vessels were majority owned by M.A. Bradley of Cleveland (Wisconsin State Journal Oct. 21, 1898).

A gale arose and the weather was heavy by the time the two vessels neared Copper Harbor on the Keweenaw Point. MARTIN, with fore and main sails set, cast off the tow line about 5:30 p.m. Monday (Oct. 17) and was soon lost to view. There was a heavy southeast wind and CHISHOLM's captain headed up the Lake across the wind (Ft. William Daily Journal, Oct. 21, 1898). CHISHOLM cruised about until Tuesday morning in an effort to locate the missing schooner (Superior Evening Telegram Oct. 21, 1898).

CHISHOLM headed for the Apostle Island group and refueled at Ashland. The search for JOHN MARTIN was resumed at 11:00 a.m. Tuesday. The search route ran to the north shore with a call at Grand Marais, and from there to search the Isle Royale area (Ft. William Daily Journal Oct. 21, 1898).

The wreck occurred on Thursday, October 20 at either 5:00 a.m. (The Daily Journal Oct. 21, 1898) or at 8:00 a.m. while the ship was trying to enter Washington Harbor (Wisconsin State Journal Oct. 21, 1898). CHISHOLM was doing about 9 knots, full speed, when it struck the Rock of Ages reef. The ship carried a crew of 16 (Duluth Evening Herald Oct. 21, 1898).

Soon after striking the reef, Capt. Smith and First Mate Whitsman (or Whitman), who had been consulting in the ship's cabin, rushed to the deck and saw many fragments of heavy oak hull planking floating in the water. The captain decided there was no hope of pulling it off and launched the 18-foot lifeboat or yawl boat (Detroit Free Press Oct. 22, 1898) under the command of the first mate. Along with Whitsman in the lifeboat were Second Mate Gilbert Wide (Wilde), Wheelsmen James Agger and Angus MacDonald, and Seaman Harry G. Carrow. These men set out rowing for Victoria Harbor 14.5 miles away. They arrived there about 11:00 a.m. and were picked up by the steamer DIXON (Ft.William Daily Journal Oct. 21, 1898).

DIXON (probably HIRAM R. DIXON, a 329 gross-ton propeller built in 1883 at Mystic, Connecticut) arrived in Duluth with the shipwrecked crew aboard (Wisconsin State Journal Oct. 21, 1898). This same account said the crew had gone to Isle Royale before Whitsman was dispatched to report the vessel's loss. CHISHOLM was reported rapidly breaking up and feared a total loss. A wrecking expedition sent by the Inman Tug Line had been dispatched.

Soon after the lifeboat under command of the first mate left CHISHOLM, the captain and remainder of the crew rowed the 4 miles to Washington Harbor. The vessel was reported in 12 feet of water at the bow and 40 feet at the stern, listing 4 feet (Ft. William Daily Journal Oct. 21, 1898).

JOHN MARTIN, although feared water logged and lost (lumber had been spotted on the south shore), survived the ordeal in good shape. The steamer NESHOTO, a 2,255 gross ton propeller commissioned that year and built at CHISHOLM's home port of Cleveland, arrived in Duluth on October 21 with a reported sighting of the missing JOHN MARTIN off Eagle Harbor. MARTIN was sailing east. MARTIN was reported at Sault Ste. Marie the evening of the 21st under tow of the Canada-Atlantic liner ROMAN. ROMAN was a 2,348 gross ton package freighter built in 1891 in Cleveland. It was reported ROMAN picked up MARTIN off Copper Harbor, near where it was originally separated from HENRY CHISHOLM (Detroit Free Press Oct. 22, 1898; Duluth Evening Herald Oct. 22, 1898).

Salvage

Soon after the steamer DIXON arrived in Duluth with the shipwrecked sailors and news of HENRY CHISHOLM's stranding, Capt. Byron B. Inman sent a wrecking crew to the site.

Inman was the most prominent tug owner of Duluth. He had, at one time under his command, 22 vessels of all types engaged principally in towing and wrecking. He had built a reputation of note many years before for towing the largest tow on record through the Detroit River: seven vessels with an aggregate tonnage of 4,323 (Mansfield 1899:2:44-46).

Capt. W.H. Singer of the Singer Tug Company, a rival of Inman, arrived at the wreck site on Friday, October 21, aboard the tug ZENITH from Duluth. Singer returned to

Duluth on Tuesday, October 25, with a message of dire prospects for CHISHOLM's being freed (Marquette Daily Mining Journal Oct. 23, 1898). Other reports were more optimistic. In Cleveland M.A. Bradley received a dispatch from Duluth that the steamer McGREGOR had reached the wreck and reported that it was "out two feet forward, but is in good shape and the weather is favorable" (Detroit Free Press Oct. 23 1898).

Apparently, Inman abandoned operations on October 24. He sent a telegram to owner M.A. Bradley stating that two steam water pumps had been unable to lower the water in CHISHOLM's hold an inch. He predicted the steamer would go completely to pieces in 6 hours should there be any bad weather (Detroit Free Press Oct. 25, 1898).

The bad weather did appear. On October 24, a northwest gale arose blowing 27 miles an hour. It blew that night, and heavy snow squalls began on the 25th (Detroit Free Press Oct. 26, 1898). The newspaper reported all vessels were held in port due to this storm. CHISHOLM was mentioned: "... is believed she went to pieces in last night's gale" (Detroit Free Press Oct. 27, 1898).

In November, salvor James Reid visited the site aboard tug PROTECTOR. He reported the ship had gone to pieces, but "the machinery can be saved" (Detroit Free Press Nov. 11, 1898).

The people around Lake Superior have a long memory for shipwrecks. It was noted that CHISHOLM was "wrecked at the same spot as the handsome Canadian passenger steamer CUMBERLAND was broken in two a few years (21 years) ago. The CUMBERLAND was commanded by Capt. Parsons, now mate of the MANITOU" (Marquette Daily Mining Journal Oct. 27, 1898).

If the storm of October 25 and 26 did not break up CHISHOLM, the next one surely did. Another storm struck Saturday and Sunday, October 29 and 30. It exceeded the fury of the earlier storm. The wind blew 34 miles an hour and whipped up a great sea. It was estimated that the velocity was nearer 50 miles an hour on the Lake.

No salvage reports have been located for the time Inman and Singer spent on the site in October 1898. In August 1901, salvage efforts resumed on the wreck of CHISHOLM. Captain England, aboard the 198 gross ton steambarge H.A. ROOT, arrived in Duluth August 1 with one of the scotch boilers recovered from HENRY CHISHOLM. The JOSEPH C. SUIT, a 152 gross ton steambarge, had been salvaging the site. Both boilers were recovered and towed to Washington Harbor.

The worth of the boilers was estimated to be $3,500, since they had only been in use for 2 years when CHISHOLM wrecked. The 1901 prices for a new Scotch boiler was between $6,000 and $7,000. The engine was reported to have rolled down off the reef in more than 100 feet of water (Duluth News Tribune Aug. 2, 1901). No records of other visits to the site are known until rediscovery of the site by sport divers in the 1960s.

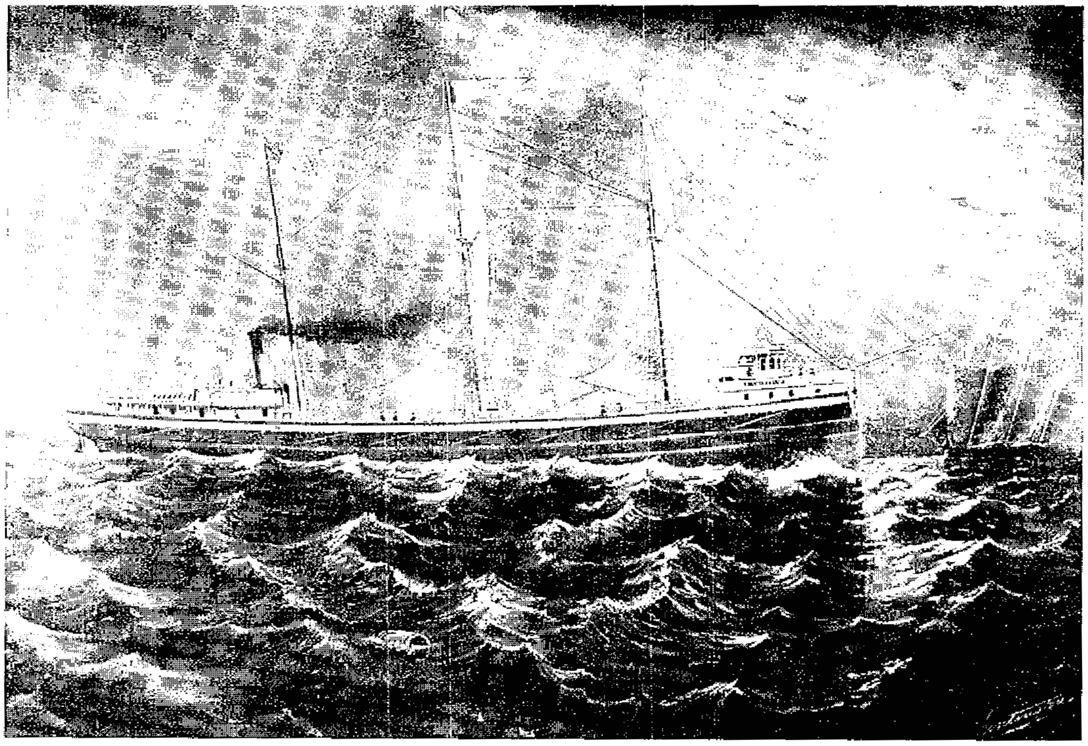


Fig. 4.3. Artist's rendition of HENRY CHISHOLM, the largest steambarge built at Cleveland at the time of launch. (Painting by Huntington) Great Lakes Historical Society.

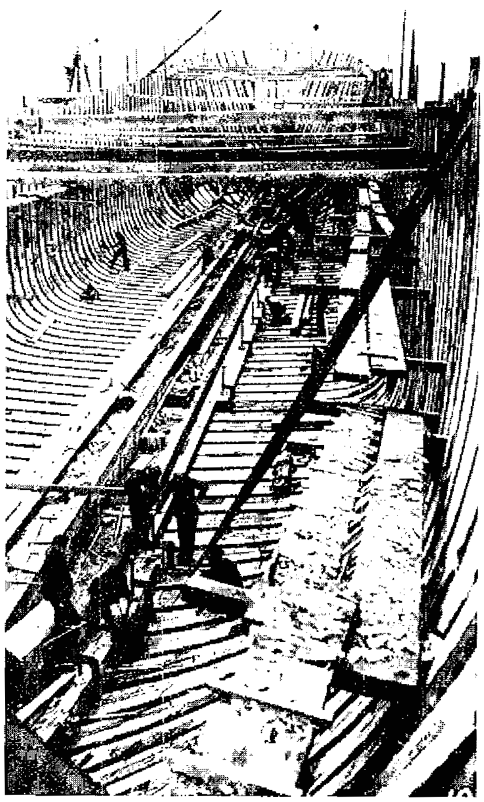


Fig. 4.4. Construction yard photograph during the building of a contemporary steambarge similar to HENRY CHISHOLM. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

ALGOMA: HISTORY

Construction

ALGOMA was one of the first steel-hulled vessels on the Great Lakes (Scanner 1976:6 from The British Whig Oct. 18,1883). Like many of the early iron and steel vessels of the Lakes, it was built in British shipyards. Britain led the world in the development of iron and steel shipbuilding, and Great Lakes owners were frequent customers. Fleet orders from the Lakes were not uncommon, particularly from Canada, for vessels constructed on the Clyde. Kelvinhaugh was a leading producer of iron and steel vessels, and some Scottish companies (particularly in the 1920s) specialized in the manufacture of Lakers (Walker 1984:58; Carvel 1950:46).

The one problem faced by the foreign shipbuilders and Great Lakes owners was that the vessels had to pass through the canal system from the ocean to the Lakes. A vessel that was built small enough to pass was too small to benefit from the economies of scale enjoyed by larger vessels constructed on the Lakes. The solution was to design vessels to pass through the St. Lawrence Canals in pieces, to be reassembled once in the Lakes. This was accomplished in two ways: by either producing the vessels in sections and transporting to the Lakes on other ships (Carvel 1950:46), or designing the vessels to sail under their own power to the Lakes and then be severed in two and bulkheaded for the passage through the canals.

ALGOMA was built by Aitken and Mansel of Glasgow, Scotland for Canadian Pacific Railway (CPR). The ship, with its two sisters ALBERTA and ATHABASCA (the earliest spelling was ATHABASKA), were the first steamers to be purchased by the new line and were used in the Owen Sound-Port Arthur run that connected the railway across Lake Huron and Lake Superior. The three vessels were similarly built, with steel hulls of 263.5 feet in length, 38.2 feet in beam and 23.3 feet in depth (Scanner 1974:8), giving a gross tonnage of about 1750 as originally built. The completed vessels would be able to accommodate about 240 first-class passengers and 600 steerage passengers.

The first of the sisters to be launched was ATHABASCA on July 3, 1883. The Scottish press carried the story (Scanner 1974:6-8 from Glasgow Herald July 4, 1883):

> Yesterday about noon, Messrs. Aitken and Mansel launched from their shipbuilding yard at Whiteinch the steel screw-steamer ATHABASKA, the vessel being the first of three presently building to the order of the Canadian Pacific Railway Co .... Miss Govan of 2 Athole Place, Glasgow, performed the usual ceremony of naming the vessel .... As the completion of these vessels will not be carried out until they reach the Lakes, it is estimated that their actual tonnage will be about 2400 when a contemplated extensive range of houses built in the American system has been erected on the upper deck.
>
> The contract for these vessels was placed in the hands of Mr. David Rowan, engineer, Elliot Street, and they will be fitted by him with compound direct-acting screw engines, capable of working to about 1700 indicated horses, the cylinders being 35 in. and 70 by 4 feet stroke, supplied with steam by two steel boilers with a working pressure of 125 lb. per square inch. To obtain strength as well as lightness of draught the hulls are constructed of Siemens-Martin steel supplied by the Steel Company of Scotland, and the bulkheads are arranged to allow the vessels being divided into two parts to permit

> their passage through the limited dimensions of the locks of the Welland and other canals leading to the level of the upper Lakes.

ALBERTA was launched July 12, 1883 and ALGOMA on July 31. Miss Shaw of Glasgow performed the ceremony of naming the latter vessel (Glasgow Herald July 13, Aug. 1, 1883 in Scanner 1974:7).

ATHABASCA was the first to sail for Montreal, leaving on August 24. The boilers were found to be leaking and the vessel returned to port on August 29. The repaired ship sailed from Glasgow three days later with a load of coal. ALBERTA and ALGOMA followed on September 25, also loaded with coal (Glasgow Herald Sept. 27, 1883). The two sisters arrived 13 days later in Montreal, making better time than the trouble-plagued ATHABASKA (Glasgow Herald Oct. 12, 1883).

The arrival of the new Clyde steamers generated much interest, and the Cleveland Herald (Nov. 30, 1883) carried a description of ATHABASCA that is informative of the procedures and details of the sister ships:

> Buffalo, Nov. 27. The ATHABASKA ... has arrived in this port. She came in two sections, which will be joined into a complete hull at the lower dry-dock of the Union Ship-yard. The arrival of a Clyde-built boat has naturally occasioned considerable interest in marine circles. The ATHABASKA is one of five steamships that will form a line from Algoma Mills, Georgian Bay, to Port Arthur, Lake Superior, a distance of 350 miles .... The ATHABASKA is of steel throughout and measures 8 feet between decks. She is quite sharp forward, and has a clean cut stern though having barely half the overhang of the average Lake steamer. The hull is divided into seven compartments. Her carrying capacity is about two thousand tons. The steamer is provided with no less than twelve engines, including two for working the rudder. One of the most remarkable of her appliances is what is called a repeating telegraph. By means of this the pilot gives the signals to the engineer, who receives them on a dial in the engine room, and sends them back to the pilot on the bridge. The latter can thus tell whether his orders have been understood. Another indicator on the bridge shows the direction of the rudder at all times.
>
> The ATHABASKA left Glasgow about September 1st for Montreal, with a cargo of soft coal and pig iron .... She arrived at that port after a tedious trip of twenty-one days, her air pumps giving out fully eight times on the trip. It was necessary to cut the hull in two in order to take it through the shallow canals of the lower St. Lawrence. As she was built with this object in view, the work was readily accomplished. The sections were placed on pontoons to go through the canals. Arriving at the foot of Lake Ontario the pontoons were removed, and the parts rested on their own bottoms. Two more ships are now in the Welland Canal, and are expected daily.
>
> Buffalo, Nov. 29. The tugs WILLIAMS and ALPHA this morning brought in the two sections of the Clyde-built steamer ALBERTA from Port Colborne. They were placed in the Union ship-yard's upper dock. The ALBERTA is the duplicate of the ATHABASKA.

The two sections of ALGOMA were brought to the docks the next day, but the job of towing the sections of the three sisters was difficult because of bad weather. The newspapers commended Maytham's tugs for succeeding (Cleveland Herald Dec. 1, 1883). There had been some problems encountered while towing.

The CPR ships were not the first vessels too long to pass through the Beauharnois and Cornwall canals to be cut in two at Montreal. Some iron gunboats had previously been cut apart, as had the passenger steamer ROTHESAY CASTLE, a former blockade runner. One of the earliest vessels to be severed in Montreal for canal passage was CAMPANA (Scanner 1976:7 from The British Whig Oct. 18, 1883). The cutting and transportation for these earlier vessels was long and difficult. However, the CPR vessels were constructed to ease the operation:

> ... the vessel[s] having been constructed with the knowledge of the required operation. In consequence, the sheets of iron [steel] were made to fit and to end at the place where she was cut, and iron bulkheads 5 feet apart erected on each side of the connection. Accordingly all that was necessary was to knock off the heads of the rivets at the joint and float the two pieces to their destination (Scanner 1976:7 from The British Whig Oct. 18, 1883).

The task of joining the sections of the new steamers was not as easy as first surmised. Reassembling ATHABASCA (for the first time appearing with a "C") took about a week -- "a delicate job to get the rivet holes exactly in place" (Cleveland Herald Dec. 2, 1883). It was an expensive operation to move the steamers from Port Colborne to Buffalo, where they would winter. It cost more than $18,000 to move the vessels (Thunder Bay Sentinel Dec. 1, 1883).

The cabins may have been fabricated in Montreal (Cleveland Herald Dec. 5, 1883). There has been some uncertainty as to whether they were installed in Port Colborne or Buffalo. The Sarnia Observer May 16, 1884 reports the cabins were installed at Port Colborne. However, it was probably Buffalo where the cabins were added while the ship was wintering. The configuration of the cabins was a long structure of wood on the upper deck. There was a lengthy gallery with staterooms flanking the sides. Accommodations were superior to those found on earlier steamers. There was no dining salon, so tables were set in the old-fashioned manner in the main lounge between the rows of staterooms. The galley had a clerestory deckhead that protruded above the boat deck to form an observation deck (Scanner 1974:8 from Glasgow Herald Oct. 12, 1883). The cabinwork was done through the winter of 1883-84; the ship was ready to begin its Lake career in early spring.

When the vessels appeared in Lakes service each ship was painted black with a narrow white stripe below the deck level. Cabins were painted white and the funnel was black with a wide red band, also carrying a very narrow white band (Scanner 1974:9).

Newspapers reported many details of ALGOMA. One of the most extensive descriptions was printed shortly after ALGOMA made its first run to Port Arthur (Thunder Bay Sentinel May 16, 1884):

> The model is admirable, not a hollow line about the bows, and without the tendency to sit down by the stern so noticeable in many of the old style. The graceful adaptability for space, even to the eye unlearned in the science of ship building. The hulls are built of steel plates of varying thickness .... The Plimsoll mark, white circle with a black band through it, is a novelty on the Lakes, but every sailor knows that it points out the line beyond which no vessel shall be loaded, thus preventing overloading. The Plimsoll marks on the CPR vessels will allow them to load to 15 feet of water on which they could carry 2,000 tons dead weight of freight, but as a rule they will

only be loaded to 13 feet. The hold is divided into compartments by six watertight steel bulkheads.

The motive power is supplied by compound engines driving a screw 13 feet, 6 inches in diameter and having a pitch of 21 feet .... The boilers, two in number, are each 12 feet, 3 inches long, and are made of Seimens-Martin steel, 15/16 inch thick and tested to a cold water pressure of 210 psi. The furnaces are of the latest improvements, being built of corrugated iron. The screws are not cast all in one piece, but the blades are bolted to the center-piece so that an injury to one piece does not necessitate the renewal of the whole screw. She carries two steel masts, with such a spread of fore and aft canvas as to be quite easily handled in case of a breakdown of the steam power. Besides the main engine she has auxiliary donkey and hoisting engines, steam pumps, and siphons. The anchors, windlasses, and capstans are handled by steam and all freight is taken in or out by a hoisting engine on the main deck running the four hatches.

The equipment is in keeping with the superior hull and motive power. She is steered by steam, and large as she is her course could be directed by a child. There is no top heavy texas [deck] as is usually seen on Lake boats, but instead there is a spacious bridge above the wheelhouse and extending the whole beam of the vessel. In the wheel house a small wheel, not 3 feet in diameter, stands before a regulated compass. Under the feet of the wheelsman is a small but exceedingly beautiful steam engine, controlling the wire cables, which serve as tiller chains. On the bridge is another similar wheel facing one of Sir William Thompson's patent compasses .... The Thompson compass is the result of the highest scientific research in navigation, and a product of human knowledge as [is] the great steel ship itself. The steering apparatus is not completed by the two wheels we have mentioned. There is another aft, to be used in case of accident to the others. It is a large hand wheel, on the shaft of which are right and left hand screws, with a binnacle compass in front of it.

... She carries six large life boats and about 600 life preservers, with a liberal allowance of life buoys about the decks. Of chain and steel wire cables and patent anchors handled by steam there is also a good supply. She was built and equipped according to the English Board of Trade regulations.

Large as the ALGOMA is she is without an oil lamp. She is lighted throughout by the Canadian Edison Electric Light Company, of Hamilton, in a style never before seen on the Lakes. She has a 6 1/2 by 8 Armington and Sime engine of 330 revolutions, driving an Edison Dynamo, supplying 110 lights of sixteen candle power each, and having all the regular attachments and details as used by the Edison Company in steamships. The lamps can be controlled by the engineer of the dynamo, or each single lamp can be turned on or off by a key attached to its socket .... A novel and useful feature of lighting is an electric lamp with a long, flexible conductor. It can be taken from the boat and carried up dark decks or can be used in the examination of the screw, rudder, or any submerged part of the hull .... Matches are not used on board, not even for lighting pipes or cigars, electric cigar lighters being provided for that purpose. The CPR boats are the first on the Lakes to be lighted by any system of electric appliances.

Her passenger accommodation is of the highest class. Single berths are provided for 180 first class passengers, and steerage bunks for 200, with room to increase steerage accommodations for 1,000 persons. The steerage is on the main deck and is roomy and well lighted. All the bunks are single, and the steerage is supplied with hot and cold water. Closets are numerous, and the steerage passengers are well provided for in every way. The furniture of the main saloon is first class and accords with the general equipment of the vessel. Bath rooms and smoking rooms are provided; and the steward's room is on the upper deck instead of on the main deck. The engineer's, porter's, purser's, and express messenger's quarters are on the main deck, which is well lighted by deadlights. The crew have a very comfortable forecastle.

The protection against fire is the most ample that human ingenuity can devise. In the first place the vessel itself is of steel, and the hull, of course, cannot burn. The main and upper decks are of steel, though they have an extra flooring of wood. Only the cabins or the cargo can burn. The cabins, and in fact all parts of the boat, are furnished with cold water pipes, for fire purposes, the water being supplied by a donkey engine. The hold being divided by fireproof bulkheads, fire cannot spread beyond the compartment in which it may originate, and there it can be controlled, by the steam pipes in each hold, through which steam can be blown to extinguish it. The cooks quarters and the oil room are encased in steel, and a steel casing is about the boilers and runs clear to the crown deck. The engine works, which is seen in the main saloon, is encased in teak.

Some additional details are provided by the descriptions of the new sisters from the Sarnia Observer (May 16, 1884), which appeared soon after their introduction:

Her hull is divided into watertight compartments by six steel bulkheads ... There is no communication whatever between these compartments, so that in a collision there will be no doors to shut to prevent the water running from one to another. The main and promenade decks are of steel .... The main saloon is nearly as large as a sidewheel steamer but it is made so at the expense of the staterooms which are somewhat small and cramped.

The kitchen and oil room are encased in steel. The fire protection of the steamer is arranged somewhat after the manner of the Holly system and there is at all times a pressure of 50 p.s.i. on all the hydrants and the hose is at all times screwed on ready for use.

The boilers are built of steel plate one inch in thickness and each one has 220 three and one-half inch tubes .... She has in all fourteen engines on board, used for hoisting anchors and freight, working steam pumps, steering and everything else that requires power. Her steam steering gear which is the most perfect made, can be worked in the pilothouse or on the bridge, and she has an auxiliary wheel aft to be used in case of accident to the steam gear .... She has two steel masts rigged with fore-and-aft canvas. These masts, together with her short thick smokestack, rake aft in a style that gives a decidedly business-like appearance to the ship. She carries six yawl boats, each of which is provided with a compass, sailing gear, water bucket, etc., and each is arranged so that when it is lowered and the proper number of people in it, it will unhook itself from the ropes by which it is lowered. Besides the boats, she carries a large number of life preservers and rafts.

There have been published reports that ALGOMA carried the first Plimsoll mark on the Great Lakes, an assertion that appears unsupportable (e.g. one of the earliest, and the probable source for later authors, is Young 1957:90). The first of the three sister ships on the Lakes was not ALGOMA, but ATHABASCA. If all three ships carried the mark, and they were the first on the Lakes, the originating honor would go to ATHABASCA.

The lengthy contemporary descriptions above are the only two that were located mentioning the Plimsoll mark. One refers to its appearance as a "novelty on the Lakes," but recognized by any sailor (Thunder Bay Sentinel May 16, 1884). The other reference only states: "she (ALBERTA as representing all three) carries the Plimsoll loading mark" (Scanner 1976:10 from The Sarnia Observer May 16, 1884). The CPR sisters may have been some of the first to carry the familiar circle and line of the Plimsoll mark, but if they were the first, it was apparently not noted in the press reports of the time. It would be surprising if the three ships indeed had carried the first Lake Plimsoll marks and the press failed to highlight that fact, especially since the newspapers made much of the other remarkable attributes of the vessels, such as all steel construction, employing an engine telegraph, Thompson compass and electric lights, etc.

There can be little doubt that some of the first electric lights on the Lakes were on these vessels. The first ship to carry electric lights anywhere in the world was the Fall River Line passenger liner PILGRIM, built in 1882. PILGRIM plied Long Island Sound with lights installed by Thomas Edison (Johnston 1983:44). There is little possibility of another Lakes vessel having been fitted with this innovation before ALGOMA and its sisters. (GARLAND, built in 1880, had electric lights, but these were probably a retrofit.) Further historical research will undoubtedly produce more detail on the construction details of the remarkable CPR vessels, and perhaps clarify which attributes of Lake craft originally appeared on these ships. Until then, the influence of ALGOMA and its sisters remains only partially documented.

Operational History

ALGOMA, completed in March (Thunder Bay Sentinel March 14, 1884), was ready to begin operations in May, 1884. The ports of call on the first voyage were to be Cleveland, Detroit, Windsor, and Sarnia, with a public gathering planned for the arrival at Owen Sound. Before its departure from Port Colborne, some concern was expressed that the new CPR ships had such a deep draft that, even when light, they would be able to enter few of the Lake harbors (Cleveland Herald May 2, 1884). The ships drew a little over 7 feet when light and could carry 1,000 tons on 12 feet of draft (Cleveland Herald May 24, 1884).

On May 16, ALGOMA was the first of the new steamers to arrive at the Lakehead port. The ship had left Owen Sound at 3 am on Sunday and arrived at the Sault River that evening and made Sault Ste. Marie by 9:30 p.m. Along the way ice was encountered. An indication of the speed capability of the new ship was demonstrated when ALGOMA overtook the steamer NYACK, quickly passing it and in a run of 17 miles, gained four miles on the older vessel. ALGOMA had 250 tons of pig iron aboard and 16 carloads of baggage (Thunder Bay Sentinel May 16, 1884).

Eight hundred to 1,000 people were waiting on the wharves when ALGOMA pulled into the Marks' Dock at 8:30 a.m.

> The appearance of the vessel as she neared the dock was striking. Every available piece of bunting was spread to the wind, and she rode in as stately as any ocean steamer ever entered harbor. The scene which presented itself upon the main deck can only be likened to the appearance of an ocean emigrant ship upon her arrival at an American seaport. Over a thousand steerage passengers were crowding round the gangways ready to land as soon as an opportunity offered.
>
> Of the general excellence of the boat herself too much cannot be said in her favor. She is certainly the finest boat that has ever sailed upon these great inland seas, and her superiority over all other Lake craft in every particular is at once apparent. She has a crew of 35 all told, Captain Moore commands her, and her first and second mates are M.S. Hastings and R. McLeod, respectively. George Pettigrew is the chief engineer and his assistant is A. McDermid. R. McKenzie is purser, and G. Taylor is steward (Thunder Bay Sentinel May 16, 1884). See also Owen Sound Advertiser Nov. 12, 1885).

The CPR steamers demonstrated their success "for the purpose for which they were intended" by entering all the harbors; they also demonstrated their success in fast runs and quick deliveries (Cleveland Herald May 24, 1884). Goods ordered from Toronto were delivered to Thunder Bay in record time. They had travelled nearly 700 miles, most of which was over water aboard ALGOMA. During this run, ALGOMA set the record for the fastest run between Owen Sound and Port Arthur. The distance was 545 statute miles and the run was made in 39 hours and 42 minutes. The run across Lake Superior was made in the extraordinary time of 20 hours. Passengers aboard this run made the journey from Toronto to Port Arthur, a distance of 670 miles of which 545 was over water, in the "unprecedented short time of 47 hours" (Thunder Bay Sentinel May 23, 1884).

All fellow mariners were not happy with the fast new CPR ships. The masters of the sisters, seeking to enhance the reputation of their new vessels, pushed the limits for speed as they made their passages.

> There is a good deal of complaint among vessel men about the speed at which the Canadian Pacific steamers are rushed through the Saulte Ste. Marie River. It is said they never slow up even when passing vessels where the channel is bad, and the wonder is that more accidents have not happened through vessels sheering or being crowded ashore (Cleveland Herald July 22, 1884).

The accident feared by the vessel men occurred between ALBERTA and the wooden steamer OSBORNE 3 1/2 miles off Whitefish Point near the mouth of St. Mary's River on July 27, 1884. The two ships, neither of which reduced speed, collided in heavy fog. J.M. OSBORNE, with two barges – GEORGE W. DAVIS and THOMAS GAWN – in tow, sank with a loss of three lives (Mansfield 1899:1:742; Scanner 1974:9). The collision caused $12,000 in damage to the bow of ALBERTA (Duluth Tribune Aug. 8, 1884).

Local people were outraged by the disaster. The Meaford Monitor (Aug. 1, 1884) wrote: "Any boat which comes against one of the CPR steel steamers stands a poor chance .... The ALBERTA received some damage to one of its plates in the bow, but it did not prevent proceeding on its trip as if nothing had happened. There is a screw loose somewhere in the management of these steamers and the railroad company had best find out where it is before their boats are all smashed to pieces" (Duluth Tribune Aug. 8, 1884).

ALGOMA was involved in an accident in August, apparently through no fault of the crew. The steamer SOVEREIGN collided with ALGOMA while the steel ship was lying at the Government dock. SOVEREIGN, under command of the first mate, reportedly struck the starboard side of ALGOMA. The stem of SOVEREIGN was carried away from the collision, and ALGOMA had one of its plates stove in near the main guard (Thunder Bay Sentinel Aug. 7, 1884).

The remainder of the season was uneventful for the CPR sisters.

Wreck Event

As the 1885 season drew to a close, it was clear it would be a poor one for Lake transportation. Severe competition, low rates, and smallpox were listed as the principal causes of the worst season on the Lakes in years. Several lines of steamers were laid up during the season. The only company to report a decided improvement was the Canadian Pacific Company, owners of the three new steel sisters ATHABASCA, ALBERTA and ALGOMA (Cleveland Leader Oct. 18, 1885). The season was not over for the successful company, however. Before the 1885 season closed, CPR would suffer the worst human life disaster in Lake Superior history.

ALGOMA left Owen Sound for Port Arthur Thursday, Oct. 5, 1885, loaded with cargo and the fewest passengers it had ever carried. There were seven cabin and six steerage passengers (or five cabin and 6 steerage, Owen Sound Times Nov. 12) aboard; the cargo consisted of 134 tons of general merchandise, and 297 tons of railway supplies (Duluth Tribune (Weekly) Nov. 13; New York Times Nov. 11, 1885). The light passenger list could be attributed to the lateness of the season and to the general decline of passenger traffic as a result of the opening of the "all rail" route around Lake Superior (Owen Sound Advertiser Nov. 12, 1885) earlier in 1885.

According to Capt. Moore, ALGOMA passed through the Sault Ste. Marie canal on Friday Nov. 6, about noon. The steel steamer ran into a heavy gale and blinding snow storm at the halfway point of crossing Lake Superior. The storm increased in intensity until it quickly reached hurricane proportions. The storm of Friday night and Saturday morning was "beyond a doubt one of the greatest hurricanes that have occurred during the last 5 years. The dreadful storms of 1881-2-3, which did so much damage, were exceeded in violence by the terrible tempest of the 6th and 7th, in the opinion of many old seamen" (Port Arthur Sentinel Nov. 13, 1885).

The storm racked ship was rolling so severely that the first mate ordered the sails set to steady it. Under sail and steam combined, ALGOMA made 15 miles an hour or better, but was drifting to leeward off the set course. A lookout was posted about 3 a.m. to sight the Passage Island light. The steamer maintained its speed until about 4 a.m. when the captain ordered the sails down and a change of course. The engines were stopped while the sails were lowered and the new course set. At 4:40 a.m., less than five minutes after the engine telegraph bells sounded to go ahead, there was a crash (Port Arthur Herald Nov. 14, 1885). ALGOMA was aground on Isle Royale.

An early newspaper report recounted the wreck event (Port Arthur Herald Nov. 14, 1885):

> "A tremor shook the steamer from stem to stern, and a moment afterwards she parted, just forward of the engine [actually, just forward of the boilers-LM.], while the waves rushed in at the vents and over the forward decks. Panic immediately ensued, and all was chaos and confusion. Passengers, who were calmly reposing in their berths ... were rudely awakened by the grinding of the hull on the rocks and the roar of the storm. There was no time, however, to consider the situation. The water poured in through the broken timbers and over the deck, putting out the fires, which soon had the effect of stopping the engines and shutting off the electric light. All was darkness, storm and snow. Daylight was just breaking, but did not afford sufficient light to enable the crew to see where they were .... The steamer had shifted around after striking and was resting with her stern upon the rocks, while the forward cabin and the bow of the boat were fast crumbling to pieces so furious was she being beaten upon the reef. The purser, second mate and steward who were all forward, made an attempt to reach the after part of the vessel, which was now the only place of safety. In doing so they were struck by a large wave, carried overboard and disappeared beneath the surface.
>
> Some fishermen sighted them and went to their rescue. After taking in the dreadful situation the fishermen went out and intercepted the ATHABASKA which was then coming up the Lake.

The first news of the disaster arrived late on Nov. 9th in Port Arthur with the survivors aboard ATHABASCA. (It would be two decades before wireless appeared on the Lakes.) The first reports of the wreck were in the press the next day. The early reports indicated about eight passengers and twenty-five crew were lost (Wisconsin State Journal Nov. 10, 1885). Other accounts reported various numbers for those lost in the wreck (e.g., Cleveland Leader Nov. 10, 1885 reported 37 lost; Wisconsin State Journal Nov. 11, reported 47 drowned, and in another article of the same issue stated: "Other officials freely say that fully 100 have gone down with the vessel"). The lack of company records accounts for the confusion regarding the number aboard -- the only passenger list was apparently aboard the lost vessel.

As is usual in the aftermath of a shipwreck, much speculation was generated to account for the disaster. The Wisconsin State Journal (Nov. 11, 1885) stated that the official dispatches "intimated" that ALGOMA was making for shelter in Rock Harbor when the wreck occurred.

A lengthy article titled: "The Captain's Statement" appeared in some of the regional newspapers. The statement, evidently fabricated by someone other than the captain, describes panic aboard the vessel during the storm. The captain had unsuccessfully attempted to quiet the fears of those on board. The wreck of ALGOMA, according to this account occurred as the captain was seeking refuge in Rock Harbor (Owen Sound Advertiser Nov. 12, 1885. This account also appeared in the Nov. 11, 1885 issue of New York Times).

This report, which had circulated as an Associated Press dispatch, was discounted by the captain and others. Captain Moore, still suffering from injuries received during the wreck, said the statement was wholly untrue, and must have been simply manufactured by the reporter (Port Arthur Weekly Sentinel Nov. 20, 1885). The same newspaper labeled the report "shameful."

An accurate statement of the captain was printed in the newspaper (Owen Sound Times Nov. 19, 1885):

> The steel steamer ALGOMA cleared from Owen Sound at 4:20 pm, Thursday, the 5th inst, bound for Port Arthur, having on board a general cargo of merchandise of about 400 tons. We had a good run to Sault Ste. Marie, which port we cleared at 1 o'clock on the afternoon of Friday, (6th) and passed Whitefish Point at 3:50 the same day. It was blowing a strong breeze from the east and north west. The wind was increasing. We made sail at Whitefish Point at 7 p.m. The weather was the same, but the wind was slightly increased, with occasional squalls attended with rain. At midnight the wind had increased to a moderate gale with frequent squalls, accompanied with rain and sleet, and a sea getting up. At 4 am [7th] the wind shifted north east with violent snow squalls and a heavy sea running, when we checked down and commenced taking in sail. At 4:30 am all sail was in except the fore trisail [probably fore staysail, cf. notarized statement of Capt. Moore Duluth Tribune Nov. 13, 1885 ed.], which was partly in, and we put the wheel hard to starboard, and the ship was coming around to head out on the Lake again on account of the snow. After leaving Whitefish Point, our proper course was northwest by west, but the wind being from the northwest, we steered northwest by west quarter west until 10 p.m. to allow for leeway, when the course was changed to northwest until 4 a.m. We then steered west by south for the purpose of taking sail in. While the ship was coming around as mentioned above she struck aft about 4:20 and continued to forge ahead, driven in by the heavy sea. About 4:40 she settled, the seas making a clean breach over her all the time and smashing the ship up. A blinding snow storm continued. On account of the seas that were running and the surf, it was impossible to make any effort to save the ship or cargo, and about 6 am she parted at the fore side of the boiler, and the freight got washed out and some of it was driven ashore.

There were 14 survivors (New York Times Nov. 13, 1885), two passengers and 12 crew including Capt. Moore. Forty-five or 47 persons were lost. This shipwreck claimed more lives than any other in Lake Superior history.

One widely circulated account had all the survivors coming ashore in a single lifeboat (New York Times Nov. 10, 1885). This is not an accurate account of the wreck events, and led to the press raising the question as to why there were but 2 passengers saved with the 12 crew. The later appearance of accurate statements of survivors cleared the insinuations (Port Arthur Herald Nov. 21, 1885).

The accounts of the survivors add much detail to the events of the wreck. Mr. William R. McCarter, a journalist and one of the two surviving passengers gave the following account (Owen Sound Times Nov. 19, 1885):

> After leaving White Fish Point the wind increased, but the vessel was a staunch one and no fears were entertained, as she stood the storm splendidly. About 9 o'clock on Friday evening, I was on deck, and although there was a heavy wind, the steamer was making splendid progress. The passengers all went to bed, and about twenty minutes to five I felt a slight shock, which alarmed me, and I jumped up. I found a general alarm, and several deck hands rushing aft excitedly. I followed them and asked what was wrong, but they did not seem to

know. One of them said, "This is a terrible affair, but I hope it will come out all right." As soon as the hull became fast on the rocks, the force of the waves dashing in fury against it soon broke up the saloon, and it was swept away. I think the women and children never got outside, but were probably drowned or disabled by the waves rushing in, and were carried off with the cabin when it was swept away. The sea was terrible, the waves rushing in great mountains over the deck, and every few minutes the despairing shriek of some poor fellow would be heard as he was carried off and lost. One thing followed another with such rapidity that there was not time to do anything with the boats, and they were swept off with the cabin. The electric lights went out, and it was intensely dark, so that I could only see what went on immediately around me. A great many jumped overboard, and tried to get to shore with life preservers, but only three of them succeeded, the others being dashed against the rocks. The men from below had crowded up on the upper deck, near the stern, although some had rushed forward and were lost. Amidst the terrible excitement and confusion, Capt. Moore was brave and cool.

At great risk to himself he seized a rope, and ran it along as a life line, telling us to hold on to that, and had it not been for it, more of us would have shared the fate of those who were lost. The forward part of the saloon had all gone, but a little piece was standing near the stern, and we were under the projecting roof outside of that. Timbers were crashing in every direction, and we were afraid that the protecting roof would fall on us. The Captain went aft to get a post to prop it up, and as he was coming back, there was crash, and I heard him cry out, "I'm done for -- what will become of these poor people?" But he stuck to the post and dragged it along, wounded as he was, though it did not prove of much service after all. When the captain was struck, another man called out, "I'm crushed, I'm gone!" Though I could not see him, those who were next to him said he was carried off by the next wave. Twice when the waves had carried me off my feet and I was nearly gone, Capt. Moore, who was next to me, caught me and helped me up again, saying, "I will save you, old man, if I can." Two of the men had got down by the fender and were holding on there. I asked them how they were doing, when they said it was terribly cold there, I did not attempt to go. One of them gave up and was lost soon after. When it became daylight,we could see the rocks towering up in front of us, close at hand, but with the terrible sea it was impossible to get to shore. We managed afterward to get down to the lower deck, where we all lay, cold and wet, listening to the terrible storm raging, and not knowing but we might share the fate of the poor follows who had already gone. We spent the whole of Saturday night in that position. On Sunday morning the storm had abated, and we descried a fishing tug,which we hoped would see us, but it went away. Near noon, when the sea had calmed, the three who had escaped to shore took a line from us -- it was only about 40 or 50 feet -- and pulled us to shore on a raft. The captain was sent first, with a man to hold him, as he was unable to stand, from his injuries. The land proved to be Green Stone Island, a small rocky islet off Isle Royale. Shortly after, some fishermen saw us, and took us to their shanty, where we spent Sunday night. On Monday they intercepted the ATHABASKA, which took us to Port Arthur.

Joseph Hastings, the first mate, gave the following description of the wreck (Owen Sound Advertiser Nov. 19, 1885):

"Nothing of any account occurred during the voyage to Sault Ste. Marie, the ALGOMA passed Whitefish Point about 1 o'clock on the afternoon of Friday. The wind was at that time blowing a stiff breeze from the east and north east. At Whitefish Point sail was made, and the steamer proceeded on her way under a full head of steam. The wind kept increasing in violence, and was accompanied with snow and sleet. At 4 o'clock Saturday morning the wind shifted to the northeast and a violent snow storm raged. The sea was running mountains high, and the boat was tossed about like a cork. Fifteen minutes past 4 o'clock the order was given to take in all sail and put the wheel hard a starboard, to bring the ship about and head out on the Lake again, on account of the snow and darkness. While the ship was coming about she struck Greenstone Point, on Isle Royale about fifty miles from Port Arthur and one mile from Passage Island Lighthouse, which has been abandoned since the first of the month. After striking the first time the boat forged ahead, being driven by the wind. A second shock occurred shortly after the first. The vessel struck the reef violently, and she immediately began to break up.

Most of the passengers and a number of the crew were in bed at the time, but were awakened by the shock, and the scene that followed beggars description. Water poured in through the broken vessel and over the bulwarks, putting out the fires in the furnace, and extinguishing the electric lights. Screams of women and children were heard above the fury of the storm. The crew hurried hither and thither, doing what they could in the darkness to render assistance; but their efforts were of little avail, for in twenty minutes after the vessel struck the entire forward part of the boat was carried away, together with her cargo of human freight. Several clung to the rigging and lifeline the captain had stretched along the decks, but were soon swept away and swallowed up by the angry waves. The stern of the boat was steadily pushed along the rock, and those who were not too much exhausted with fatigue and benumbed by the cold, crept to the after steerage and sought its shelter. Less than an hour after striking all was over, and but fifteen out of over sixty were saved."

When the shock was felt he ran down to the purser's room. He then pushed forward amid the stifling steam and aroused the steward and other employees as well as the steerage passengers. Finding the escaping steam almost suffocating, he again rushed up to the cabin, aroused all the passengers whom he had not awakened on the way down, and conducted them to the forward end. A lady passenger and her sister were wildly crying in a saloon clothed in only a thin nightdress. The mate urged quiet and obeying orders. While he was advancing forward with one of the lady's hands in his and holding the little girl with his other hand a great wave dashed through the cabin, caught the woman and child and swept them out into the Lake. Some of the men lost their reason completely, and rushed into the stormy depths. About seventeen persons followed the men and climbed into the rigging. The terrible sea swept the boat and the masts were washed clean under the waves. Every time they came up there were two or three forms missing. Once the mast made a dip with ten men, and when it came up right again only two persons were seen on it. The next swept all the brave strugglers away. One man fought nobly for his life. He was washed off the boat and clung to some rope. Slowly, inch by inch he struggled along the ropes, hand over hand, back to the vessel. Every few seconds a wave would hurl him around like a feather, dash him up, and then bury him under a mountain of icy cold water, but he struggled on until just a few feet from the boat, when his strength gave out and he passed away with a wild, wailing appeal for aid. Many of the passengers could be seen on their knees, loudly calling for mercy and succor. The waves spared none. They dashed in and around each shrinking form and bore away as their prey with each returning visit dozens of human beings.

John McLean was one of the two waiters who survived the wreck. His account appeared with the others (Owen Sound Advertiser Nov. 19, 1885):

> McLean felt the shock when the boat struck and jumped out of bed. He saw the engine had stopped, and the electric lights were out, while the boat was full of steam. He ran up the hurricane deck and saw the captain blowing off steam, which he continued until all was exhausted. "The captain told us there was no great danger and the safest place was down on the lower decks. We started to run there , when the waves carried away the hurricane deck, and we grasped the rigging. The captain passed us a life line along, and we hung on to it for over eight hours, believing that every minute would be our last. It was dark and freezing cold, with a terrible sea. There were two ladies and three little girls that I noticed. They were swept away with the cabins. We could hear the ladies and girls calling piteously, but no one could help them. After a while their voices ceased, and we all knew they were out in the Lake. The cabin went to pieces in ten minutes after the boat struck, and only the stern part of the boat was left when we came away. All our clothing was lost. We all owe our lives to the exertions made by the captain. If it had not been for his coolness and prompt action we could not have gone through the first night. I have been on the Lakes for five rough seasons, but this is the roughest I ever saw."

Particulars of the wreck can be gleaned from many sources. Most reports indicate there were two shocks. The initial one, according to the captain, was near the stern (captain's account above). The boat moved forward and struck a second time. "A second shock occurred shortly after the first. The vessel then struck the reef violently at the fore side of the boiler, and she immediately commenced to break up" (Cleveland Leader Nov. 11, 1885).

The hull was immediately opened and water poured through the fractured plates. The wooden deck houses were quickly washed overboard, and the forward portion of the hull apparently broke up very shortly after. (Other accounts indicate the bow went to pieces an hour and a half after striking.) "The water poured in through the broken vessel and over the bulwarks, putting out the fires in the furnaces and extinguishing the electric lights .... In less than twenty minutes the entire forward part of the boat was carried away" (Cleveland Leader Nov. 11, 1885).

A letter from Joseph Buckley Hastings, First Officer of ALGOMA to Miss MacKenzie, sister of Alec MacKenzie, Purser, lost when the ship sank, gives some details of the ship's shifting position as it broke up (Michigan Technological University Archives Collection; Isle Royale National Park Underwater Cultural Resources File)

> It being at this time so pitchy dark one could not recognize another standing three yards away and it was snowing hard at the time. This part of the cabin where Alec was standing [near the kitchen smoke stack stays] was washed away very quickly as the ship had swung around from the time I left the deck until I returned, in all not five minutes. Those of us who were saved had left the forward end and gone aft as the stern had by this time swung inshore and was now sheltered by the bow which on my going below was the sheltered end, the bow now acting as a breakwater for the after end, but she stood for but a short time the heavy seas completely breaking and sweeping over her and each sea washing away portions of the forward end till she was completely demolished forward of the engines and all the cabins gone fore and aft.

First Mate Hastings returned to the wreck site at the earliest opportunity and led the first extensive search of the area. Hastings had arrived at Port Arthur, frostbitten and bruised, with the other survivors aboard ATHABASCA on Monday, Nov. 9. The next morning he left aboard SISKIWIT with the search party bound for the wreck site.

They searched 20 miles of coast line. The only articles they found were two passenger trunks and three bags of mail. There had been four bags of mail on the boat. One of the mail bags had been found buried five-feet deep in the sand. There was little wreckage reported near the boat, most was found four miles down the shore (Port Arthur Daily News Nov. 16, 1885; Port Arthur Sentinel Nov. 20, 1885).

Officers of the company visited the site to check the progress of the search operations. H.M. Kersey, chief clerk of the CPR lines, chartered BUTCHER BOY with two captains aboard. Kersey ascertained the search had been thoroughly performed, and considered it useless to keep the men out any longer. He instructed 4 Norwegian fishermen to continue the investigation whenever possible and to bury any bodies they found on the island for identification in the spring.

The company officers and search party returned to Port Arthur with the SISKIWIT and scow, reporting little of value found. They planned to leave for the east aboard ATHABASCA on the 17th. (Port Arthur Sentinel Nov. 20, 1885).

The tug HATTIE VINTON, with about 15 citizens aboard, started out for the wreck site on November 10. The weather was marginal for the crossing, and the captain decided to lay up in the lee of Green Island overnight. The sight of the wreck was described in detail (Port Arthur Herald Nov. 14, 1885):

> The whole of the after portion of the vessel, from the engine cylinders, with the exception of the upper cabin work, lies about forty feet from shore, listed well over to the port side; and a more dismal looking sight could hardly be imagined. In consequence of quite a heavy swell breaking over the wreck, no attempt was made to board the remains of the once staunch craft, but the whole party at once proceeded to search the shore for the corpses of the unfortunate people who were drowned. The first body was found by Mr. Harry Micholson about seventy-five yards south-west of the wreck, well up on shore, among the debris. A large piece of the upper cabin partially covered the body, which proved to be the corpse of poor Hanson, the

> wheelsman, who was at his post at the time the vessel struck .... About three hours after the above discovery, one of the surviving waiters, who was with the party, noticed a body lying amongst a lot of wreckage, wedged in the crevice of a rock about forty yards from the stern of the boat .... No other bodies were found, although the search was continued all day.

HATTIE VINTON returned to Port Arthur with its grim cargo. The bodies were crushed and battered. The searchers reported that the bodies had been robbed. Hanson was known to have had a gold watch and $12.00 in his pockets. When he was found his pockets were turned inside out. Several fishing boats had been spotted loaded with carpets and other goods near the wrecksite and fishermen were suspected of robbing the bodies. The bodies were placed aboard ATHBASCA bound for Owen Sound (Port Arthur Sentinel Nov. 20, 1885; Cleveland Leader Nov. 14, 1885).

A party of fishermen returned to Hancock Nov. 23, from the North Shore of Lake Superior after visiting the ALGOMA wreck site. They had picked up 4 floating bodies from the shore of Rock Harbor. The fishermen reported over 300 tons of freight strewn on the shore. "Portions of the pilot house cabin wheel, and a number of life preservers were picked up .... The steamer can be plainly seen on the sandy bottom of Rock Harbor" (Cleveland Leader Nov. 24, 1885).

An indication of the force of the storm that sank ALGOMA can be obtained from some of the accounts of scattered wreckage. "The piano belonging to the wrecked steamer ALGOMA, was washed high and dry upon the rocks of Isle Royale, some fifteen feet above the water's edge" (Port Arthur Herald and Lake Superior Mining Journal Nov. 14, 1885).

The wreckage was badly broken up and widely scattered. The only intact items were "one barrel of brandy, one of beer, a box of axe handles, candles, etc., lying along the beach. No doubt a large quantity will be found some five or six miles up along the beach and among the islands, where it is expected" (Port Arthur Daily Herald Nov. 14, 1885). "There was not a piece of wood left longer than a foot in length. Every piece of furniture was broken in small portions (Port Arthur Sentinel Nov. 20, 1885). The Menagerie Islet Lighthouse Station Journal reported sighting material from ALGOMA on November 9, 1885. A uniform coat was picked up at the edge of the water 17 miles from the wreck. The coat had 14 first class tickets in the pocket.

There were other grim indications of the force of the storm. Pieces of bodies were found along with the battered wreckage. "Portions of other bodies were found, showing that the waves were tremendous having dashed them to pieces against the rocks, breaking bones and crushing bodies like egg shells (Portage Lake Mining Gazette Nov. 26, 1885).

The hull of ALGOMA was reported all "washed away" but the after part, up to the main mast. "The rest of the boat is completely flattened out, the iron sides being laid out even with the shores. The wreck is piled all along the the coast for two miles" (Port Arthur Sentinel Nov. 20, 1885).

A remarkable correspondence from the archives of the Canadian Pacific Railway Company indicates the company investigated the circumstances of the wreck of ALGOMA. A letter, dated Nov. 24, 1885, from Henry Beatty, Manager of Lake Traffic, and W.C. Van Horne, Vice President contains the results of the company's investigation (Corporate archives, Canadian Pacific, Montreal; Portions of this correspondence appeared in Lavelle 1974:234):

Dear Sir:

I returned from Owen Sound last night where I have been for some time taking the evidence of the survivors of the "Algoma", for the purpose of ascertaining the cause of the loss of that ship.

The Steamer left Sault Ste. Marie at one o'clock p.m. on Friday, Sixth of Nov., and passed Whitefish Point about four, wind blowing a strong breeze from E.N.E. After passing Whitefish Point, they made sail and steered N.W. by W. 1/4 W., her proper course being N.W. by W. 1/2 W., but the wind being from the northward they allowed one quarter of a point for leeway.

At 7 p.m. the wind slightly increased with occasional rain. At 10 p.m. wind increased to moderate gale with rain and sleet, the course was changed to N.W. by W. At 4 a.m. Saturday, the wind shifted N.E. with violent snow squalls and blowing a gale.

The engines were then slowed down and shortly after, the ship's course was changed to W. by S. for the purpose of taking in sail and running back into the Lake. She immediately after struck a reef, aft, she continued to forge ahead, being driven in among the rocks by the heavy sea.

At 5 o'clock she settled down forward and her stern swung on shore, the sea making a clear break over her all the time from when she first struck.

Owing to the gale of wind, the heavy sea running and the surf, nothing could be done to save either ship or cargo. At 6 o'clock, she parted forward of the boilers.

Before the ship was turned to run back into the Lake, the Captain, First Officer, and Chief Engineer, consulted, and all were of the opinion that they were 15 miles off Isle Royale, but as a matter of fact they were much farther up the Lake. The only one of the engineer's crew saved, a fireman, says they were running under easy steam all that night, for the purpose of saving fuel, and on account of the wind, but notwithstanding this the ship must have been going very much faster than they calculated, carried along by the wind, which was far stronger than they had any conception of, owing to its being nearly after them.

The distance from Whitefish Point to where she turned is about 190 miles so that the ship was going nearly 16 miles per hour.

I have carefully looked for the cause of this deplorable accident. I learned that the captain did not leave the bridge the whole night except for 5 minutes at midnight. The first officer was also on the bridge from midnight. Both Engineers were on watch, every precaution seems to have been used and everything done that was necessary except putting out their log. This was not done, for the reason, which they give, that they had the ship's time so accurate, that they could, in ordinary weather tell from the revolutions of the wheel, exactly where they were. They also claim that there is always a strong current in the Lake during the continuance of a stiff breeze, and therefore the log would be of no use, but would rather tend to deceive.

I may say that logs are not used on the Lakes, I do not think any Steamers but ours are furnished with them. Lake Captains depend on their compasses, revolutions of the wheels, and land marks to guide them.

The cause of the accident was, in my opinion, entirely due to the wind being much stronger than they thought, and the ship was therefore going along much faster than they calculated. When they supposed that they were 15 miles from Isle Royale, they were actually running up along it, and in turning the ship to run back into the Lake, the stern struck a reef running out from Green Stone Island.

The ship was exactly on her course before she turned, and had the Captain been reckless enough to have gone on, there is no doubt he would have passed Passage Island all right, but this, of course, he did not know at the time, and to avoid one danger, he runs straight into a greater, the effect of which was the loss of our fine ship and a number of valuable lives.

Capt. Moore is badly injured and the chances are about even, whether he will recover. I have therefore been unable to get his testimony.

Yours truly,
/s/ Henry Beatty,
Manager Lake Traffic

An official inquiry was held regarding the loss of ALGOMA. A tribunal was appointed by the Canadian government consisting of Lt. A.R. Gordon, R.N. and Capt. Thomas Harbottle of Toronto (Cleveland Leader Nov. 17, 1885; Owen Sound Advertiser Nov. 26, 1885). The men were instructed to "inquire into the cause of the wreck and place blame where it belongs."

Principal concerns of the inquiry focused on the actions of the managers of the company as well as the captain and crew.

> It is hoped they will spare no pains in placing blame, if any exists, where it belongs. If it is found that the managers of the line compelled their captains to navigate the boats without regard to wind or weather, the fact should be made known to the public. If passenger boats are run without regard for those who ride on them, the public is entitled to know it .... It is not improbable that a considerable share of the blame will be found to rest with the managers of the connecting line of the Canadian Pacific. From the very first an undue pressure has been brought to bear by the management on the masters sailing these vessels, as evidenced by the frequent disasters from the ALBERTA in the summer of 1884. A prominent vessel man who had been interviewed recently in Buffalo says, "I was up at Owen Sound last summer and saw those three great steamers coming and going just on the minute, and all the while making such high speed, and I was astonished. I went on board of the ATHABASKA, and I believe one of the others, and I asked some of the officers how they could make such time. Were they not obliged to run fast in thick weather to do it? They replied that their orders were to make their time anyhow. I told them their iron hulls were ill-suited for going on the rocks. They have succeeded in about running the smaller Canadian craft off Lake Superior, and that is how they have done it. Now, with the ALGOMA gone, and so many

passengers with her, their success is not anything to be proud of" (Cleveland Leader Nov. 22, 1885; cf. Owen Sound Advertiser Nov. 26, 1885).

Other sources also focused some of the blame for the wreck on the management of the company and their push for quick voyages and tight schedules. An example of this sentiment appeared soon after the wreck:

> ... Over all this terrible affair hangs the appalling fact that the result was largely due to carelessness or blind obedience to orders, the captain saying his orders were to "Push Through" and he did push on to death, carrying, while the storm was at its height, a full spread of canvas. At the time of the wreck the boat was 40 miles farther along than the captain had supposed her to be, showing that from the time of starting she had sailed over 16 miles and hour. It is barely possible that the captain 'shall ever sail a vessel again, and therefore the law may not reach him, but in the meantime what punishment should be meted to a company that gives such orders and with the expectation that they will be implicitly obeyed? (Portage Lake Mining Gazette Nov. 26, 1885).

The Canadian Pacific Railway Company, like most other companies that have lost vessels, was quick to rally to the support of their captain.

> No man could stand higher in the opinion of the company than Captain Moore does. If the company was having another boat built tomorrow, costing $500,000, no one would be offered the command in preference to Captain Moore, who is known and trusted as one of the ablest, most discrete, and careful masters on the Lakes. There is no doubt that all who survived the wreck owe their lives to the Captain, and had he not been stricken down by the fall of the cabin many more lives would have been saved. He never attempted to make Rock Harbor, and did not want shelter as so stated. The boats do not fear any sea when there is plenty of room. He did not sight Isle Royale and was turning out for the open Lake when the reef was struck (Cleveland Leader Nov. 22, 1885; cf. Port Arthur Sentinel Nov. 20, 1885).

The Commissioners of the official inquiry made a partial report of their findings on Nov. 28. They had not been able to interview Capt. Moore, who was still suffering from his injuries. Moore was reported dying from shock and exposure (Duluth Tribune Nov. 27, 1885). Moore did eventually recover from his injuries, including multiple rib fractures (Cleveland Leader Nov. 29, 1885).

The partial report, released to the government, indicated that:

> the reports as given in the newspapers are correct in all important points with one exception. This is a correction of the statement that the ALGOMA was making for the harbor when she struck the rocks, as it is now shown that she was putting around and heading for the Lake when it was found she was nearer to the fatal rocks than was anticipated by the officers. It remains, therefore, for the court to decide who, if any one, was responsible for the vessel being out of her course and in that dangerous locality the time of the wreck. It is said the evidence shows also that after the vessel struck the crew behaved like heroes, and all hands had a terrible experience" (Cleveland Leader Nov. 29, 1885).

The Commissioners traveled to Owen Sound to interview the injured captain. The final decision of the inquiry came in January, 1886. Captain Moore and Chief Officer Hastings were censured. Captain Moore was found negligent, and his certificate was cancelled for a year. First Officer Hastings' certificate was suspended for six months (Duluth Daily Tribune Jan. 16,1886). The Minister of Marine approved the sentences, but shortened the suspension of the captain to nine months "owing to previous good record" (Portage Lake Mining Gazette Feb. 4, 1886).

The loss of ALGOMA also prompted discussion as to the merits of iron and steel vessels for Lake transportation. "The general opinion is that they are unsafe unless built with a double bottom and water tight compartments. The CPR vessels have neither" (Duluth Trubune Nov. 27, 1885). ALGOMA had multiple water tight compartments, but not a double bottom. The loss also prompted a re-evaluation of the remaining sister ships. "Outside of passenger accommodations the vessels of the line are now said to be inferior to many others on the Lakes" (Ibid.).

Salvage

The CPR company contracted to recover the machinery of ALGOMA in early June, 1886 after sending an agent to various wrecking companies (Port Arthur Sentinel June 11, 1886). They agreed to pay $6,500 for delivery of the machinery to Owen Sound. An effort was also directed to the recovery of the railroad iron on the wreck (Duluth Tribune June 18, 1886). Detroit and Port Huron parties were awarded the contract "to blast the hull of the Canadian Pacific Railway steamer ALGOMA." Fred L. Merryman (or Merriman), of Port Huron, was placed in charge of the expedition (Ibid. Aug. 2, 1886).

Henry Beatty announced that a contract had been let to the Moffat Tug and Wrecking Company of Detroit, with L.B. Montgomery assisting the operations. (The company also appears as "Moffat Tug and Canada Wrecking Co." in Port Arthur Sentinel June 11, 1886, and may actually represent two companies working together.) CPR had taken over the wreck from the insurers after a settlement had been reached. The company was particularly interested in recovering the engines and machinery for eventual reuse because they had no counterpart in the country except for those in ALGOMA's sister ships (Owen Sound Advertiser June 10, 1886).

The tug GEORGE HAND and schooner L.L. LAMB were engaged in recovery operations by early July (Detroit Free Press July 7, 1886). The operations were expected to be completed within a month (Detroit Free Press July 21, 1886).

Commercial salvage companies were not the only ones engaged in the salvage of materials from the ALGOMA wreck site. Sport fishing parties were visiting the wreck, as well as prehistoric sites to gather artifacts and relics (Duluth Daily Tribune July 20, 1886).

One of the "darkest mysteries known to the Lakes" developed in connection with the salvage of ALGOMA. The commercial wreckers made a careful search for more victims of the disaster. There were only

> one or two bodies found pinned in the timbers and frame-work of the vessel. The theory for this mysterious disappearance is that the bodies were despoiled by the islanders and then sunk in the Lake. This theory is strengthened by the finding of mutilated clothes and articles of value in their cabins. Such is the explanation advanced by

the wreckers as the reason why the bodies have never been recovered (Detroit Free Press Aug. 2, 1886).

The revenue cutter ANDREW JOHNSON left Milwaukee August 3 to investigate the wreckers' allegations. Captain Baker of ANDY JOHNSON reported his findings 4 days later. As to the alleged robbery of bodies from the wrecked steamer ALGOMA, he "... found no truth in it. Only a few bodies were found and they were shipped to Canada. The railway company that owned the steamer has had guards on the island continuously since the wreck" (Detroit Free Press Aug. 8, 1886).

Indignant responses to the allegations came quickly:

> Of course the story about fishermen plundering the bodies off the wrecked steamer ALGOMA is all pure bosh, and no one, who ever knew anything about the habits of the fishermen of Lake Superior, ever believed for a moment. The report was a cruel slander upon as honest and industrious a class of men as exist in the northwest, and very probably was started expressly to gull some innocent. If it was, the bait took (Duluth Daily Tribune Aug. 8, 1886); see also (Portage Lake Mining Gazette Aug. 19, 1886).

The contracting wreckers suffered more than the indignation of the fishermen and press. The tug GEORGE HAND was reported wrecked and subsequently abandoned on the rocks at Rock Harbor. The tug was lying on its side and filled with water (Detroit Free Press Aug. 12, 1886). The uninsured tug was reported to have gone to pieces in a storm, the crew barely escaping with their lives (Detroit Free Press Aug. 26, 1886). Mr. Montgomery, who was in charge of the operations, was brought to Port Arthur aboard the tug KATIE MARKS from Passage Island. He reported GEORGE HAND broke in two on a reef near Passage Island. Montgomery chartered the tug BEEBE and left for Passage Island to pick up the crew (Port Arthur Sentinel August 20, 1886). The boiler and engine may have been salvaged. They were reported raised and put aboard L.L. LAMB (Port Arthur Sentinel Sept. 3, 1886).

The newspaper accounts of the location of the wreck of GEORGE HAND as Passage Island or Rock Harbor are evidently in error. The journal of the Menagerie Islet Lighthouse Station for the date of loss records the following:

> August 10--We discovered a tug on the Schooner Island reef almost a wreck. I found her to be the Geo. Hand of Alconac Mich. The tug that was wrecking the steamer Algoma at Rock Harbor. Full particulars of how she got on there are not known yet. We have had very thick smoky weather here lately. She is laying in about 4 feet of water on her starboard side and about five hundred yards from the Little Schooner Island Rocks. She is listed a starboard full of water. She is surrounded with very shole water. The foggy weather prevented us from seeing the main shore.
>
> August 11--Wrecking party are at work raising the machinery of tug Geo Hand.

The machinery that had been salvaged from ALGOMA was not lost. The schooner L.L. LAMB arrived in Owen Sound August 26, with the salvaged engines aboard. The boilers had been recovered, but stored at Isle Royale. LAMB brought machinery to both Owen Sound and Port Huron (Detroit Free Press Aug. 27, 1886). The engine and other machinery estimated to be "some hundreds of tons weight" were displayed on a number of platform cars at Owen Sound (Meaford Monitor Sept. 10, 1886).

There were 13 engines from ALGOMA reported on board when L.L. LAMB arrived at Owen Sound (Port Arthur Sentinel Sept. 3, 1886; Daily Mining Journal Sept. 13, 1886). This is an important clue to the nature of the deposition of the wreck. Some historians and divers believe the ALGOMA bow to be "lost" in deep water. One source for this belief is probably Dana Thomas Bowen's (1952:127) account of the ALGOMA wreck that implies the bow sank in deep water.

The missing bow has been considered somewhat of a mystery and divers have periodically searched the area in hopes of finding an intact section of ALGOMA. Rather than breaking off and sinking as intact structure, the probability is that the bow was broken up during the wreck event and sank as fractured hull elements. The references to deep water in the historical accounts is probably only in relation to the water at the stern. The stern of ALGOMA had hit and lodged on the reef; the bow was still afloat, free to work with the wave action.

The evidence indicates clearly that the bow was accessible to the 1886 salvagers. Detailed descriptions of ALGOMA published soon after its appearance on the Lakes state that there were a total of 12 auxiliary engines aboard (see above ALGOMA Construction; Cleveland Herald Nov. 30, 1883). A total of 13 engines aboard L.L. LAMB indicates all engines aboard ALGOMA, including the main engine were recovered. In order to have salvaged all the engines from the wreck, the salvagers had to have worked on the bow portion of the vessel. It could not have been "lost", and it was not likely to have been in very deep water. This may account for the fact that no anchors or cables have been located. If the wreckers were able to recover the bow windlass and capstans (all having steam engines to operate them), they most likely recovered the anchors and cables. Additional research into the records of the salvage companies and other sources may clarify some of these points. A complete mapping operation of the material record of ALGOMA will certainly augment our knowledge of this important historic site.

The salvaged engine from ALGOMA was installed in MANITOBA in 1889. The new passenger steamer was launched that year and had a safe 60-year career on the Lakes. The vessel was only retired after the enactment of stringent new safety regulations prompted by the disastrous burning of NORONIC in 1949 (Landon 1970:313-315).

A later salvage effort stated that the ALGOMA wreckage as seen in 1903 remained much as it had been in 1886. Captain Ryan aboard JOSEPH C. SUIT salvaged portions of the wreck in that year, apparently the second commercial salvage effort. A newspaper account records Ryan's comments as: "Her bow is resting above water on shore, but the stern is sunk about thirty feet below the level of the Lake" (Duluth Evening Herald May 22, 1903). Evidently, "bow" and "stern" were reversed in the newspaper account. If that is the case, the recognizable bow sections were located in shallow water some 19 years after the wreck.

Ryan carried out fairly extensive salvage operations. The operation employed a diver and a steam crane. "About eighty tons of iron plates, fish plates and railroad iron have been recovered. Dynamite was used to break the wreckage into pieces that could be easily handled by the crew." It was reported that this was the second trip of SUIT (Duluth Evening Herald May 22, 1903).

Apparently, there have been other commercial salvage efforts on ALGOMA. A silver-plated crown jug from the wreck was exhibited in 1906. A Great Lakes Dredging Company diver had given the artifact to L.G. Andrews, who was displaying it in Port Arthur (Port Arthur Daily News Dec. 6, 1906).

In more recent times, ALGOMA has been the site of SCUBA diving activity. Many portable artifacts have been removed from the wreckage, but the site still proves an interesting dive, particularly when searching for new wreckage. The site has not been thoroughly surveyed and mapped. There are many discoveries to be made on this widely scattered shipwreck, both for divers and for those interested in Lakes' vessel architecture.

Dives conducted by Patrick Labadie with SCRU personnel in 1985 have produced indications that portions of the bow of ALGOMA lie to the west. Other divers have reported sightings to Labadie that may be other bow-related structures, such as the gaff from the forward mast and the ship's galley stack reported by Scott McWilliam. Videotapes made during 1986 also show a bulkhead that is believed to be from the bow. There is much exploration and documentation to be done on this site.

Epilogue

To better understand the contemporary perception of the nature of the ALGOMA disaster, it may be instructive to consider the following song. It was written by Thomas Hughes, a resident of Port Arthur, Ontario and printed in Toronto in 1885.

THE WRECK OF THE ALGOMA

On the sev'nth day of November
Our Dominion look'd with pride
On a steam boat which spread her
Reputation far and wide,
The world's two mighty oceans
Were join'd by iron band,
And the great work so accomplish'd
Was the pride of our fair land.

But no one thought that ere the dawn
Of that glad triumphant day,
A sad and fearful accident
Would take that joy away.
The noble ship "ALGOMA"
With some sixty souls set sail,
And only fifteen of them all
Were left to tell the tale.

CHORUS:

Hear the cry of us poor sinners
Cast upon the friendless wave,
And protect us we implore Thee,
Thou alone hast power to save.

On the shore of Isle Royale that morn,
The vessel struck upon the shoals,
And 'mid tempest, storm and blinding snow
Sank forty-five poor souls.
The captain of the gallant ship
With courage few would dare,
Oft risked his life to save the lives
Of those placed in his care.

Full thirty hours they lay exposed
To the fierce relentless wave,
Uniting in their prayers to Him
Who only now can save.
On Sunday morn, that morn on which
Christ burst the bonds of death,
He heard the prayers poured forth to Him
With supplicating breath.

Their wounded helpless captain now
They fasten on a slender raft,
And with what feeble strength remains
They leave the ill-fated craft,
And reaching shore on bended knees
They joined in praise to One
Who saved them: but for those who're lost
Whispered "Thy will be done."

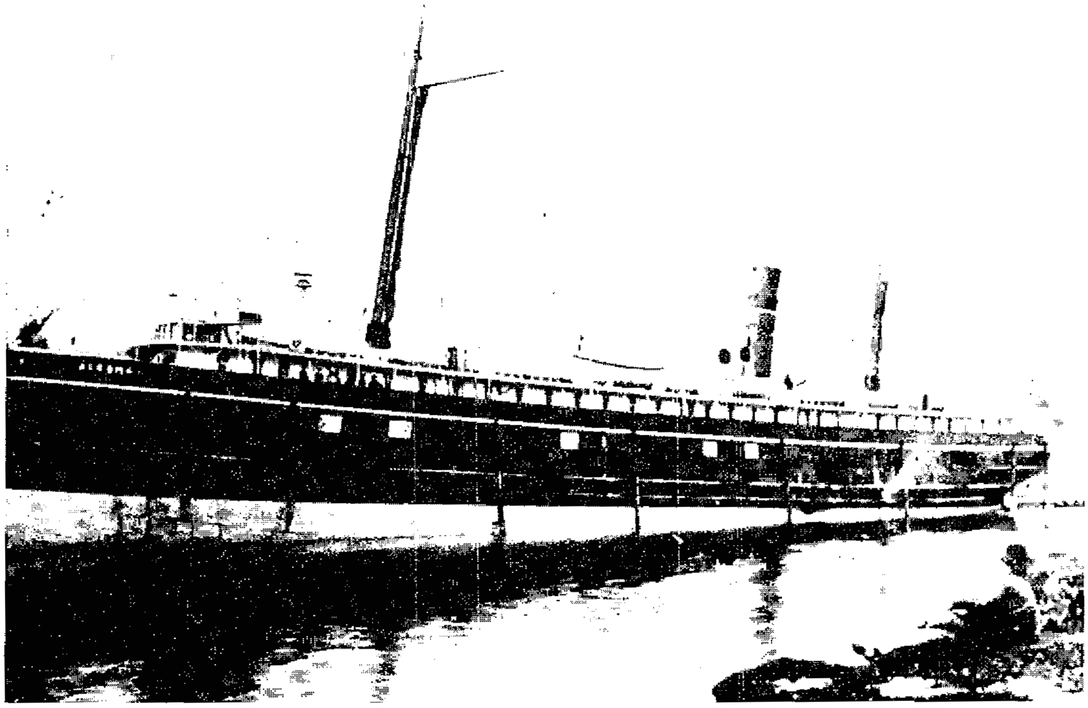


Fig. 4.5. Canadian Pacific Railway passenger vessel ALGOMA, one of the first steel-hulled vessels on the Great Lakes. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

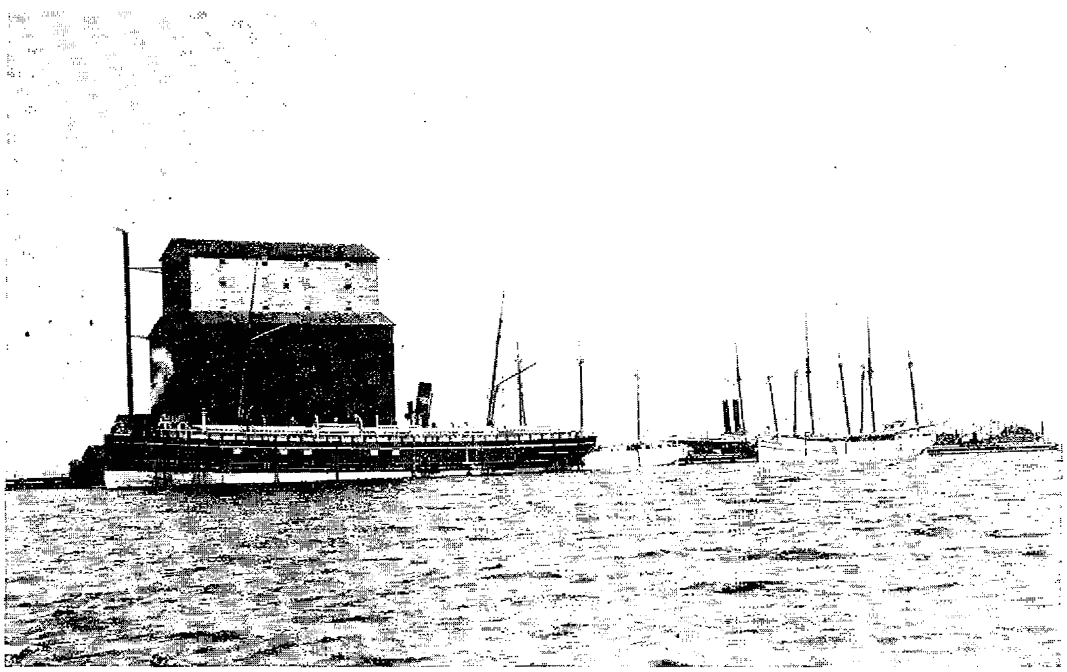


Fig. 4.6. ALGOMA at the dock with schooners. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

MONARCH: HISTORY

Construction

MONARCH was built in 1890 by John Dyble, formerly of Parry and Dyble. The combined firm had, in 1882-83, built UNITED EMPIRE, MONARCH's running mate. The new ship was built for the Northwest Transportation Company of Sarnia, Ontario on the southern tip of Lake Huron and launched June 27, 1890 (Chicago Inter Ocean June 27, 1890). The company, owned by the two Beatty brothers, was known as the "Beatty Line." James H. and John Beatty had built the Northwest Transportation Co. from a partnership they formed in 1865, which became the Lake Superior Line in 1870.

The demand for their transportation services on the upper Lakes grew, and the two brothers incorporated their enterprise in 1882 to form the Northwest Transportation Co. This firm continued to grow into the largest company transporting package freight and passengers under the Canadian flag on the upper Lakes. It was locally called the "Blackline."

In early 1899, the Beattys merged with the Great Northern Transit Company of Collingwood. The latter company, known as the White Line, operated steamers on Georgian Bay and the North Channel. This merger formed the Northern Navigation Company and evolved into the Northern Navigation Co. Ltd., which dominated upper Lakes transportation of freight and passengers for many years. This company was, in 1915, to become a part of the Canada Steamship Lines Limited, which still carries the original Beatty Line funnel design, red with a white band and black top, maintained throughout the series of mergers.

UNITED EMPIRE, MONARCH's running mate, formerly known as "Old Betsy," was an arch-trussed wooden propeller, 252 feet 8 inches by 36 feet 15 inches with a gross tonnage of 1,961 and a registered tonnage of 1,296. The ship originally carried a sail on the foremast. This ship had a fore-and-aft compound engine of 1,000 horsepower. This vessel was rebuilt at Collingwood in 1904 and renamed SARONIC in 1905.

UNITED EMPIRE was a well-appointed vessel sometimes referred to as the "Queen Vessel of the Inland Seas" (Thunder Bay Sentinel, Port Arthur, Dec. 1, 1883). Captain Edward Robertson and his crew of 50 became known for their competency and courteous attention to passengers.

A perspective on MONARCH's passenger and freight capabilities may be gained from comparison with those of UNITED EMPIRE. UNITED EMPIRE carried 200 cabin passengers and at least another 200 (some sources give 400) in steerage, and it made the Sarnia-Port Arthur run on the average of 60 hours. In a single season, UNITED EMPIRE carried more than 5,000 passengers and 40,400 tons of freight during 16 trips, netting the owners some $40,000 (Thunder Bay Sentinel, Port Arthur, Dec. 1, 1883; Chicago Tribune May 21, 1883).

Continued demands prompted the company to construct another vessel for the Port Arthur-Duluth-Sarnia run. This new vessel was to become the flagship of the Beatty Line and bear the appropriate name of MONARCH. Edward Robertson was made captain of the new steamer, which was considered a "high but entirely deserved compliment to Capt. Robertson" (Duluth Evening Herald Oct. 22, 1890).

MONARCH was built in Sarnia, Ontario on the St. Clair River for a cost between $150,000 and $200,000 (Chicago Inter Ocean June 27, 1890; Duluth Evening Herald June 28, 1890). The vessel was built for extended season service on Lake Superior and was strongly reinforced with iron. The hull was of white oak. The vessel was 259.0 feet long overall with a beam of 34.8 feet and 14.8 feet depth, with a waterline length of 245 feet. The registered tonnage was 2,017 gross tons and 1,372 net. The hull was originally painted white to the main deck rail; the cabins were also white.

The engine of MONARCH was a three cylinder, triple-expansion, inverted, vertical steam engine, which some sources say was built at the Phoenix Iron Works of Port Huron, Michigan. Other sources, such as the Duluth Evening Herald of Oct. 22, 1890, state the engines were built by Kerr Brothers of Walkerville, Ontario. The cylinders of the engine were 21 inches, 33 inches and 54 inches in diameter with a common 42-inch stroke. The engine, with a 900 horsepower rating at 80 revolutions per minute, was capable of making the 26-mile run from Thunder Cape to Passage Island in a normal running time of 2 hours and 20 minutes. The ship averaged 32 hours to Sault Ste. Marie. Some sources say the engines developed 2,000 horsepower (e.g. Chicago Inter Ocean June 27, 1890), although this is unlikely.

The engine required 160 pounds of steam from the two Scotch marine boilers. These boilers were 11 feet 4 inches long and 16 feet in diameter, and were built by the Lake Erie Boiler Works of Buffalo, New York and installed there in July, 1890 (Chicago Inter Ocean June 27, 1890).

Apparently, MONARCH was the last vessel to be constructed at Sarnia for 54 years until the MAC-Craft Corporation used its shipyards during the second World War. When the company's first vessel went down the ways, there were none present who remembered the last launching in Sarnia (Young 1957:107).

MONARCH was appointed with luxury fittings and was unsurpassed for elegance of furnishings until the company built the 321-foot steel steamer HURONIC in 1902. MONARCH's cabins were finished in white enamel trimmed with gold moldings and carefully crafted; they

> ... had a fair rake and that meant that all the window sashes were cut out of square to follow the lines of the cabins. Every sash had to be made separately for its place and paired off, port and starboard, a nice piece of work which W.H. Pitfield carried out the whole length of the cabin (London, Ontario, Free Press Dec. 1, 1956).

One of the best descriptions of MONARCH appeared in the Duluth Evening Herald (Oct. 22, 1890):

> A Beautiful Ship: The magnificent New Monarch of the Beatty Line. Far the Finest Running to Duluth, Destined to be the Popular Passenger Ship of the Upper Lakes ....
>
> On her first trip, which was enjoyed by about thirty passengers, she made an average speed of thirteen miles and hour. She was built, however for a speed of fourteen miles an hour and that rate can easily be attained .... This will make her the fastest passenger boat running into Duluth harbor.
>
> The smoking room and washroom for the gentleman as well as the offices for the captain and purser are on the main deck.
>
> The cabin is finished in white and gold, and will be lighted by electricity. There are sixty-two staterooms and a bathroom. Doors

between each alternate stateroom can be thrown open .... Each stateroom has a double lower and single upper berth for nearly 200 passengers.

In the center of the cabin is the pantry and steam tables, the kitchen being on the main deck below. Forward of the pantry is the dining room, there being twelve tables with room for ten people at each. The ice box is a model one and is large enough to hold several tons .... There are five separate holds, the hoisting machinery being operated by pony engines....

The stack of the Monarch is a trifle smaller than that of the Empire, and is a little further astern. The low steel sustaining arch visible amidships on the upper deck of the Empire is in the Monarch clear out of the way below decks thus entirely obliterating one objectionable feature.

The new ship was special in every way. The ship's menus made the news; it carried the most famous names on its passenger list. The decor, orchestras and salons were noted in the social columns (Doner 1958:121).

On the first trip the boat was loaded to capacity, and the working of the new vessel in a heavy sea wedged the stateroom doors shut. When the vessel returned to Sarnia, this was corrected (London, Ontario, Free Press Dec. 1, 1956). The original appearance of MONARCH was completely white; later, its hull was painted black. The pilot house was later raised, and the Texas deck lengthened some 30 feet. Examinations of photographs taken before and after the alteration reveal that there were also port holes installed in the aft crew quarters.

Operational History

The normal route for MONARCH and running mate UNITED EMPIRE was from Sarnia, Ontario on Lake Huron, through Sault Ste. Marie to Fort William in Thunder Bay, Ontario, and to Duluth, Minnesota. Passengers and package freight were carried both ways. The ship had a relatively uneventful career, except for these few known incidents.

In the first incident, the vessel ran its bow aground at the river's mouth at Port Arthur in August 1892. MONARCH was released after its cargo was lightered (Detroit Free Press Aug. 8, 1892).

A second incident, which took place on Thanksgiving Day 1896, was considerably more exciting. MONARCH was downbound from Port Arthur to Duluth with cargo and passengers aboard; there was some speculation in Duluth as to whether Capt. Robertson would leave Port Arthur because there was a storm approaching. The storm became a gale and continued to build in force until it became one of the worst in the recent memory of those reporting the event.

Capt. Robertson and crew left Port Arthur at 1:30 a.m. expecting a wind shift from easterly to westerly. Instead of a shift came sleet, snow, and gale force winds that whipped waves up to a height level with the ship's rail. Several times the sea came over the stern of the vessel, which sometimes occurs when Lakes ships run before a gale. The full force of the gale struck when MONARCH was about 70 miles out of Port Arthur. The weather was too fierce to turn back.

By 4:00 p.m. it was already getting dark as the ship passed Two Harbors. The captain had trouble picking up the range lights to align the vessel with the Duluth Ship Canal, and came close enough to the south shore to hear the breakers. When the ship was not more than 1,000 feet from the piers, the wheel was put hard to port. MONARCH responded to the helm splendidly for a vessel laboring in such a heavy sea. The captain finally made out the ranges and struck for the entrance under a full head of steam. A large wave threw MONARCH against the south pier, damaging the hull slightly. The heavy current threw the ship toward the north pier, but because Capt. Robertson had ordered full steam, the ship avoided a serious collision and sped safely through the narrow waterway. The spectators who had gone to the piers to see the huge breakers were witness to an additional performance of masterful seamanship that Thanksgiving night (Duluth Tribune Nov. 27, 1896; Duluth Evening Herald, Nov. 27, 1896).

MONARCH was involved in minor collision with the steamer MAHONING October 4, 1898. MONARCH was lying at the outer end of the St. Paul and Duluth slip, and MAHONING was entering the channel. Apparently, there was a problem with MAHONING's steering, and it collided with MONARCH, causing some damage to its stern hull planks (Duluth Evening Herald Oct. 4, 1898).

One incident in MONARCH's career has only been documented in the biography of salvor Tom Reid (Doner 1958:121-2). MONARCH, in later years, was overhauled in the shipyard and thereafter ran package freight. The year the ship was refitted it froze in the ice in mid-November near Sailors' Emcampmant at the Soo. The tugs REID, SARNIAN and eventually PROTECTOR were sent to the rescue. MONARCH was reportedly freed at a cost of $20,000.

The 1903 season ended with reduced business for the company. It was reported that MONARCH would only make the trip between Duluth and Sarnia once every 10 days (Duluth Evening Herald Oct. 10, 1903).

Wreck Event

The final voyage of MONARCH would have been its last trip of the 1906 season. It was not unusual for a Great Lakes vessel of this period to be lost on the last trip of the season. November and December are busy months on the Lakes as vessel operators attempt to make as many trips as possible before the close of the season. Freight rates are at the highest of the year, and pressure is great to make one more passage.

According to the Marine Protest, MONARCH had run into heavy weather on the upbound trip from Sarnia. The vessel suffered some water damage to the cargo in the Number 3 and Number 4 holds (Marine Protest: MONARCH 12-11-06, Canadian Archives).

On Thursday, December 6, 1906, MONARCH was loaded at Port Arthur with a cargo listed as "grain and general merchandise" (Marine Protest, re: MONARCH). The Toronto Daily Star Dec. 10, 1906 and the Toronto World Dec. 11, 1906, both list the cargo as "35,000 bushels [which would be about 1,050 tons weight] No. 1 Northern wheat; one car oats for Thessalon; one car oats for Gore Bay, four cars for the Soo; one car of flour for George Gardner, Sarnia; one car of salmon for Montreal; one car of salmon for London; 200 tons of flour for the GTR, Sarnia." (A car of grain was equal to 350 bushels.) Unfortunately, little mention has been made of any additional "general merchandise." The ship was downbound through the Soo Locks to Sarnia.

At 5:25 in the afternoon, with loading completed, MONARCH departed its berth and started out into Thunder Bay, arriving at Thunder Cape at 6:48 p.m. Here the course was changed to a heading toward Passage Light, off the northeast tip of Isle Royale. The Marine Protest (December 11, 1906) states the wind was from the northwest, with snow, fog, and a heavy sea running; the temperature was below zero degrees Fahrenheit. The normal running time for MONARCH from Thunder Cape to Passage Light would have been 2 hours and 20 minutes. Near the end of the normal running time the second mate went aft to check the log, only to find it frozen and registering 10 of the 26 miles between the Cape and Passage Light. Passage Light had been glimpsed twice during the voyage. At the normal time, the captain set the course for Whitefish Point (recorded in the Protest as southeast by east 1/4 east, or about 120 degrees). Six minutes later the captain adjusted the course "to allow for leeway," to east by 3/4 south, or about 110 degrees. The wind was blowing fresh from the North-Northwest. The time must have been about 8:54 p.m. About 9:30, MONARCH ran into the solid rock wall known as the The Palisades, about 900 yards west of BLake Point, the northeastern tip of Isle Royale.

The exact cause of the wreck is not readily apparent. Popular explanations for the vessel being off course seem rather weak when subjected to scrutiny. For example, the loss has been attributed to the compass being out of order, possibly from the cold (Fort William Daily Times Journal Dec. 11, 1906; Toronto World, Dec. 12, 1906; Wolff 1979:88). This seems unlikely on two counts: 1) it would certainly have been an advantage to report such a malfunction during the Marine Protest, but it was not reported; 2) MONARCH carried steam radiators for heat, many were located by the Park Service dive team on the site, and the pilothouse was surely heated. The taffrail log, however, was reported frozen so that their distance out was not known. Coupled with snow, fog, wind and heavy seas, it was sufficient to put the MONARCH hard up on Isle Royale.

Wolff (1979:88) reports the pilot house crew mistook the BLake Point Light for Passage Light and they were steering "some 70 degrees" off course. While the varying reports do mention that in a couple of instances during the voyage the Passage Light was visible, there could have been no confusion as to which light it was. BLake Point Light was not installed until 1917, 11 years after MONARCH had wrecked. (See examples of criticism of U.S. Government after the wreck from the Canadian press for not marking both sides of the Channel, Barry 1980:18).

Wolff does not mention how he computed the course variance of 70 degrees. The difference between the route of MONARCH from a point clearing the north of Thunder Bay by Thunder Cape Light on the current downbound route to the site of the wreck is a course variation of about 6-1/2 degrees. At the latter course, the vessel would have hit the Palisade Cliff at an angle of somewhat greater than 103 degrees true. The course recorded for MONARCH was east by south 3/4 south, or about 110 degrees. An examination of the five side-scan sonar passes of the wreck site done by the Submerged Cultural Resources Unit in 1980 show the bearing of MONARCH's structural remains to be about 110 degrees true. Although those data coincide with the course as stated in the Marine Protest, the position of the remains may not precisely represent the final course heading of MONARCH.

The weather was extreme during MONARCH's last voyage. Two Booth Line steamers, AMERICA, a later casualty at Isle Royale, and EASTON, were held up in Duluth due to weather conditions (Port Arthur Daily News Dec. 6, 1906). The same newspaper reported the lowest temperature reading of the season on December 7;

the reading was 22 degrees below zero Fahrenheit. Charles Thomas Davis, the lighthouse keeper at Copper Harbor Ranges, recorded in the log for December 5, 1906 a fresh, east wind and snowstorm, with a northeast gale that evening. The log entry for December 6 was: "north wind, gale, cold and heavy snowstorms, freezing very hard today."

The intense cold of this storm caused the formation of 6 to 9 inches of ice in Lake Superior, which trapped 20 vessels. The Lake Carriers Association organized an ice breaking expedition that left Sault St. Marie on December 11 to free the trapped vessels. (Fort William Daily Times Journal Dec. 10, 1906).

Damage to vessels resulting from this December 6 storm was not limited to Lake Superior. Three vessels, one steamer and two schooners, were damaged on Lake Huron (U.S. Department of Agriculture 1907:10). The 1906 shipping season closed abruptly because of the storm; it was reopened only briefly by tug ice-breaking operations.

During the season 229 vessels were damaged and 53 were lost to weather causes. The financial loss for the season was put at $2,043,850. The greatest loss to heavy weather conditions was in the month of December and amounted to $471,750. The wreck of MONARCH, a loss of $100,000 for the vessel and $60,000 for the cargo, was the largest single loss of the 1906 season (Henry and Conger 1907:5-6). The single largest cargo loss from the MONARCH disaster was probably sustained by Parish and Lindsay of Winnipeg, who had 35,000 bushels of wheat on board (Duluth News Tribune Dec. 11, 1906).

MONARCH hit the rock face of Isle Royale Thursday, December 6, a little after 9:00 p.m., on the coldest day of the year; a heavy snow had been falling, driven by gale force winds. Visibility had been reduced to less than 50 feet, a distance little further than the bow from the bridge. Captain Robertson had gone outside and "with his face to the full brunt of the storm [he] endeavored to regain his course" when the "vessel veered to the right and there was a scraping, grinding sound, and then a crash; the MONARCH had struck" (Fort William Daily Times Journal Dec. 11, 1906).

Capt. Robertson reported (Port Arthur Daily News Dec. 11, 1906) that he caught a glimpse of Passage Light twice before the ship struck, but could not hear the fog whistle. He also said to the newspaper reporters he assumed his compass must have been at fault. The ship had been proceeding at the "usual speed" when it struck, and immediately the order for full speed astern was signalled to the engine room. The engineer (Samuel Beatty) realizing the ship was on the rocks, disobeyed the order and kept the engines in gear and moving forward to hold the damaged ship on the rocks. A great hole was torn in the bow (Port Arthur Daily New Dec. 11, 1906).

Plight of the Survivors: Soon after the impact the passengers and crew rushed up on deck, but the brief confusion was soon put in order (Port Arthur Daily News Dec. 11, 1906). The electric lights went out leaving the ship in darkness. Quickly, a lifeboat was lowered and manned by by fireman Walter Houghton and three sailors: Edwin Brealin, Jacob Smith and Robert Berry. The boat was evidently lowered on the starboard side, the side closest to the rocks, but floating wreckage and the force of the waves prevented the men from rowing to the closest rock, a scant 25 feet away (Fort William Daily Times Journal Dec. 11, 1906).

Shipwrecks often prompt acts of courage; indeed, many people have survived only through heroic acts, their own or those of others. The wreck of MONARCH produced a hero, James (Jack) D. McCallum. McCallum, a deck hand and brother of the second mate, was working off his passage down the Lakes. It was he who, after the failure of the landing attempt, managed to get a line to shore. Accounts vary as to what actually took place. Some say he tied a rope around his waist and used a ladder to get ashore (Port Arthur Daily News Dec. 11, 1906); or was swung pendulum-like until he managed to cling to the rocks and was passed a ladder (Fort William Daily Times Journal Dec. 11, 1906); others say that he gained a foothold on sacks of grain and mattresses thrown over the bow (Particulars of Service rendered in Saving Life, rendered by John D. McCallum to passengers and crew, S.S. MONARCH.) However McCallum did it, he managed to get up the bank to the shore apparently with the aid of a ladder and secured a line. One account said the rope broke and a tow line was thrown to him and he secured it to a tree (Fort Williams Daily Times Journal Dec. 11, 1906). Using this line, the passengers and crew were able to leave the ship and make their way up the rocks. There may have been a boat used to aid the crossing. One passenger (R.M. Lockhead) in his account stated he fell off the line and hit the gunwale of the boat that had been used to pass the life line to the shore (Port Arthur Daily News Dec. 11, 1906).

When about half of the ship's company were safe on the rocks, MONARCH's stern began to sink (Port Arthur Daily News Dec. 11, 1906). This shift of the wreck apparently caused some confusion among those remaining on the vessel. In the confusion, the only fatality occurred. Joseph Jacques (reported elsewhere as James Jacques, e.g., Port Arthur Daily News Dec. 11, 1906) an 18-year old watchman aboard MONARCH, drowned (Fort William Daily Times Journal Dec. 18, 1906). Jacques, whose family lived in Point Edward, had been working at the Grand Trunk elevator all summer and had only quit two weeks before deciding to take his ill-fated trip on MONARCH. His mother, Mrs. A. Jacques, had begged him not to go, but young Jacques shipped as a watchman aboard the vessel on the upbound trip. His mother was in shock for some time after hearing the news of her son's death (Fort William Daily Times Journal Dec. 18, 1906).

There are some slight discrepancies regarding this single MONARCH fatality. In the Fort William Daily Times Journal (Dec. 18, 1906), it was reported Jacques was asleep in his bunk when the boat foundered and sank. Accounts that appeared immediately after the wreck state that in the confusion that occurred when the stem section broke off and sank, Jacques by mistake seized a fender rope rather than the shore line and fell into the Lake. His cry could be heard by those on deck, but no assistance could be rendered (Port Arthur Daily News Dec. 11, 1906). Other accounts state that Jacques had been subject to temporary blindness (Fort William Daily Times Journal Dec. 11, 1906). No trace of Jacques was ever recovered. In this latter article, it is reported that Jacques was trying to lower himself into the row boat and had slid down what he thought was a fender rope, but was actually a short line that reached only half way down the vessel.

The exhausted survivors huddled together in the bitter cold. The rocky shoreline was covered with ice. At least one passenger had fallen into the water during the crossing, and his clothes had become frozen solid. W.H. Lockhead was spared serious frostbite by a fire that was started with the few dry matches found among the other passengers (Duluth News Tribune Dec. 11, 1906; Port Arthur Daily News Dec. 11, 1906). Along with the fire, a crude windbreak was constructed of branches. The only blanket was given to the one woman aboard, the stewardess: Rachel McCormick. Before morning, a second fire was started on high ground to attract the attention of the lighthouse keeper on Passage Island, or of passing vessels (Fort William Daily Times Journal Dec. 11, 1906). Later, a tent was constructed of sails recovered from the wreck (Port Arthur Daily News Dec. 11, 1906).

On Friday, food was obtained from the wreck. Either that morning (Port Arthur Daily News Dec. 11, 1906), or in the evening (Fort William Daily Times Journal Dec. 11, 1906), a case of salmon was found on shore, or a bag of flour and a box of salmon washed ashore. A sailor was lowered by rope to retrieve them (Fort William Daily Times Journal Dec. 11, 1906). Sometime Friday the wreck was boarded, and a quantity of damaged bacon, bread and pie was secured and served. These meager supplies did not last long. The remainder of the time the survivors ate salmon and flour. The flour was made into flapjacks by Rachel McCormick and cooked in the ashes. The flapjacks "resembled a piece of frozen asphalt block" blackened, no doubt, by the ashes in which they were cooked. The survivors had divided into three camps on Friday. Each camp maintained a fire for warmth, and together they chopped wood for the beacon fires on the point (Port Arthur Daily News, Dec. 11, 1906).

The beacon fires were kept burning all day Saturday (December 8) in an effort to attract the attention of the Passage Island lighthouse keeper. Saturday passed without a response. Although the keeper had seen the light of the fire during the night, heavy seas prevented an attempt to reach the island. Sunday the waves subsided enough to allow Lightkeeper Shaw (Port Arthur Daily News Dec. 10, 1906) to row the 4 miles distance to the wreck site. Waves were still heavy enough to prevent Shaw from landing the rowboat, but he was able to take off one person, purser Reginald Beaumont. Beaumont waded and swam out to the boat (Duluth News Tribune Dec. 11, 1906; Fort William Daily Times Journal Dec. 11, 1906). That evening Beaumont and Shaw signalled the steamer EDMONTON downbound with a load of grain. Beaumont was picked up and EDMONTON immediately headed back to Port Arthur after finding she could not get near the wreck (Port Arthur Daily News Dec. 10, 1906).

EDMONTON arrived in Port Arthur Sunday about 2:00 a.m., bearing the news of the wrecking of MONARCH. Immediately, Agent Bell of the Northern Navigation Company began to organize the rescue of the survivors. By 6:00 a.m. the owners, crew and masters of the tugs JAMES WHALEN and LAURA GRACE had been roused and dispatched to the wreck site (Port Arthur Daily News Dec. 10, 1906).

The rescue party aboard JAMES WHALEN and LAURA GRACE was led by Capt. Campbell of MONARCH's running mate, SARONIC (earlier UNITED EMPIRE), which had just arrived in Port Arthur. Several of SARONIC's boats were taken on the rescue trip to aid in removing the survivors from Isle Royale. Doctors McCougall and E. McEwen were taken to provide medical aid to the survivors feared to be in bad shape after their ordeal. The relief party left at 6:00 a.m. on what was expected to be a 6 or 8 hour round trip (Port Arthur Daily News Dec. 10, 1906).

Meanwhile, on Isle Royale, a party of four men set out from the main camp on Monday (10th) soon after purser Beaumont left with the lightkeeper. Firemen Walter Houghton and three sailors, Styles Fisher, John McPherson and Edwin Brealin, walked 12 miles to Tobin Harbor on the opposite side of the island (Fort William Daily Times Journal Dec. 11, 1906). It is informative to trace the probable route of the party with distances reported in the contemporary press a d the geography of the island to establish possible terrestrial site locations. Historic fish camps are still on Isle Royale and are like the one to which this party went. (Probably the site now known as Mattson Fishery.) The four men probably came across the central ridge of Isle Royale from The Palisades (near the present-day Merritt Lane Campground) down along the shore to a position across Tobin Harbor from Scoville Point, the location of the Matson Fishery, a distance of about 2 miles, or 2-3/10 miles from the wreck. The men had no choice but to walk around Tobin Harbor to reach the fish camp, another 8.5 miles, or a little more than 10 miles total, unless they were able to cross on the ice that was probably in the mouth of Tobin Creek. They located several fishermen's huts, all deserted. Fortunately, provisions had been left by the fishermen, and the four spent the night. They secured more supplies and started back across the frozen trail Tuesday (11th) morning, arriving a few minutes before the rescue tugs arriving from Port Arthur were spotted by the survivors (Fort William Daily Times Journal Dec. 11, 1906).

WHALEN and GRACE approached the wreck, but could not launch their boats for the pickup. The tugs signalled and went around to the south side of the point into Tobin Harbor. The survivors had to walk across the island, the second such trip of the day for the four-man party that had just returned. The survivors were taken aboard the rescue tugs, and their injuries attended.

In the report given by Capt. Robertson (Port Arthur Daily News Dec. 11, 1906), he says the survivors had to walk a distance of 8 miles. The route they took from the wreck site over to Tobin Harbor to be picked up by the rescue tugs is not recorded. The distance straight across the tip of the island to a point near present-day Merritt Lane Campground and opposite Merritt Island is about 1,500 feet. If the tugs could not pick them up at this point, it is hard to conceive of a reason for traveling down shore another 7-3/4 miles. This would have placed them beyond Tobin Harbor, but they could have come across to Rock Harbor to be picked up at a point near Rabbit Island. The only explanation for going to Rock Harbor was if ice or wave conditions prevented the tugs from approaching the island. However, this is unlikely on both counts, because JAMES WHALEN was an ice-breaking tug and most probably could have landed virtually anywhere. The four-man party apparently walked around Tobin Harbor to the fish camp, something they would not have done if they could have crossed the ice. The southeast shore of the island should have been in the lee of the diminishing storm. The most probable explanation is that the survivors' walk to reach the tugs was nowhere near 8 miles, but it seemed that it was because of the extreme conditions.

The survivors were in good condition, considering their plight. Mr. Farquar had evidently come through the worst. He had frostbite and perhaps pneumonia and was in a seriously exhausted state (Port Arthur Daily News Dec. 11, 1906).

The tugs made their way back to Port Arthur and arrived about 8:00 p.m. (Monday, 10th). Both Mr. Farquar and Capt. Robertson were made comfortable on board the steamer HURONIC, the newer vessel of Northern Navigation Co. Mr. Farquar was transferred to St. Joseph Hospital for treatment, and Capt. Robertson went to the Algoma Hotel (Fort William Daily Times Journal Dec. 11, 1906).

At the Algoma Hotel, a beaten and exhausted Capt. Robertson gave reporter Sarah Stafford an account of the disaster (Port Arthur Daily News Dec. 11, 1906). It was not a formal interview, the captain simply talked while eating his dinner.

> We were near Isle Royale about half past nine at night. I was standing on the bridge, when I heard a ripping sound and a part of the upper cabins were torn away ... it was found we were on a rock, and

> that the stern was slowly sinking ... I had a number of farmers on board, and they made just as good a scramble for their lives as the rest of us. We had only one women on board, the stewardess, and she was a good one. She went down that rope 30 feet, hand over hand, into the boat and the way she stirred up that flour with a stick and made us pancakes was a caution!
>
> We had nothing to eat for 6 hours, and not being able to get water over that high bluff, we had to melt snow for a while. After a time the men went back to the ship and yanked out something to eat.
>
> The MONARCH's bow stands up 10 feet above the water on the rock.
>
> I lost all my clothes and shoes but I got an old belt I have had for many years, and I was glad to get it.
>
> We made a tent out of some sails, and I had to watch the fire, or some fellow would put it out with his feet, covered with snow, as he lay sleeping.
>
> We had canned salmon, but after a few mouthfuls we did not want to eat.
>
> We had to walk 8 miles before we could get to the tugs. The way that woman walked through the woods with the best of them! I was on my face half the time.
>
> The old ship stands there up against the side of the rock. You might pass her by a hundred times and not see her. Everything is covered with snow and ice.

Apparently, the survivors were taken on the steamer HURONIC to Sarnia. The passage was courtesy of the Northern Navigation Co. The arrival was heralded by the citizens, replete with brass band. The following report appeared in the Port Arthur Daily News (Dec. 19, 1906):

> Sarnia, December 18th ... Pandemonium broke loose when the steamer HURONIC arrived on Sunday night with the survivors of the wrecked steamer MONARCH on board. It appeared as if the entire town came down to the wharf to welcome the shipwrecked crew. A brass band added to the din of whistles, and seldom has such a demonstration occurred on the Great Lakes.
>
> Every man was a hero, but it remained for the woman, Miss Rachel McCormick, one of the crew, to carry off the real honors.

The Northern Navigation Co. responded quickly. The following statement appeared in the Port Arthur Daily News on December 12, the day after the rescue:

> No compensation will be offered by the Northern Navigation Company to passengers who lost their effects on the wrecked steamer MONARCH. That is one of the risks taken by passengers and they have no case for damages against the company.

Company representatives also pointed out that the passengers had been given transportation on HURONIC, but, even this was more than it was required to do, as the loss of the steamer terminated their contract with the passengers.

The captain and crew of MONARCH were exonerated for their actions involving the wreck, although some rumors to the contrary had been circulated (Port Arthur Daily News December 12, 1906). A special address of esteem and sympathy was presented, along with a purse of gold, to Capt. Robertson on the evening of December 12. The ceremony took place at the Algoma Hotel in Port Arthur, and many prominent citizens of both Port Arthur and Fort William were in attendance, including the mayor, members of the Council and Board of Trade of Port Arthur.

In addition to the captain, Jack McCallum received recognition. On July 6, 1907, it was reported that he had been presented with a Royale Humane Society medal at a special session of the Board of Trade for his gallantry the previous season (Superior Evening Telegram, July 6, 1907).

Salvage

Commercial operations were not undertaken on the wreck for two years. The Northern Navigation Co. did invite bids for salvage of the wreck (Canadian Railway and Marine World Nov. 1907:855). Apparently none were submitted.

Plans to remove the machinery were expressed in 1907. A description of the site was published six months after the wreck (Detroit News June 9, 1907):

> The wreck of the Monarch bow presents a most interesting sight, while the stern is buried deep in water. Where it was wrecked the shore can easily be reached by a Lake boat, the drop being so rapid. Portions of the machinery are exposed, the timbers and planks covering it having been torn away by the severe storms which occurred since the wreck.
>
> Huge timbers 12 inches through and bolted by long steel bands were broken like so many matches. Pieces of wreckage can be seen along the Lake shore.... Masses of iron twisted into all conceivable shapes show how the wind must have buffeted the ship from the time that it went on the rocks.

The time of the separation of the large stern section from the bow is uncertain. The newspaper account above indicates the stern may have been attached as late as 1907. At least one newspaper account that reported the wreck events stated the stern broke before all the survivors were removed from the wreck. All contemporary photographs of the wreck of MONARCH located so far show the only the bow section on the rocks. These photographs may have been taken the next year.

MONARCH's machinery was salvaged in 1908 by Reid Wrecking Company under the direction of Capt. Thomas Reid. The salvage operations began in late August or in September, 1908. The Reid Wrecking Company apparently purchased the salvage rights to MONARCH from the underwriters in late August (Port Arthur Daily News September 9, 1908) and work was in progress soon after (Ibid., September 17, 1908). It was reported that the salvage of MONARCH was complete after 25 days of work.

Capt. Reid was quoted in a newspaper article (Port Arthur Daily News September 26, 1908):

> We took in everything of value out of the wreck ... having found conditions such that we were able to make a very complete job of it. We have the boilers, engines, dynamos, chains windlasses, etc., loaded onto the barge KELDERHOWE (This is certainly the KELDERHOUSE, see Port Arthur Daily News Oct. 6, 1908) ready to be taken to Sarnia and we will likely leave for our trip down the Lake tomorrow.

In the same article, it was reported that MONARCH:

... stood with her nose shoved upon the rocks of Isle Royale and her bow and forward cabins out of the water to withstand the onslaught of the waves, but now that has been broken away by the salvage crew, the engines and all moveable material of worth taken away and the remnants of the hull and the last cargo loaded into it left to be scattered by the waves or swallowed up by the waters of Superior ... of the cargo Capt. Reid says he saw little. The flour was still in the hold, also an amount of canned goods .... The hull was practically all broken up and all that remains in place now is the bottom, underwater.

The crew of SALVOR reported MONARCH's engines were set about half speed (Duluth News Tribune Oct. 1, 1908): "When the MONARCH struck she must have been running alright as her engines indicated that she was open to about half speed." This may, however, not have been the speed the vessel was running when it struck. The Port Arthur Daily News (Dec. 11, 1906) reported that Capt. Robertson called for "full speed astern" immediately after running aground, but Chief Engineer Samuel Beatty, realizing the extent of hull damage, kept the engines ahead to hold the steamer against the rocks. The decision probably saved those on board; the engine telegraph was probably found in the position left by the engineer when he abandoned his post.

The final disposition of MONARCH's machinery is currently uncertain. It is known that one of the salvage barges, BENNINGTON, sank soon after the completion of the salvage of MONARCH while enroute to the Soo Locks, somewhere in the vicinity of Whitefish Point. The Port Arthur Daily News (Oct. 6, 1908) reports the overturning of the scow owned by Reid, and the loss of two lives. The barge was reportedly loaded with derricks and other machinery and in tow of the schooner KELDERHOUSE with the tug SALVOR in close proximity. Beeson's Marine Directory (1909:131) reports the loss of the Reid Wrecking Company schooner BENNINGTON, 250 gross tons, due to foundering. KELDERHOUSE was probably JOHN KELDERHOUSE, a 500 gross ton vessel built in 1857 (Mansfield 1899:1:844).

The newspaper report quoted earlier (Port Arthur Daily News Sept. 26, 1908) stated the machinery was placed aboard KELDERHOUSE. There is some speculation that it was in fact aboard the schooner BENNINGTON when it was lost while enroute to the Soo.

It may have been the case that some of MONARCH's machinery was lost. It is known that the triple-expansion engine itself was not lost when the salvage vessel sank. The engine was not placed aboard another vessel, as was a frequent Great Lakes practice. MONARCH's engine was taken to Reid's Port Huron salvage yard where it sat until 1913, when it was finally broken up for scrap. "It was necessary to use dynamite to break up the machinery and for several days the town echoed to the rumbles of the explosions" (Detroit Free Press Dec. 4, 1913).

Research into the activities of the Reid Wrecking Company in their salvage efforts would contribute to the understanding of wooden wreck formation processes in the Great Lakes. It would be quite helpful to know what impact the salvage activities of Reid Wrecking Company had on the site. Many questions were raised when the distribution of the structural elements of the vessel was examined; e.g., are their current positions the result of natural impacts such as wave activity and ice shelving and reflect the process of normal wreck formation (the breakup of the hull on points of weakness, such as along the bilge) or is it the result of breaking apart the stern with tugs to ease removal of machinery?

More recent salvage activity of sport divers visiting the wreck has removed some of the material Reid missed. The capstan was brought up in the 1960s and is now on display at Isle Royale National Park. Other artifacts from MONARCH have been recovered and returned to the Park, such as the ship's wheel, lamps, china and some pieces of tea service.

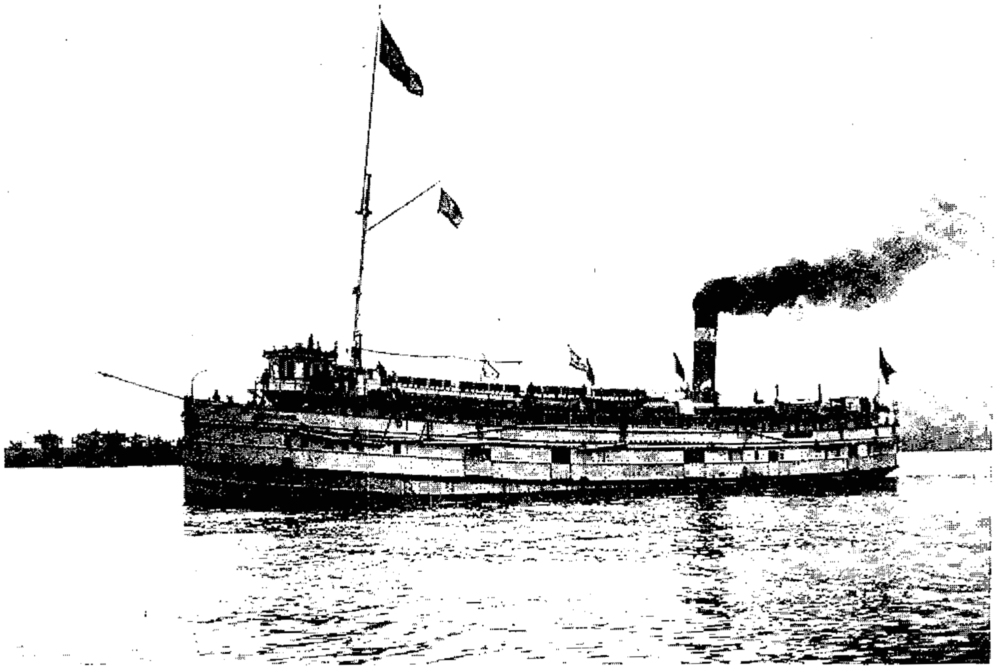


Fig. 4.7. Passenger/package freight vessel MONARCH. An early photograph of the ship before alterations. The iron hull support arch is visible above the gangways. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

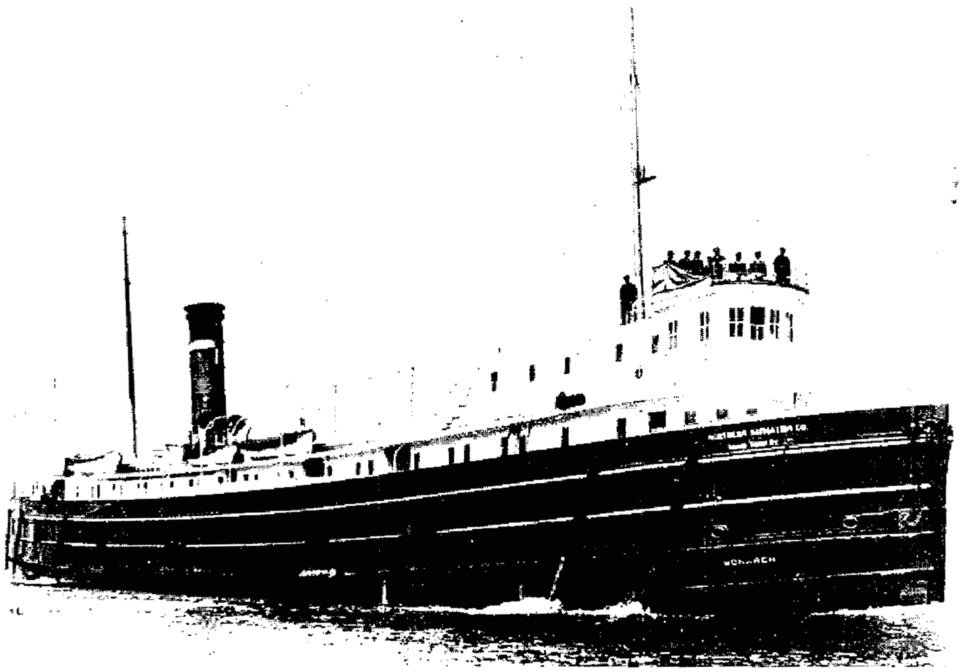


Fig. 4.8. MONARCH after alterations that included the addition of cabins aft of the pilot house. The vessel had this configuration when lost. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

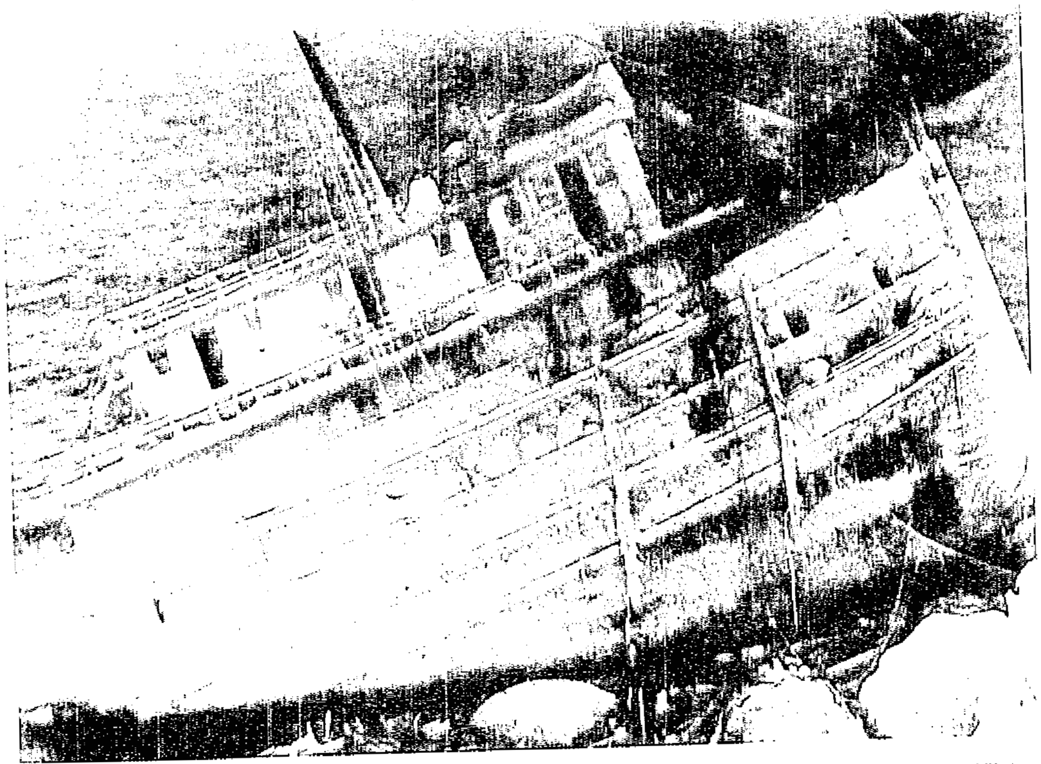


Fig. 4.9. Bow of MONARCH on the rocks at Isle Royale after the wreck. This photo may have been taken the following spring. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

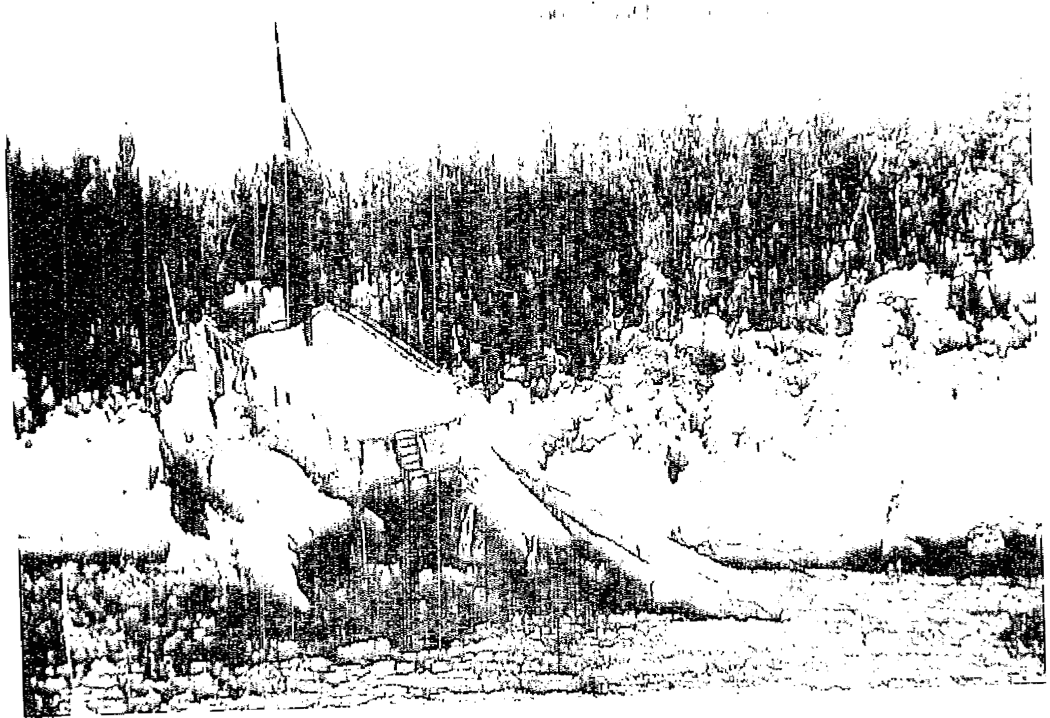


Fig. 4.10. Bow of MONARCH, offshore view. This photograph was reversed when published in the contemporary press. This view is correct. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

GLENLYON: HISTORY

Construction

GLENLYON was built as WILLIAM H. GRATWICK in 1893 at West Bay City, Michigan by F.W. Wheeler & Company. The original U.S. registry number was 81427. Prior to 1893, Wheeler-built vessels carried engines built by one of two Detroit engine companies, S.F. Hodge & Company or the Frontier Iron Works. Wheeler later expanded its operations to include engine construction, and its own new engine works were put in operation in the latter part of 1892. The foreman of the new Wheeler facility was William Willis, formerly of the Hodge Company. Willis supervised the placement of the first Wheeler-built engine in hull 93. WILLIAM H. GRATWICK had the distinction of carrying their first engine (Wright 1969:124). The triple-expansion engine had cylinder diameters of 20, 32 and 54 inches on a 42-inch stroke, with an indicated horsepower of 1200. The original cylindrical Scotch boilers, 12 feet x 13 feet, were built by the Wickes Brothers Boiler Works of Saginaw, Michigan.

GRATWICK was built to serve as a package freighter for John Mitchell & Company of Cleveland. The hull was of steel with a length of 328 feet, a beam of 42.5 feet and a depth of 20.5 feet. Gross tonnage of the vessel was 2,818.27 and the net was 2,202.90. In the builder's certification of March 13, 1893, GRATWICK was described as a screw steamer with two decks, three masts, plain head, and round stern. GRATWICK was launched Saturday afternoon, February 4, 1893 (Port Huron Times Feb. 6, 1893).

This was the fourth vessel to carry the name WILLIAM H. GRATWICK. Others were a steam tug built in 1882 in Buffalo; the 475-ton (1880) propeller later renamed JOHN C. PRINGLE; and a 1687-ton wooden vessel built in West Bay City in 1887. All three earlier vessels were in commission at the same time that GLENLYON was constructed (Mansfield 1899:1:832). The fourth vessel was the first GRATWICK to be made of steel. When constructed, the steel GRATWICK was notable because of its large size (Lake Carriers' Association 1924:118-119).

The first owner of WILLIAM H. GRATWICK was the Mitchell Steamship Company of Cleveland (Doc. of Enrollment April 15, 1893, Huron, Ohio). The president of the company was Capt. John Mitchell, a prominent businessman, who was born in Canada in 1850.

Apparently, the Mitchell Steamship Company was a personal entrepreneurial concern for Mitchell, who was also a member of the board of directors of the Hopkins Steamship Company when GRATWICK was built. F.W. Wheeler, whose company built the boat, was vice president of the same company. In 1894 Mitchell became vice president of the newly formed Gratwick Steamship Company. In 1895, Capt. Mitchell was made secretary and general manager of the Etna Steamship Company of which William H. Gratwick was president (Mansfield 1899:2:435).

Operational History

A change of ownership is recorded for GRATWICK in 1899. In October, the documents list the new owner as the Drake-Maythem Steamship Company of Mentor, Ohio (Duluth News Tribune Sept. 16, 1899; Doc. of Enrollment Oct. 16, 1899, Cleveland). This company retained ownership until 1902 when the ship was sold to the United States Transportation Company of Syracuse, New York (Doc. of Enrollment Oct. 14, 1902, Oswego).

GRATWICK was sold again in 1907 when the Prindville Transportation Company of Michigan City, Indiana became the owner (Doc. of Enrollment Nov. 29, 1907, Chicago). While owned by the Michigan City firm, GRATWICK was chartered by the Graham and Morton Transportation Company of St. Joseph, Michigan. The G&M Line operated ships in the fruit and passenger service from lower Michigan ports to Chicago but ran to Lake Superior ports for a few seasons (Detroit Marine Historian 1951, Vol. 4, No. 10:3). If GRATWICK carried the G&M colors at this time, she had a dark green hull and a black stack during this period.

The vessel was reboilered while under Prindville ownership in 1908. The Wickes-built boilers were replaced with 13 feet 9 inches by 11 feet 6 inches Scotch boilers built by the American Shipbuilding Company of Cleveland.

The Chicago and Duluth Transportation Company of Michigan City purchased GRATWICK in 1910 (Doc. of Enrollment April 8, 1910, Chicago). While owned by this company, GRATWICK was noted for receiving the first load of iron ore taken from the Cuyuna Range in Minnesota. In May 1911, GRATWICK loaded 4,000 tons of ore at the Soo Line's newly constructed St. Louis Ore Dock on St. Louis Bay in Superior, Wisconsin, and headed east (Duluth Tribune May 22, 1911). It is not clear, however, that this is the same GRATWICK associated with Isle Royale.

In August 1911, the company changed GRATWICK's name to MINNEKAHTA (Doc. of Enrollment Aug. 23, 1911, Chicago). Apparently, the company converted both MINNEKAHTA and MINNETONKA, ex-ALVA, into passenger/package boats (Lake Carrier's Association 1924:119).

A "Coasting and Foreign Trade" document was issued in Chicago for the vessel in February, 1913. MINNEKAHTA was sold to the Lake Michigan Steamship Company of Gary, Indiana in September 1913 (Doc. of Enrollment Sept. 23, 1913). This company owned MINNEKAHTA for less than a year before reselling it. The ship's documents were surrendered in April 1914 when she was "sold foreign" to the Great Lakes Transportation Company, Ltd. of Midland, Ontario, who returned the ship to the grain and coal trades. MINNEKAHTA received Canadian registry number 126,660.

Four years later, the ship was overhauled at the Midland Shipbuilding Company, and renamed GLENLYON. Among the alterations were a steel deck house with accommodations for the master and mate added forward, another steel deck house built aft, and some minor repairs were made to the hull (Canadian Railway and Marine World 1918:126). At this time the ship had a light blue-gray hull, white cabins and a rose-red stack with a black top (Williams 1956:255). At the time, GLENLYON was one of a dozen vessels owned by this company, all the names of which began with "GLEN." (e.g. GLENFINNAN; GLENLEDIE).

GLENLYON had a rather unusual operational history. During the course of its serviceable life, the ship participated in the package freight trade, the passenger-package freight trade and the bulk grain trade in two countries. Few ships were involved in all the major trades of the Great Lakes.

GLENLYON was slightly damaged in an incident that occurred in August of 1920. While entering Sarnia, GLENLYON was diverted from its course by the schooner HATTIE HUTT and a sand sucker working at the port. GLENLYON lost steerage and struck the Grand Trunk Railway freight sheds causing $5,000 worth of damage (Canadian Railway and Marine World 1920:463).

Wreck Event

The last navigation season for GLENLYON was 1924. On the last trip, the boat left Ft. William, Ontario on Thursday, October 30 downbound to Port Colborne (Port Arthur News Chronicle Nov. 1, 1924) with a cargo of 145,000 bushels of wheat (Port Arthur News Chronicle Nov. 3, 1924). (The Superior Evening Telegram Nov. 1, 1924 reported 245,000 bushels; the Port Arthur News Chronicle Nov. 4, 1924 reported 318,000 bushels.) The last 3 or 4 weeks of the season were very stormy and foggy with gales and snowstorms. Ships in many ports were delayed while seeking shelter from winds and seas (Canadian Railway and Marine World 1925:642). GLENLYON was one of the vessels delayed. The boat cleared feet William Thursday night only to remain at anchor in the shelter of the Welcome Islands all of Friday, October 31 (Superior Evening Telegram Nov. 4, 1924) while a northeast gale raged (Port Arthur News Chronicle Nov. 1, 1924). The captain was William Taylor, it was his first season as master of GLENLYON. The chief engineer was Edward Hurl (Great Lakes Redbook 1924:72).

The weather lessened somewhat by Friday afternoon and Capt. Taylor resumed the voyage. The weather worsened, and the wind shifted to the north, then to the southwest, soon reaching a heavy gale (Port Arthur News Chronicle Nov. 1, 1924). Shortly after clearing Passage Island, the course was altered to run down the south shore of Isle Royale to Siskiwit Bay to seek shelter from the storm (Canadian Railway and Marine World 1924:642). The storm of Friday night and Saturday would be labeled by mariners as one of the worst encountered in years. "Whitefish Light, which stands up some 60 feet out of the water, was deluged by the breaking waves, running mountains high" (Port Arthur News Chronicle Nov. 3, 1924). John Collins, wireless operator off G.J. GRAMMER, a vessel crossing Lake Superior Friday and Saturday, made the following comments:

> Rough, I should say it was rough. The waves in Lake Superior on Friday last were mountains high. We had to ballast the boat with water to keep her on some sort of even keel. After a short lull Friday afternoon the wind at midnight reached the hurricane velocity of nearly 60 miles per hour. It came from the southeast to southwest. Our boat was tossing about like a cockle shell. Many of the crew had never been through such an experience before. I never want to go through it again (Port Arthur News Chronicle Nov. 4, 1924).

At about 1:00 a.m. on November 1, (Houghton Mining Gazette Nov. 2, 1924) GLENLYON reached the entrance of Siskiwit Bay. While entering, the vessel ran hard aground on a submerged reef off Menagerie Island.

The first reports of the disaster were received by wireless in time to be carried in the November 1, 1924, edition of the Port Arthur News Chronicle. The account of the wreck that follows is taken from that source, except where otherwise noted.

Siskiwit Bay was a known sanctuary from gales for ships in the area, and the entrance channel was not considered dangerous. The crew expected nothing out of the ordinary. "The off watch were asleep in their berths when the grinding, crumbling, grating of ship's keel awakened them" (page 1). Roger Paige, GLENLYON's wireless operator, was on watch at his key and immediately sent a distress message giving the ship's position. The message was received aboard running mates GLENSANNOX and GLENLINNIE, who rushed to their stricken mate's aid (reported as GLENSANNOX and GLENFINNIE in Detroit Free Press Nov. 2, 1924). The vessels stood off in the lee of Isle Royale throughout the early hours of the morning.

As soon as GLENLYON struck the submerged reef, all crew members were ordered to their watch stations and the pumps were manned. The pumps were later abandoned, and the captain scuttled the ship to secure it to the reef (Canadian Railway and Marine World Dec. 1924). (It is is interesting to note that the captain scuttled the vessel to secure it but did not drop the anchors---they were found still shipped during the site investigations of 1982-84.) During the night GLENLYON communicated with the government wireless station at Port Arthur. John Bell, agent for the Great Lakes Transportation Company, was notified and dispatched the salvage tug STRATHMORE to the scene at 6:00 that morning. Agent Bell and Strathmore were familiar with shipwrecks at Isle Royale--they were both involved in the events of the wreck of MONARCH in 1906.

Shortly after the wreck, two men set out in one of the ship's open lifeboats (referred to as a yawl in some reports). Mate John McLaughlin (reported as Daniel Mclaughlin, Daily Mining Gazette Nov. 4, 1924 and as Donald in Superior Evening Telegram Nov. 3, 1924) and Watchman (or wheelsman as reported in Detroit Free Press Nov. 2, 1924) Wilfred Roy were soon missing and were presumed lost in the first reports to reach Port Arthur. A search for the two men was begun.

It is not known why these two men left the ship. The reasons for their departure has been the subject of some speculation. One source (Wolff 1979:127) stated they launched the lifeboat to seek help. This is unlikely when one considers that the vessel had been in wireless communication with Port Arthur and a lifeboat would be quite unmanageable in the heavy seas, especially with only two men aboard. Another account asserted the two crew members launched the boat in a panic against the direct orders of the captain and were blown across the Lake to the Apostle Islands (Stonehouse 1974:9). Neither statement is supportable as far as we can determine. In his next edition the latter author said the two men lowered the lifeboat in the confusion of stranding (Stonehouse 1977:51). Stonehouse may have confused the account of three sailors from GLENLOCHIE, who were drowned when their lifeboat was crushed against the side of their vessel after it was grounded in Lake Ontario. These men launched the lifeboat against their captains orders (Detroit Free Press Nov. 18, 1924). It seems most likely that the two men from GLENLYON were sent overboard to carry out a damage inspection and were accidentally swept away. No historical accounts have been located that shed any light on this event of the wreck.

The U.S. Coast Guard was notified of GLENLYON's stranding. The Portage Lake Ship Canal crew under the command of Capt. C.A. Tucker and the Eagle Harbor crew commanded by Anthony Glaza responded. The Canal crew left for the site Saturday morning about 11:30 only to return to port at midnight due to the heavy weather. This crew was unable to make the 45 miles to the site in the face of "one of the most severe storms in the history of the Lakes. Marine men estimated that the wind attained a velocity of between 50 and 60 miles an hour" (Daily Mining Gazette Nov. 4, 1924). Eight-foot waves were washing over the breakwater when the Coast Guard vessel entered the Lake (Daily Mining Gazette Nov. 4, 1924).

The Eagle Harbor crew aboard the cutter COOK left Sault Ste. Marie about 10:45 a.m. The Lakes Division Office of the Coast Guard had received the message of the stranding from Lt. Commander R.B. Hammes of the Navy, who had transmitted the message by the steamer JAMES E. FERRIS, which had intercepted the original distress signal (Detroit Free Press Nov. 2, 1924). At 11:45 a.m. the gaskets on the manifold of COOK's engine had to be replaced. Repairs were completed by 4:00 p.m. The cutter locked through and proceeded up the St. Mary's River in a fresh west-southwesterly breeze that was shifting to the north. At 6:15 p.m. the flywheel on the main engine became loose due to a defective key. By this time the wind had hauled to the northwest at gale force and there was a heavy sea running. The captain turned his vessel back and anchored to make repairs.

In the incident report that was filed Capt. Glaza stated that it would add greatly if their vessel was equipped with a wireless (this information taken from U.S. Coast Guard report from Commander of Cook to Commander, Lakes Division, November 3, 1924). Apparently, COOK did reach Isle Royale late on the evening of November 2 (Daily Mining Gazette Nov. 4, 1924).

At 10:30 a.m. Saturday the steam tug JAMES WHALEN and barges EMPIRE and GREEN RIVER were dispatched to the site. By noon they had not reached the Welcome Islands because of the heavy weather that impeded the progress of the tug and its two tows. The Great Lakes Transportation Company indicated that it would also send the barge STRATHBUOY to the wreck as soon as tug STRATHMORE returned. The plan was to pump out and refloat GLENLYON after she had been lightered of its cargo. The grain was to be removed by EMPIRE, which was equipped with two clams, and then loaded onto GREEN RIVER.

STRATHMORE reached the wreck site about 1:00 Saturday afternoon. By 2:00 p.m. Agent Bell was able to report that he had received radio communication from Capt. Brown of GLENNLINNIE. Brown was able to pull alongside GLENLYON, remove the crew and transfer them to GLENNSANNOX. It was also reported that the weather had subsided and GLENLYON was in no immediate danger of breaking up.

At midnight the Canal Coast Guard crew arrived at Siskiwit Bay. A light was spotted on shore and the crew investigated. They found McLaughlin and Roy, the two men who had disappeared in a lifeboat. They had been washed ashore further up in Siskiwit Bay (Daily Mining Gazette Nov. 4, 1924). An earlier account said the men were picked up on the open Lake (Port Arthur News Chronicle Nov. 3, 1924). It is assumed the November 4 report is the accurate account. The two men were transferred to GLENNSANNOX with the rest of the shipwrecked crew. GLENNSSANOX soon left the site and headed east (Port Arthur News Chronicle Nov. 3, 1924).

Salvage

The first reports received from the wreck were encouraging. The Port Arthur News Chronicle of November 1 reported "that any immediate danger of the ship breaking up had passed." Later the same newspaper (Nov. 3, 1924) was able to report that "unless a disastrous southeast gale sets in the GLENLYON is in no immediate danger. Although storm signals are now up for a westerly blow, such a gale will have little effect on the wrecked steamer owing to her protected position."

Lightering operations were underway by the barges GREEN RIVER and EMPIRE. They were interrupted for a time by an east wind. They had only managed to lighter 10,000 bushels before having to cease operations because of weather (Canadian Railway and Marine World Dec. 1924:642). Agent Bell told the press of the company's plans to bring GLENLYON to Port Arthur for drydocking to make repairs if the lightering efforts were successful (Port Arthur News Chronicle Nov. 3, 1924).

A report on the vessel's condition on the 3rd was radioed by Capt. Taylor: "On the starboard side her decks have been pushed up some 20 inches. Actual damage to her hull has not been determined" (Ibid.). The November 4 edition of the same newspaper said the steam tug BUTTERFIELD had been visiting the wreck site and was expected back at Port Arthur that afternoon.

By November 4 reports being received from the wreck were sounding more serious. "The GLENLYON", a report said, "was in bad condition. Its hull is broken and its engine room is taking water. It is believed the ship will be a total wreck" (Daily Mining Gazette Nov. 4, 1924).

Lightering operations were resumed whenever weather allowed, but the entire fleet of the Dominion Towing and Salvage returned to Port Arthur November 13. Heavy southeast gales had plagued the operation and they were only able to lighter 75,000 bushels of the cargo. The wheat was transferred to the Richardson's Elevator. The salvors reported that GLENLYON had broken in two and settled on the shoal. It was thought that the insurance company would call for tenders for the wrecking of the steamer since all efforts to remove the boat had been unsuccessful (Port Arthur News Chronicle Nov. 13, 1924).

The Great Lakes Transportation Company called in the well-known Reid Wrecking Company to ascertain whether it was possible to raise the wreck (Canadian Railway and Marine World Dec. 1924). Captain Reid visited the site to assess the possibility of saving GLENLYON.

The reports on GLENLYON that were made public later in November dispelled any remaining hope for refloating the wreck.

> The freighter GLENLYON ... will probably be abandoned as a total loss by the underwriters. This statement was made jointly by John Smith, General Manager of the Port Arthur Shipbuilding Company, and Captain Thomas Reid, of the Reid Wrecking Company of Port Huron, following a trip to the scene of the wreck early this morning. Disagreement between the tendering wrecking companies and the underwriters is given (as the reason) for abandonment.
>
> It is believed the underwriters were willing to award a contract to the Reid Wrecking Company, but the delay of two weeks has altered the position of the vessel and the company is not ready to undertake the hazardous task at this season of the year. Mr. Smith, who with Captain Reid, returned from the wreck at 3:00 this afternoon, told the News Chronicle that the GLENLYON appeared to have settled considerably since last week. The vessel has also twisted and the stanchions are forcing the deck plates. The crack, however, had not widened any further, although the aft section has been working. The

GLENLYON is in a more difficult position for re-floating than at any time since she went on the shoals.

The question of refloating appears to be now up to a decision from the wrecking company and indications late this afternoon were to the effect that the Company was not over anxious to tackle the job (Port Arthur News Chronicle Nov. 20, 1924).

The Reid Company did not tackle the salvage job. On November 21 the announcement was made that the wrecking companies had abandoned GLENLYON as impossible to refloat. The vessel had settled another 18 inches and swung to port. The tank tops were also gone (Port Arthur News Chronicle Nov. 21, 1924). The Port Arthur Shipbuilding Co. was disappointed by the news. It was expected that repair of GLENLYON would provide work for a large force of men.

The wreck remained on the shoal through the winter. In mid-December wreckage was reported washing up on the northwest coast of the Keweenaw Peninsula and the Eagle Harbor Coast Guard responded. A thorough investigation was carried out but no wreck was located. Captain Glaza said he believed the wreckage came from GLENLYON. He went on to suggest that the vessel had been broken up in a northeast storm the week before and wreckage had been driven ashore by a nor'wester (Marquette Daily Mining Journal Dec. 16, 1924).

An April 30, 1924 report said GLENLYON had completely disappeared over the winter (Canadian Railway and Marine World June 1925).

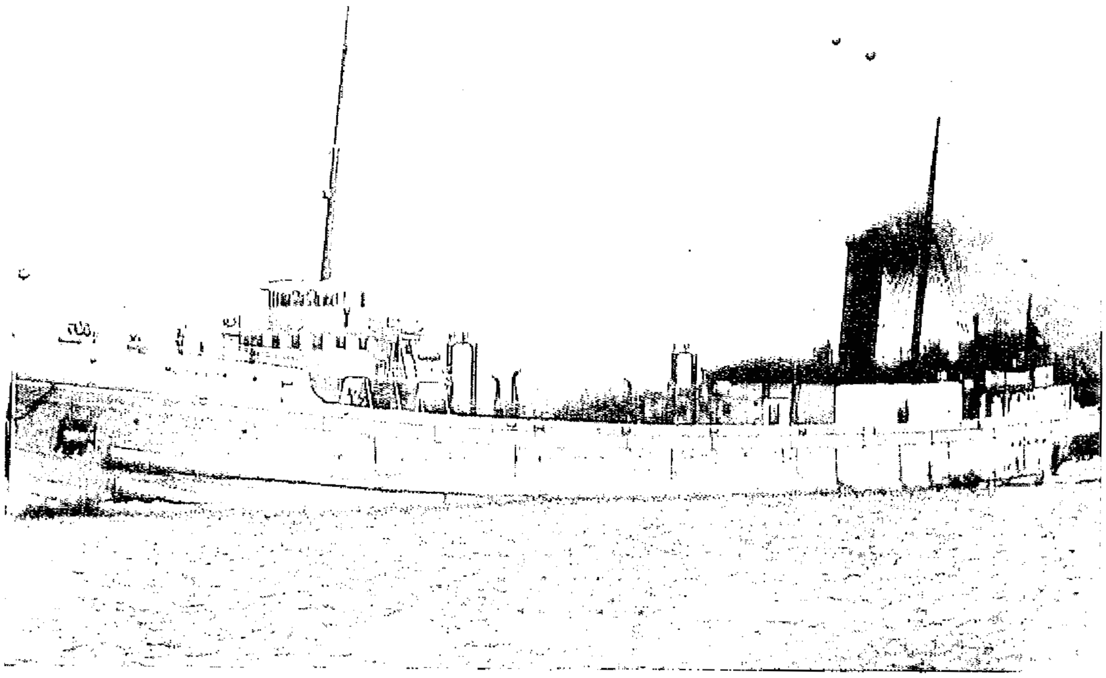


Fig. 4.11. Later view of package freighter GLENLYON. Note freight elevators and gangway hatch cranes. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

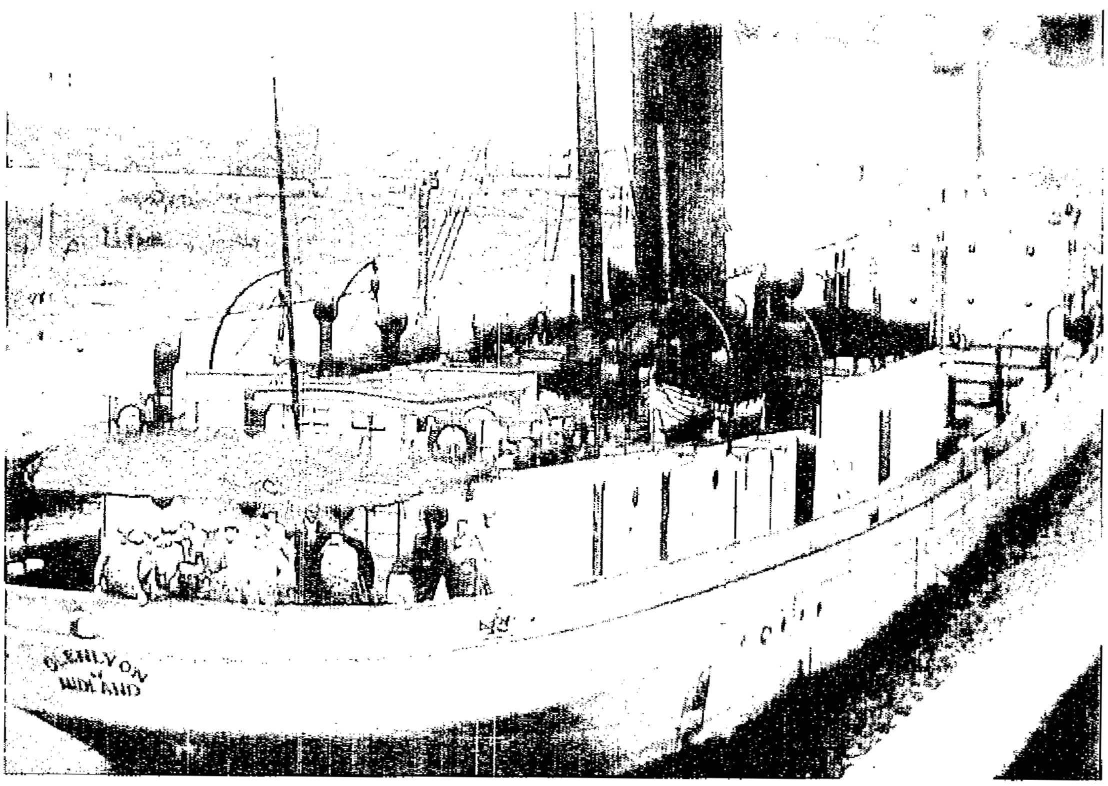


Fig. 4.12. Stern of GLENLYON. Both views are of the configuration of the ship when lost. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

AMERICA: HISTORY

The passenger/package freight vessel AMERICA was more closely tied to the people of Isle Royale than any of the other ships that remain in its waters. AMERICA was tied also to those who lived along the Lake Superior north shore between Duluth-Superior and Thunder Bay. Few Lakes vessels are recalled with more genuine affection than the popular AMERICA. The popularity of this vessel was renewed with the advent of scuba diving; AMERICA is by far the most dived shipwreck at Isle Royale National Park.

Construction

AMERICA was Hull Number 127 for Detroit Dry Dock Company (Edward N. Middleton notes, Canal Park Marine Museum Collection, Duluth). Events surrounding the launch of the AMERICA's hull on Saturday, April 2, 1898, were carried by the Detroit Free Press (May 22, 1898):

> Yesterday afternoon at 3:26 o'clock the steel passenger steamer AMERICA was launched at the Wyandotte yards of the Detroit Dry Dock Co. There were about 400 people present .... At exactly 3:17 the first click of the hammers was heard and in just nine minutes the axmen had cut the ropes that held the big beams in place and the boat slid gracefully off the ways .... She was christened "AMERICA" by Mrs. E. C. Dunbar, wife of one of the owners.
>
> The new boat, which was intended for the Lake Michigan service between Michigan City and Chicago, was built on the same general lines as the CITY OF ERIE, though much smaller (Detroit Free Press April 3, 1898).

Less than a month later, after the new ship was completed at the Detroit Drydock (about June 10) and began the daily run between Chicago and Michigan City (Detroit Free Press May 22, 1898), Chicago marine men were expressing their satisfaction with AMERICA and remarking on its speed of 15-17 miles an hour.

AMERICA's first document of enrollment was a temporary one issued on June 13, 1898 in Detroit. This document listed E. C. Dunbar of Michigan City as 3/4 owner and M. B. McMillan of Detroit as 1/4 owner. The master of record is Capt. M. F. Morgan. A master must be assigned at the time of ship enrollment. In many cases this master, as shown on the documents, is not actually the captain of the vessel, but rather a representative of the company or individual who owns the vessel. In this instance, Capt. M. F. Morgan was also the captain. The document shows AMERICA was built by Detroit Dry Dock Company in 1898 at Wyandotte, Michigan. United States registry number 107367 was given to AMERICA, which was classed as a steel hull screw steamer. This document states the steamer had one deck, no masts, plain head, and round stern, with registered dimensions of 164.6 feet in length, 31.0 feet in breadth, and 11.0 feet in depth. The gross tonnage was calculated to be 486.37 tons, consisting of 309.79 tons capacity under the tonnage deck and 176.58 tons capacity of enclosures on the upper deck. AMERICA's net tonnage was 283.40 tons, allowing for deductions of 28.90 tons for crew quarters, 28.90 tons for master's cabin, 18.43 tons for anchor gear, and 155.64 tons for propelling power (Temporary Certificate of Enrollment, No. 69, Port of Detroit, issued June 13, 1898; Detroit Free Press (May 22, 1898).

The 1899 edition of Great Lakes Register (p. 7), issued in conjunction with Bureau Veritas, gives similar information to that shown on AMERICA's first two documents, with some additions and differences noted: Michigan City, Michigan was shown as

AMERICA's home port. The construction materials were given as "Oak and Steel", meaning steel hull and oak superstructure. In this register AMERICA's dimensions differed from the official documents with a length of 154.0 feet rather than 164.6 feet, a breadth of 27.0 feet rather than 31.0 feet, and depth of 13.0 feet rather than 11.0 feet. It is not clear why this discrepancy occurs other than, perhaps, differences in the rules of measurement used by Bureau Veritas and the U.S. Government. AMERICA was also shown as having three decks in Great Lakes Register rather than one as shown on the documents.

AMERICA's engine and boilers were listed as built in 1898 by Dry Dock Engine Works of Detroit. It is a triple-expansion engine with cylinder diameters of 15, 24, and 38 inches and a stroke of 24 inches. The engine produced 700 indicated horsepower at 160 RPM. Steam for the engine came from two Scotch boilers, 10.0 feet in diameter and 10 feet 2 inches long. The boilers had four furnaces with grate surface of 48 square feet, and heating surface of 2,242 square feet; working pressure was 125 psi.

The hull of AMERICA was lengthened in 1911 at the shipyard in West Superior, Wisconsin. When work was complete, AMERICA was 18 feet longer with 12 added staterooms for 50 additional passengers. The freight capacity was also increased by about 100 tons. The beam of 31 feet and depth of 11 feet remained unchanged. However, the new length was 182.6 feet and registered tonnages increased to 937 gross and 593 net tons (Doc. of Enrollment Sept. 9, 1911). The speed remained unchanged, but handling and appearance were reported improved with the addition of the 18-foot section .

Master of AMERICA was listed as E. C. Smith with Louis P. Hogstad of Duluth as the owner's representative. The approximate number of crewmen required was listed for the first time as 20 persons (Permanent Certificate of Enrollment, No. 79, Port of Duluth, issued June 9, 1911). By the time of its sinking, AMERICA would be required to carry 30 crew members.

Both the hull (HIR) and boiler inspection report (BIR) books for the AMERICA's 1921 and 1928 inspections are in the collections of the U.S. Army Corps of Engineers' Canal Park Marine Museum in Duluth. These inspection reports add much to what is known of details of machinery, equipment, as well as the Lakes passenger/package practices during the period. A comparison between the two inspections gives an indication of the revisions made to the vessel in the last years of operation.

In 1921 AMERICA was classed by the American Bureau of Shipping and it was noted that the hull had been rebuilt in 1911 (1921 HIR:2-3). The number of staterooms was listed as 51 with 43 "available for passengers only." Of the total, there were 40 double and 46 with single berths. The number of first-cabin passengers allowed was set at 94 persons under the "100 percent clause" and 228 persons under the "50 percent clause." The square footage of deck space for passengers was 2,666 square feet on the Saloon Deck, 1,420 on the boat and Texas deck, and 418 on the Texas alone (Ibid:8-9).

The number of persons allowed in the steward's and other departments not connected with navigation was set at 12 (1921 HIR:12-13). This was reduced in 1928 to 8 with 5 required at all times (1928 HIR:12-13). In a handwritten note regarding operation of AMERICA under Class (A) rules, it was added: "When navigated more than 3 miles off shore during the interval between May 15th and September 15th 322 passengers are allowed a total of 352 persons including crew" (1921:12-13). These figures were reduced without comment in the 1928 season to

277 and 307, respectively (1928:12-13). The report gave the ship's hatches as "2 cargo hatches between decks" (HIR 1921:14-15).

The 1928 hull inspection, conducted while AMERICA was berthed at the Booth dock in Duluth, Minnesota shows she was previously inspected on April 21, 1927. For the 1928 season, the last brief operational year, accommodations were for 42 staterooms providing 37 double berths, and 51 single berths for a total of 88. The number of first-cabin passengers allowed was set at 94 under the "100 percent clause", but increased to 277 persons under the "50 percent clause." When AMERICA was not laden with freight, the main deck had 2,657 square feet of space for passengers, the cabin deck had 3,739, and the boat deck 1,174 for a total of 7,570 square feet (1928 HIR:8-9).

Minimum crew requirements were specified as 1 licensed master and pilot, 1 licensed first-class pilot, 5 able seamen, 3 seamen, 11 certificated lifeboat men, 1 licensed chief engineer, 1 licensed first assistant engineer, 3 oilers, 3 firemen, and 4 watchmen. An added note stated, "Of the watchmen specified, 2 are main or deck watchmen included in the deck department and 2 are cabin watchmen or deck patrol and included in the stewards department" (Ibid:10-11). In all, the number of officers and crew allowed was 30 and the total number of passengers allowed was 94. Thus, the total number of persons allowed to be carried under Class (A) rules equalled 124. An additional handwritten note referring to Class (A) stated, "When running more than 3 miles off shore during the interval between May 15 and Sept. 15, both dates inclusive, 277 passengers are allowed making a total of 307 persons including crew" (1928 BIR:13). One additional note was pencilled adjacent to the latter saying simply "14 less than last year", but without further explanation.

The inspectors described AMERICA's hull as having three decks; main deck, cabin deck, and boat deck. It had 2 cargo hatches and 3 fuel hatches on the main deck with wood covers for the cargo and metal for fuel. All hatch coamings and covers were said to be in "good" condition. The steel hull was 1/4-inch thick with 4 water-tight cross bulkheads. The type of construction was described as "on angles and channel stiffeners, plate lapped & riveted to frames and deck beams." There were 5 "sluice gates" located at bulkheads in the hull for movement of bilge water (1928 HIR:14-15). Listed as in "good" condition were the bulkheads, floor plates and frames in the forward and after holds as well as under the engines, along with the hull and frames in the bunkers, hull abaft transom, and "all other accessible parts of hull." It was further noted that the main decking had been repaired since the vessel was last inspected. Additionally, the vessel had permanent stairways from the main to upper decks both forward and aft, and suitable ladders were to be found on each side of the ship for escape to lifeboats with at least two avenues of escape provided passengers from the ship's interior (1928 HIR:16-17).

Pilothouse equipment was also inspected, and it was recorded that AMERICA had hand or manual steering gear with wire tiller ropes and no steering engine. All were tested and found in good working condition. The auxiliary or emergency steering gear was also found in good order and efficient for the task using tackle on the tiller aft. Pilothouse communication with the engine room was through "wire whistle pulls" and "electric signal speaking tube", presumably meaning an intercom system. AMERICA had 1 compass, which was located in the pilothouse, in good condition. No record of when it was last swung was located.

The "electric signal" between pilothouse and engine room was not noted in the 1921 inspection as it was in 1928, probably reflecting a modification during the intervening years. The 1921 survey listed "bell pulls" as a means of communicating with the engine room, which was not listed in 1928. This equipment may have been removed or simply omitted in the 1928 inspection.

Regarding ground tackle, Inspector Sullivan noted AMERICA had 2 anchors of 2,100 and 1,900 pounds, each fitted with 60 fathoms of 1-15/16-inch chain. The anchor windlass was steam powered and provided with a devil's claw to hold the anchor chain (1928 HIR 18-19).

Among the miscellaneous equipment carried aboard AMERICA and noted by Sullivan in his inspection were a hand lead and line for determining depths, a message case, and two 10-gallon tanks of storm oil with proper distribution equipment carried in the windlass room (1928 HIR:42-43).

Lifesaving apparatus was included in the inspection reports. The description within the 1928 HIR is of the same equipment that was deployed during the wreck events. AMERICA carried 5 metallic non-motor lifeboats, all built in 1898, with a combined capacity of 93 persons or 936 cu. feet. There were also 6 life rafts carried aboard AMERICA. All were of wood frame with metal cylinders. Total capacity of the 6 rafts was 83 persons (1928 HIR:36-39).

AMERICA carried cork life preservers: 307 for adults, 39 for children, and 12 for lifeboats. Sixteen were condemned during inspection in April 1928, perhaps explaining why the number of passengers allowed was reduced by 14 as noted above. The ship also carried 2 ordinary ring life buoys and 2 "luminous ring life buoys" (1928 HIR:40-41).

Apparently, Inspectors observed lifeboat drills as this note, which was appended to the 1921 inspection, indicates:

> Tested out life boats loaded to full capacity and lowered to water and then lifted clear; boats in good condition. Ordered rail constructed where No. 6 life boat was formerly carried.

The boiler inspections give specific detail on the machinery. All engine data were the same in 1921 as listed in 1928; however, the cover of the 1921 inspection book noted AMERICA's boilers had been "rebuilt" in 1914 while later it stated clearly "Repaired 1914" (1921 BIR cover; 10-11). All boiler data were the same in other respects. The boiler was hydrostatically tested to 249 psi with allowable operating pressure set at 166 psi (1921 BIR:12-13). New fusible plugs, with a heat number of 20, were installed in the boilers on April 19,1921 by Marine Iron and Ship Building Works. A double-acting hand fire pump was located on the forward port side and another on the after main deck. Both were tested and in good condition (1921 BIR:30-31). There was no notation made as to the number and kind of fire extinguishers carried in the boiler spaces, if any (1921 BIR:34-35).

The boiler inspector noted in his record book that the engineering department required 1 licensed chief engineer, 1 licensed first assistant engineer, 3 oilers, and 3 firemen. Thus a total of 8 persons were required to properly staff this department (1928 BIR:2-6).

The boiler report recorded AMERICA was powered by a triple-expansion condensing steam engine of an estimated 450 horsepower with cylinder diameters of 15, 24, and 38 inches and stroke of 2 feet (1928 BIR:8-9).

The boiler inspection showed 2 Scotch boilers built in 1898 at Detroit, Michigan by Detroit Dry Dock & Engineering Works. The boilers were each 10-1/6 feet long and 120 inches in diameter. There were made of rolled sheet steel of 0.875 inches thickness and having a tensile strength of 60,000 psi. The boiler sheets were made by Lukens Iron & Steel Works Co. of Pittsburgh, Pennsylvania. Boiler draft was noted as forced rather than natural. Boiler plate was last drilled for inspection on April 22, 1922 and found to be 0.875 inches thick (1928 BIR:12-13). The boilers were of lap joint construction and triple riveted. Rivet holes were drilled, not punched, to diameter of 1-7/16 inch. Rivet pitch on lap joints was 4-1/2 x 3-1/2 inches. The boilers were given hydrostatic testing to 249 psi with allowable steam pressure of 166 psi. Each boiler had 4 circular furnaces in 3 sections. Furnace grates were 7/16-inch thick measuring 48 x 36 inches and totalling 4,800 square inches. Adamson flues were used. They were 7 feet 9 inches in length and 36 inches in diameter with a thickness of 7/16 inches. Each boiler had 188 tubes, each 7 feet 3 inches in length with a 2-1/2-inch diameter and thickness of 0.109 inches. There were both steam and water connections between the two boilers. One main and one cross steam pipe were installed and last inspected for thickness on April 23,1926 (1928 BIR:13-19).

Two spring-loaded safety valves were installed on the boilers and tested by the inspector. The valves were manufactured by Scott Valve Manufacturing Company of Detroit, Michigan. There were set to blow off at 166 psi. The valves were located at a distance of 3 feet from the boilers. A set of steam gauges were located in the engine and boiler rooms; 2 in the engine room and 2 in the boiler room. All steam gauges were in "OK" condition and compared favorably with test gauges. Fusible plugs of heat number 28 and manufactured by Marine Iron & Shipbuilding Co. of Duluth, Minnesota were installed during the inspection (1928 BIR:24-25).

Also attached to the boiler was 1 bilge pump of 4-inch diameter and 8-inch stroke. Four other syphonous bilge pumps of 4 inches diameter and 6-inch stroke were also installed. One additional pump of the same size, but designated for fire, was also connected to the boilers.

AMERICA had two lamp lockers or oil rooms, both metal lined. One was located in the engine room beneath the dynamo and the other in the fore peak. Location of the sprinkler system that was noted in the HIR was delineated in the BIR as being on the main deck and the crew's dining room and in the kitchen or galley area. It was fed by a 3/4-inch water line (1928 BIR:30-31). The boiler inspection also showed AMERICA to have two electric lighting systems and no refrigeration unit. Both the engine room and the fire or stokehold had two avenues of escape in case of emergency.

Appended to the inspection report was a list of the number of square feet of deck area for passengers on the following decks:

Deck No. 1 (Main Deck)	2,657 when not freight laden
Deck No. 2 (Saloon Deck)	3,739
Deck No. 3 (Boat Deck)	1,174
Total:	7,570

Operational History

Little historical documentation has been located for the first two seasons of America's operation, other than the ship was periodically chartered for special cruises and to augment the vessels of other lines. One of the early charters was to the International Navigation Co. of New York to run between Buffalo and Niagara Falls (Benton Harbor Daily Palladium March 12, 1901; Holland City News March 15, 1901).

AMERICA's involvement with Isle Royale began in March 1902 when the Booth Steamship Line purchased the new ship. Booth put AMERICA on "the Duluth Port Arthur,and Isle Royale route" (Canadian Railway and Marine World March 1902:109). Before heading up the Lakes, the ship was altered at Grand Haven where the cabin capacity was "materially increased" (Duluth News Tribune March 18, 1902). The new Booth Line steamer, due to arrive in Duluth April 15, was rated "one of the finest and fastest freight and passenger boats available" (Ibid. April 5, 1902).

AMERICA was not in service long before being seriously damaged in a collision with the south pier at the Duluth Ship Canal. "Her bow is bent double and stove in from about 3 feet below the water line to the main deck" and the plates were torn allowing the forward compartment to flood. The accident was attributed to "a good rate of speed" and a crew unacquainted with the current in the canal. The ship was drydocked for repairs (Duluth News Tribune May 5, 1902).

The competition must have been stiff in the excursion trade between Duluth and Two Harbors. The excursions were heavily advertised and races between competing vessels were not unknown. The Canadian steamer HURONIC lost a race down the shore with AMERICA (Duluth Evening Herald May 29, 1903; June 26, 1903).

At the end of the 1903 season, the Isle Royale lightkeepers were returned to the mainland aboard AMERICA, as they frequently were in the years that followed (Ibid. Nov. 26, 1903). AMERICA often had the distinction of being the first passenger out and the last to end the navigation season (e.g. Duluth Evening Herald April 20, 1914; Duluth News Tribune April 24, 1918)

In July 1904, the steamer HOLMES' anchor destroyed 5 staterooms along the boat deck of AMERICA (Duluth News Tribune July 19, 1904). HOLMES was not equipped with anchor pockets. The cabin repair was done by carpenters who worked while AMERICA proceeded on its regular trips (Ibid. July 22, 1904).

In November, 1905 AMERICA was bound from Two Harbors to Duluth during one of the most severe storms ever to hit Lake Superior. The devastating storm of November 27-29, which became known as the "Mataafa Storm", was responsible for 30 casualties on the Lake, the largest from a single storm in Lake Superior history. Casualties from this one storm account for 1 percent of all recorded casualties on Lake Superior (T.R. Holden collection, Lake Superior shipwreck notes). The crew of AMERICA saw MATAAFA, the shipwreck for which the storm was named, during the storm (Duluth News Tribune July 23, 1944).

For most of AMERICA's career it served as a prime communication and transportation link between the Lake Superior north shore settlements and between the mainland and Isle Royale. Passengers and freight were connected to the main economic outlet of the port of Duluth, and this trade was the commercial mainstay of AMERICA's operation. In the early period of AMERICA'S operation the north shore roads were poor (e.g. Duluth Evening Herald April 22, 1907). AMERICA was also a principal summer mail carrier alternating with a stage line that carried during the winter (Duluth Evening Herald April 30, 1913). Over the course of the last two decades of AMERICA's operation, land transportation along the north shore improved markedly, cutting sharply into the steamer's prime role in communications and transportation. A road was completed around Lake Superior in 1921 (Duluth News Tribune May 1, 1921). During the later years AMERICA expanded operations in the excursion trade, although it never left the north shore–Isle Royale run.

In the 1908 season AMERICA served as much more than a communication and transportation link for the smaller ports. Early in September forest fires threatened many areas, "Grand Marais is in great danger of being burned and no avenue of escape -- forest fires raging within a mile of town and fate of the place is in doubt" (Duluth Evening Herald Sept. 8, 1908). It was not only Grand Marais, but a large portion of the north shore with fires at Knife River and at Split Rock, at Chicago Bay (Hovaland) and Grand [Portage just east of the Susie Islands. "Everywhere on the north shore the flames are slowly crawling through the forests, eating up miles of timber lands and making life a terror for the scattered settlers" (Ibid. September 10, 1908). Fires were also seen on Isle Royale (Port Arthur Daily News Sept. 12, 1908).

The threatened settlers who had escaped the fires congregated on the shore line. Household goods and belongings were piled on the docks. There was little hope of escape except by water. AMERICA picked up many of those escaping the flames. The governor of Minnesota sent AMERICA to Beaver Bay to rescue 300 villagers threatened with destruction by the flames (Duluth News Tribune Sept. 12, 1908). The steamer was the only source of news of the fate of the shore towns (Duluth Evening Herald Sept. 12, 1908). The forest fires were not extinguished until September 29 (Ibid. Sept. 29, 1908).

While AMERICA was rescuing villagers from the forest fires, its owner A. Booth and Co. failed and was placed in receivership (New York Times Sept. 11, 1908). The fishermen who depended on the company and their vessels for their livelihood were alarmed (Duluth Evening Herald Sept. 12, 1908), but the company managed to keep its vessels operating (Ibid. Sept. 21, 1908).

In 1909 the old company was dissolved and a new enterprise named Booth Fisheries Company of Delaware was formed, that took over the operations (Duluth Evening Herald June 3, 1909). AMERICA had not been affected and was continuing on schedule. A month later Fourth of July celebrations were celebrated at Isle Royale (Ibid. July 10, 1908). The managing agent of AMERICA was changed in 1914 to the United States & Dominion Transportation Co., a company formed by the Booth Fisheries Co. (Duluth Evening Herald April 22, 1914). Ownership of the vessel was unchanged.

"The steamer AMERICA ran aground at Burlington Point on the north shore about 6 o'clock this morning. She released herself after about an hour, arriving in port about 11 o'clock. Her forefoot was slightly damaged" (Duluth Evening Herald July 9, 1909). "... her bow post and several plates are badly broken and twisted. She will be in dry dock several days" (Duluth News Tribune July 19, 1909). "It was found necessary to put in a new stem and replace about 40 feet of her keel. Twelve new plates are being put in which were bent or broken in the accident and seven frames (Ibid. July 14, 1909).

In 1910 AMERICA had wireless installed (Duluth Evening Herald August 1, 1910).

The start of AMERICA's 1911 season was delayed while the hull lengthening was completed (Duluth News Tribune May 9, 1911). Eighteen feet of length and 12 cabins had been added. The steamer could carry 100 tons more freight as a result of the new alterations. It was announced that the steamer would make three trips a week between Duluth and Port Arthur, and Isle Royale.

One of the popular Isle Royale resorts that AMERICA frequented was Schofield's Lodge on Belle Isle. It was a popular excursion, and the resort catered to vacation clientele (Duluth Evening Herald June 17, 1912).

The sinking of TITANIC, the largest vessel afloat, in the Atlantic in April led to the documentation of AMERICA's passenger, crew and lifesaving capacities that might not have otherwise been recorded. TITANIC, with over 2,000 passengers aboard carried only lifeboat capacity for 1,178, and as a consequence an estimated 1500 people lost their lives. The disaster prompted newspaper investigation into Great Lakes practice, of which AMERICA was used as an example:

> "Passenger boats on the Great Lakes do not pretend to carry boats and rafts to accommodate all the passengers on board in case of an accident," said a marine man this morning. After the investigation now going on as the result of the TITANIC disaster, they will probably be forced to either cut down the number of passengers or increase the number of boats and rafts.
>
> But few passenger boats are inspected at the port of Duluth. Only the boats of the Booth line, excursion steamers, and ferry boats are inspected at this end of the Lakes.
>
> The steamer AMERICA, for an instance, is allowed to carry 450 passengers, but has room for but 108 people in the life boats and on the rafts. She complies with the law in every respect.
>
> The law states that she be required to have 1,080 cu. feet of carry capacity. This she is doing, but ... this gives room to but about 108 people.
>
> The AMERICA carries a crew of 25. She is allowed 450 passengers. There are life preservers to the number of 478 on the boat, one for each one aboard and three over. She has five life boats and two rafts, making up the amount of cubic carrying space required by law.
>
> The law regarding the carrying of life boats and rafts, is claimed to be lax. All the boats live up to the law, but ... the law is not stringent enough in insisting that sufficient boats and rafts be carried (Duluth Evening Herald April 20, 1912).

AMERICA was severely damaged when it ran aground a mile northeast of Two Harbors, Minnesota in early May 1914. It was positioned about 100 feet from GENERAL O.M. POE. Five years earlier the two ships had been aground together in virtually the same spot (Duluth News Tribune May 6, 1914). AMERICA was positioned broadside to the waves and was punctured below the boilers (Ibid. May 7, 1914). The stranded vessel was lightered and freed on the night of May 7. Necessary repairs were described as "nine plates will be removed and straightened ... and about five feet of her keel will be relaid. The hull was quite badly damaged beneath her engines" (Ibid. May 12, 1914).

The reinspection of AMERICA in 1921 by the Steamboat Inspection Service resulted in the issuance of a "Certificate Amending Certificate of Inspection By Changing

Character of Vessel, Route, Equipment, Etc." The vessel would now operate under Class B rules that limited it to navigation of not more than 3 miles off shore. It was allowed to carry 146 passengers or a total of 176 including crew (Certificate dated September 19, 1921 issued at Duluth, copy in Canal Park Marine Museum Collection).

In 1925, the steamer BRUCE took over AMERICA's operation on the south shore. AMERICA would make three trips weekly to Isle Royale and Port Arthur (Duluth News Tribune April 25, 1925). Later that year, AMERICA ran aground at Scott's Point, near Grand Marais and damaged the rudder shoe and stern bearing (Duluth News Tribune May 30, 31, 1925).

A collision between AMERICA and HURONIC occurred in 1926. The vessels were maneuvering in dense fog near the entrance to the Kaministiquia River. Captain Smith was at the wheel of AMERICA when he saw HURONIC loom up out of the fog. He quickly turned the wheel and his ship received a glancing blow and slight damage rather than the full brunt of the impact of the other larger steamer (Port Arthur News Chronicle Sept. 13, 1926; Duluth News Tribune Sept. 14, 1926).

In mid-summer of 1927 AMERICA was involved in a bizarre series of events at Thunder Bay Harbor. On Thursday, July 21,1927, AMERICA was headed toward the Booth dock in Port Arthur when a mix-up in the engine room caused it to ram the tug VIOLET G berthed at the Booth dock, shearing off 15 feet of the tug's stern and tearing away some 20 feet of the dock. There were three crewmen aboard the VIOLET G at the time; they escaped uninjured. Moments later, AMERICA was aground on the rocks at the head of the dock, requiring assistance to be released. Then it collided with, and nearly capsized, the tug CON LYNCH that had just freed it. During all this, a lighthouse keeper's gas launch was also slightly damaged. AMERICA was reported to be carrying "passengers and a cargo of fruit and package freight" at the time (Detroit Free Press July 23, 1927).

During the last winter of its operation, AMERICA steamed to Port Arthur during a severe December storm:

> The steamer AMERICA arrived in port this afternoon from Duluth. She was completely ice-coated. Aboard was a cargo of salt for the Booth Fisheries Canadian company. The vessel is taking back salted herring" (Port Arthur News Chronicle Dec. 3, 1927).

This would have put AMERICA on its return voyage to Duluth in the same storm that halted KAMLOOPS, QUEDOC, WINNIPEG, and other vessels on their upbound journeys from the Sault toward the Canadian Lakehead.

Wreck Event

AMERICA's 1928 season began as many before it. There were no signs at all that this would be AMERICA's final season. AMERICA last steamed out of the Duluth Ship Canal on Wednesday, June 6, 1928, headed up the north shore and expected to touch at all the usual ports of call. From Grand Marais it headed toward Isle Royale to drop off a number of passengers in the darkness of early morning so they would not have to wait out the trip to Port Arthur and around the northeast tip of the island, before landing at their Washington Harbor destinations the following day (Duluth News Tribune June 7, 1928; Superior Evening Telegram June 7, 1928; Holden interview with Capt. Stanley Sivertson, Duluth, Minn. in 1973 and with James R. Marshall, Pike Lake, Minn. in Oct. 1974, 1986).

The Great Lakes Red Book for 1928 listed AMERICA's officers as Capt. Edward C. Smith and Chief Engineer Frank McMillan. Edward C. Smith is also listed as master of AMERICA in a special certificate related to AMERICA's carrying of petroleum (Steamboat Inspection Service, Dept. of Commerce. "Certificate Relative to Carrying Refined Petroleum On Routes Where There Is No Other Practicable Mode Of Transporting It, issued on April 21, 1928 at Duluth, Minn.)

Soon after clearing the dock in Washington Harbor, Capt. Smith turned command of AMERICA over to First Mate John Wick, with Fred Nelson at the wheel, and retired to his cabin behind the bridge. Five minutes later AMERICA thudded over a reef, bumping four times and tearing a small hole through its single bottom below the engine room on the starboard side. Mate John Wick was a new mate on AMERICA, having served previously as mate under Capt. Gus Ege on JACK of the Minnesota Atlantic Transit Co., popularly known as the "Poker Fleet." Wick quit MATCo because Capt. Ege would not recommend him for his own ship in the fleet (Ken Hafner interview with Capt. Duncan Schubert at Sault Ste. Marie, Mich. ca. 1977, copy in Holden Collection).

At first it seemed as though AMERICA's pumps could handle the inrushing water, but Chief Engineer Frank McMillan quickly reassessed the situation — AMERICA was going to sink. Meanwhile Capt. Smith returned to the bridge where he found Mate Wick ringing the ship's bell to alert all aboard of the disaster. Moments later Capt. Smith yelled, "Beach her! Beach her!" (Holden interviews with Marshall 1974, 1986).

Capt. Smith remembered a small gravel beach nearby in the North Gap of Washington Harbor. It would be a good place to try to nose AMERICA ashore before she foundered in deep water. He ordered Fred Nelson to swing the wheel to point AMERICA directly toward the beach. Then another thud and AMERICA ground to a halt about 30 yards short of the beach that probably would have assured its imminent salvage, subsequent repair, and return to service.

Below deck in the engine room, Engineer McMillan ordered his crew to relieve boiler pressure and grease down everything in sight so AMERICA's power plant could be made readily functional when salvage work was completed. Water already had snuffed fireman Hans Fjorne's boiler fires (Holden interviews with Marshall 1974, 1986.

The loss of the steamer AMERICA was covered in newspapers and journals ranging from the American and Canadian Lakehead port cities to Chicago and New York (Lake Carriers' Association, 1928 Annual Report: 51–52; Canadian Railway and Marine World, ca. July 1928). First news of the wreck was carried over the wireless station affiliated with Singer's resort on Washington Island and sent to Duluth (Port Arthur News Chronicle June 7,8, 1928).

In an "extra" for the Calumet News of Calumet, Michigan was an Associated Press wire story headlined "Steamer Sinks Near Isle Royale; All Hands Are Safe", the same story carried by the New York Times (Calumet News June 7, 1928). This same wire service article also appeared in the Superior Evening Telegram (June 7, 1928).

AMERICA was carrying 31 crew and 16 passengers at the time of the accident (Duluth News Tribune June 9, 1928):

> In all 10 passengers and at least 30 officers and crewmen were aboard when AMERICA slipped away from the Singer Hotel dock at

Washington Island. Captain Smith officially reported 31 crewmen aboard at the time of the accident. It is possible Louis P. Hogstad, Manager of United States & Dominion Transportation Company, was aboard at the time of the accident and considered by Capt. Smith as a member of the crew (Record of Casualties to Vessels, U.S. Treasury Department, p. 17, bound journal, copy in Canal Park Marine Museum collection).

First reports at the Canadian Lakehead said AMERICA sank at 4:30 a.m., local time, on June 7th after striking a "reef that split the hull." Word was first received in Port Arthur from Booth Fisheries by S. H. Knauss of the Fitzsimmons Fruit Co. that had a consignment of fruit was lost in the wreck. In describing the vessel's normal occupation the newspaper stated that AMERICA engaged in:

> ... carrying fresh fruit and vegetables from produce housed in Duluth to the Head of the Lakes, and on the East-bound trips called at various fishing stations around Isle Royale. A large number of wealthy Americans, with Summer homes at Isle Royale, used the steamer at Week-ends (Port Arthur News Chronicle June 7, 1928).

A Chicago newspaper reported

> Duluth, Minn., June 7 -- An old well-known passenger steamer, The AMERICA, was lying on the bottom of Lake Superior tonight under seventeen fathoms of water .... Reports of the sinking and rescue were still vague here early this evening. The only report so far came from the ship's purser, who said that the vessel struck a reef near Washington Harbor on Isle Royale at 3 a.m. and that the ship sank an hour and a half later.
>
> The steamer WINYAH was sent to take the rescued persons off the island. When the AMERICA left here yesterday morning she carried twenty passengers in addition to her crew of thirty (Chicago Herald and Examiner June 8, 1928).

WINYAH was enroute from Duluth up the north shore and off Schroeder when its crew was notified to proceed to Washington Island to pick up AMERICA's survivors (Duluth News Tribune June 8, 1928). WINYAH was in the fish and freight trade on the north shore and owned by H. Christiansen and Sons of Duluth (Superior Evening Telegraph June 8, 1928).

An amusing note pertaining to the importance of a fresh strawberry, at least as viewed by the editors of the Fort William newspaper, was headlined, "Fruit Supply For Lakehead Lost in Wreck:

> Sinking of the steamer AMERICA off Isle Royale created a shortage of strawberries and fresh vegetables in Fort William and Port Arthur today. The Fitzsimmons Fruit company had ten tons of vegetables and fresh fruit on the boat.
>
> These products would have been here for distribution today had the boat not gone down. However, it is reported that two trucks left Duluth at 5 o'clock this morning with a fresh supply.
> (Fort William Daily Times Journal June 8, 11, 1928).

More details of the wreck emerged in the press the day after the event:

> In the most orderly manner, without any confusion whatsoever, 15 passengers and 30 members of the crew of the steamer AMERICA ... launched five boats and made for shore early Thursday morning ...

according to the account of a member of the crew, Fred Nelson, wheelsman, who arrived here last night (Duluth News Tribune June 8, 1928).

Wheelsman Fred Nelson gave a detailed report of the events:

> We were out in Washington Harbor about a half mile from the dock when the ship struck the reef .... This caused a loud noise which awakened most of the crew and passengers. Those who were not up when the crash occurred came on deck when the ships bells started ringing. Members of the crew went to cabin doors telling passengers and crew of the danger. The boat started sinking slowly. All five of the ship's life boats were launched. Members of the crew were assigned to take charge of these boats and everyone was taken off. Captain Edward C. Smith left on the last boat just before the entire ship was practically under water. There was no confusion while the life boats were being lowered. Everyone behaved wonderfully and the six women aboard, mostly members of the crew, were not a bit excited over the crash as all saw there was no danger. All of the five life boats reached Washington Harbor, a half mile from where the AMERICA hit the reef, without any trouble" (Duluth News Tribune June 8, 1928).

Booth officials reported that John Wick, the first mate, was in charge of AMERICA at the time of the disaster, having relieved Capt. Smith just five minutes before the crash. These same officials were cautious about providing other particulars of the incident, pending their discussion with Capt. Smith in Grand Marais the night of June 8th (Duluth News Tribune June 8, 1928).

On the same day the Fort William press proclaimed the shortage of fruit in their city, it also carried the following based upon a passenger's recounting of the event:

> Heroism on the part of Capt. Edward C. Smith and coolness on the part of crew and passengers stand out sharply in the accounts given of the sinking of the steamer AMERICA ....
>
> The veteran captain, with all the love a real tar feels for his craft, stayed with the boat until she was ready to sink to the depths of the Lake" (Fort William Daily Times Journal June 8, 1928).

Passenger H. S. Cottier said after arriving in Port Arthur:

> There is nothing to be seen of the old AMERICA now except the top of the mainmast and part of the pilot house sticking up out of the water ....
>
> I left Duluth along with fourteen or fifteen other passengers for Port Arthur on Wednesday night .... We had an uneventful trip, and put in to Washington Harbor to let off two passengers for Isle Royale.
>
> I understand that Captain Smith does not care to put in to Washington Harbor on the trip out of Duluth, but prefers to do so only on the return trip from Port Arthur. However, this time, in the middle of the night, he put in to Washington Harbor, and put his passengers off all right. Then we started out for open water again. It had not yet broken day, and we struck a reef just outside the harbor.
>
> I was in bed and we got a fearful jar, and it woke me and everybody else up. I don't think anyone was hurt. We all dressed, and there were lots of boats to take us ashore. The ship began to settle and all we had to do was to get into the boats .... There was

no panic whatever, and it was not until an hour later, when it was just breaking day, that the good ship sank almost out of sight in the waters of Lake Superior. It must have been shortly before four o'clock this morning, I should judge ....

Captain Smith stayed on his ship until to do so any longer was at the risk of his life. He saw everybody else ashore, sent all his crew away, and stayed on board himself, and alone until the ship was ready to sink. Then he, too, with evident reluctance, for he loved his ship, was put ashore himself.

Captain Smith sent the purser ashore with the first news of the disaster, and through the private telephone wire he got the news into Duluth. The purser was taken to the mainland, and proceeded back to Duluth, as did the captain later ....

We are all thankful ... to be alive and well today. I have lost some clothes and a few personal belongings. There were two men aboard who were going to Nipigon to fish the Nipigon river. They were on their way up from Detroit and they had a truck in the hold of the boat in which were their fishing tackle, rods, lines, and flies, and $500 in cash. They lost it all and did not continue on, but have returned to Duluth, and are now on their way to Detroit.

... The discipline was perfect .... There was complete order; there was no need for the cry "women and children first" because we had plenty of time. There was no real danger, and the passengers were given the first and every possible consideration" (Fort William Daily Times Journal June 8, 1928).

Identity of the two men from Detroit who had the truck with their fishing gear has never been clarified because no one among the passengers listed was identified as having come from Detroit (Duluth News Tribune June 9, 1928). An account years later reported the truck as simply being shipped to the Canadian Lakehead for some plasterers (Duluth News Tribune Oct. 17, 1967).

In a second account by Mr. Cottier, he said:

"The first we realized that there was anything amiss was when the AMERICA struck and was shaken from stern to stem. Hurried examinations were made by Mate Wick, and just a minute or so later we were aroused and told to make ready to get into life boats. We were told the boat was sinking. The boats were lowered and, without confusion, we got into them. We were taken to Washington Harbor, where Mr. Singer, proprietor of the resort there, made us comfortable. Captain Smith sent one of the crew to the wireless station and a message was sent to Duluth" (Port Arthur News Chronicle June 8, 1928).

Passengers expressed satisfaction with the way officers of AMERICA dealt with the disaster, as the following indicates:

"I can tell you very little more than what has already appeared in the press .... It was a most unusual experience, I can tell you that, and there was no loss of life. I was particularly struck with the conduct of Captain E. C. Smith, and the crew, and with the dispatch at which they went about the task of getting all people safely away from the sinking vessel" (Port Arthur News Chronicle June 9, 1928).

Capt. D. T. Sullivan of the Steamboat Inspection Service announced in Duluth that an investigation into AMERICA's sinking would be conducted by his office (Houghton Daily Mining Gazette June 6, 1928). Curiously, the Houghton newspaper failed to carry any further news on AMERICA sinking through the end of June.

Capt. Edward C. Smith filed an official "Record of Casualties to Vessels" report on June 12, 1928 after returning to Duluth (Record of Casualties to Vessels, U.S. Treasury Department, 17, bound journal, copy in Holden Collection). It appears that this volume is what could be termed "a blotter book", that is, a handwritten facsimile of the original, single-page report which was forwarded to higher authorities by the receiving officer. This copy was kept in the receiving office. A synopsis of Capt. Smith's answers is given. The wreck occurred on June 7, 1928 at 2:47 am. The ship had sailed from Duluth June 6 and was bound for Port Arthur with 10 passengers and 31 crew. The estimated value of the vessel was $100,000; the 55-ton cargo of miscellaneous merchandise was valued at $10,000. The amount of insurance on the hull was $60,000; disbursements was $40,000. The cargo was uninsured. The cause of the wreck was "hit reef" and the vessel was stranded and beached about 400 feet from where it hit.

The official investigative hearing held by Capt. Sullivan opened in Duluth on June 11 and concluded on June 12, 1928. Nine members of AMERICA's crew including the captain and chief engineer testified at the hearing, which was closed to the public. Records of testimony were forwarded to the Marquette office of the Steamboat Inspection Service where a determination of negligence or inattention to duty was to be made (Duluth News Tribune June 13, 1928; Fort William Daily Times Journal June 13, 1928; Port Arthur News Chronicle June 15, 1928).

While it has been believed that Mate Wick was censured for careless navigation (Pomeroy, Dick. "Shallow, Cold, Watery Grave Still Holds Steamer AMERICA", Superior Evening Telegram Oct. 25, 1983; Holden "Above and Below: Steamer AMERICA", THE NOR'EASTER, Vol. 3, No. 4, July-August 1978: 2), records in the National Archives are to the contrary, apparently exonerating all parties:

> Summary records there [National Archives] indicate that the hearing on the [AMERICA's] sinking on June 7,1928 was held in Marquette, Michigan, with the case being dismissed. The actual transcript of the hearing is not available (Correspondence, Bruce C. Harding, Chief, Archives Branch, Federal Archives and Records Center, Chicago, Ill. to Holden Dec. 2, 1974).

The Fort William Daily Times Journal carried the most fitting eulogy for the AMERICA to appear in any of the Lake Superior port city newspapers:

> The unfortunate loss of the steamer AMERICA has, for a time at least, removed from the run between Fort William and Duluth, a boat that has served the public at the head of the Lakes in good stead for over a quarter of a century.
>
> While connection with Duluth has been maintained by the passenger boats of the Canada Steamship Line, originally of the Northern Navigation Company, it was the AMERICA which did the local, routine work along the north shore, poking her nose into every little harbor on the coast line and keeping communication between the mainland and Isle Royale uninterrupted. While the HAMONIC was sailing majestically from point to point, the AMERICA was serving all the places enroute. She was like the local train which unloads its

freight at every unimportant siding, past which the stately express train glides as if it never existed ....

So accustomed had she become to the run that it seems almost strange that she could not find her way alone through any passage along the north shore or Isle Royale .... The work done by the AMERICA will have to be continued by some other boat, but it will be hoped by all who have made use of the AMERICA and enjoyed her picturesque trips, that she will be raised and sail the same route again (Fort William Daily Times Journal June 9, 1928).

Salvage

Following the accident, there was an almost immediate expression of hope for salvaging AMERICA. In Port Arthur it was reported:

> ... The owners of the AMERICA are preparing to send out a wrecking outfit from Duluth. If possible the vessel will be raised and taken to the Superior shipyard for repairs and reconditioning. In the meantime efforts are being made to get another steamer, as in addition to the freight the company handles between these two ports, a large number of fishermen were accustomed to send in their catches to the Duluth market by the AMERICA twice a week (Port Arthur News Chronicle June 11, 1928).

In a brief editorial in the Fort William Daily Times Journal, it was noted that if the spars and pilothouse were still visible, it should be possible to salvage AMERICA (Fort William Daily Times Journal June 9, 1928).

Other press reports indicated little optimism concerning salvage as being expressed by Booth Fisheries and the United States & Dominion Transportation Co.

> Hopes of salvaging the vessel have been practically abandoned by the United States & Dominion Transportation Company .... The ship is to be replaced by a new vessel (Detroit Free Press June 10, 1928).

As the official investigation concluded, it was announced that bids were being sought by AMERICA's underwriters for salvage of the vessel (Fort William Daily Times Journal June 13, 1928), but aspirations for complete salvage were mixed:

> The underwriters interested in the loss of the steamer AMERICA of the Booth Line have been seeking bids for the boat just as she lies, on the rocks at Isle Royale. It is said that she probably is damaged beyond chance of profit by releasing her and causing her to be repaired. So, in any event, the boat may not bring more than somebody can see profit in recovering the machinery and junking the steel plates, etc. blankets, pillows, and other articles that have floated out of the stranded boat (Skillings' Mining Review July 14, 1928).

Four parties were requested to submit salvage bids: Barnett and Record of Duluth with a bid of $35,000; Reid Towing & Salvage Company of Sarnia and Port Huron bidding $65,000; Merritt Chapman & Scott bidding $30,000 to $40,000; and Capt. Cornelius O. Flynn whose bid was about $30,000, but definitely less than Merritt Chapman & Scott. Reid Towing's bid was excessive because he did not have his salvage floating plant on Lake Superior at the time. In fact his bid was not even received until October 1928, affecting low bidder Flynn's ability to begin salvage that year. Consequently, when Flynn did acquire salvage rights from the court in 1929, he had not only a salvage job on the vessel, but also an extensive refurbishing job due to ice and weather damage, as well as vandalism, before AMERICA could see service again. The onset of the Great Depression also adversely affected Flynn's salvage plans (Skillings' Mining Review July 14, 1928; Holden interview with Marshall 1986).

Capt. Cornelius O. Flynn of Duluth is believed to have been the first diver on the wreck of AMERICA, apparently as owner's representative. He determined there was a single hole in AMERICA's hull on the starboard side. Captain Flynn hoped he could raise AMERICA and place it back in service along the south shore, running between Houghton-Hancock and Isle Royale, perhaps across to Port Arthur and Fort William (Ibid).

Unauthorized salvage work on AMERICA began almost before its boilers cooled as area fisherman found the vessel a new source of prosperity:

> It is said that some of the fishermen's boys around the western end of Isle Royale have displayed unbelievable skill at locating and floating pails of candy and crates of fruit, using an iron hook on a long pole, and operating from a small boat. There was $4,000 worth of fresh fruit on the AMERICA when she went down (Skillings' Mining Review July 14, 1928).

Isle Royale's resort operators could not long be without passenger service and survive financially. Arrangements for alternative service to the island were announced by Booth representative Hogstad on June 22, 1928:

> Boat service between Duluth and Isle Royale ... will be resumed today by an arrangement with the Northern Navigation Company ... to operate a passenger steamer from Duluth to Port Arthur and Fort William. From Port Arthur and Fort William a smaller steamer will be used for transporting the passengers to Isle Royale (Duluth News Tribune June 24, 1928).

AMERICA's document of enrollment issued in March 1927 was surrendered at Duluth on September 6, 1928 carrying the notation that it had last been renewed on March 22, 1928 and that the reason for surrender was "Vessel struck reef and sunk in Lake Superior at North Gap, Isle Royale, Michigan on June 7, 1928, 48 persons on board, No lives lost" (reverse of Permanent Certificate of Enrollment, No. 89, Port of Duluth, issued March 22, 1927). This document showed no indication of any preferred mortgage on AMERICA, that is, it was apparently owned outright by Booth Fisheries Company of Delaware.

Booth's own aspirations for salvaging AMERICA seemed to have been rejected outright by August 21, 1928 (Duluth News Tribune Aug. 23, 1928).

Underwriters settled with Booth Fisheries for AMERICA's hull, but apparently not for the cargo or the belongings of crewmen or passengers. Confusion and hard feelings resulted all around since Booth Fisheries had been paid for their loss, but those of the passengers and crew who lost personal property and those to whom cargo had been consigned were not subsequently paid by Booth interests (Holden interviews with Marshall 1974, 1986).

Some felt, and still feel, AMERICA was scuttled for the insurance since the north shore highway had cut drastically into Booth's passenger and freight business.

AMERICA's loss effectively put an end to Booth's Duluth operations although they apparently ran the HOLLIS M, possibly in 1928, but at least part of 1929 and perhaps longer (Holden interviews with Sivertsen 1973 and Marshall 1974, 1986).

The settlement dispute found its way into court. Captain Flynn went to court as well to propose a settlement that would satisfy all parties. He proposed to purchase AMERICA and its salvage rights from the court by paying a nominal court fee and settling any outstanding claims against Booth or the vessel. Ultimately, Flynn was successful in his bid. It was announced on September 12, 1929, more than a year after the wreck, that Capt. Flynn had obtained ownership of AMERICA (Canadian Railway and Marine World Oct. 1929:665; Duluth News Tribune Sept. 12, 1929). Marshall reports the actual date of transfer of ownership as July 29, 1929 (Holden interview with Marshall 1986).

When sunk, AMERICA was still protruding above the water; technically a stranding rather than a foundering, since the wheelhouse and forward deck were left above the surface. Ice damaged this portion over the winter of 1928-29, shearing off those cabins. The following winter, 1929-30, AMERICA was further ice damaged, but more importantly, was buoyed up sufficiently by the ice to be released from the rock pinnacle atop which she rested. By spring of 1930, AMERICA had slipped totally beneath the surface to 85 feet at the stern and 4 feet at the bow while listing over on the port side.

Capt. Flynn visited the wreck a couple of times in the next few years and devised ways of raising AMERICA, but was never able to secure the necessary capital for the venture as the Great Depression descended on the Twin Ports and the nation. Flynn and/or his son Paul visited the wreck in 1930, 1932, 1933, and 1935 (Holden interview with Marshall 1986).

Capt. Flynn never did get the chance to make a real attempt to raise AMERICA. He died in 1936 at the age of 81 having served the Port of Duluth for more than half a century. In that time he had been master of the ELLA G. STONE, James J. Hill's yacht WACOUTAK, Thomas F. Cole's yacht ELVINA, and R. G. STEWART among others. He had also worked various salvage jobs including that on the NOQUE BAY in the Apostle Islands (Duluth News Tribune April 3, 1936; Duluth Evening Herald April 3, 1936; Mansfield 1899:2:483-84).

Capt. Flynn's plan for raising AMERICA did not die with him. His son, Paul J. Flynn, also a hardhat salvage diver, purchased salvage rights to AMERICA from his father before he died. Paul Flynn purchased the salvage rights with his business partner, Alexander J. McDonnell. These two men also visited AMERICA several times. But they, too, were unable to fund a real salvage attempt through their inability to raise the necessary capital and interference from World War II. Still, Flynn and McDonnell held documents showing their claim to the AMERICA's salvage rights from 1935 until 1965 (Holden interviews with Marshall 1974, 1986).

In June 1943 what is believed to be one of the earliest (there were no anniversary columns on the loss in the Duluth Evening Herald or Duluth News Tribune on June 6,7 1929 or 1939) in a long list of articles recounting AMERICA's loss was published in a Duluth newspaper under the title "SS AMERICA Ends 15th Year at Bottom of Lake Superior." While the article recounted the event briefly, it added an aspect of the wreck brought on by the advent of World War II and attempted to bring the history of salvage efforts up to date:

During the last 15 years, there has been no effort to raise her [AMERICA], although when she first went down there were reports this would be done. The hull has entirely disappeared, the cabin the last to drop from view.

Not long ago the War Production board compiled a list of ships resting in Lake Superior which might be salvaged for the scrap iron and cargoes they contain. [America was listed for salvage.]

Interest in the salvage of AMERICA lay dormant through World War II and into the 1950s, although the ship was not forgotten. Transference of Cousteau and Gagnon's military aqualung of 1943 into a post-war recreational outlet brought AMERICA back into the press; the wreck was being visited by sport divers in the summer of 1956:

> Duluth's intrepid skin divers, aptly named the Frigid Frogs, next week-end will take to the deeps of Isle Royale to look over the sunken passenger steamer AMERICA ....
>
> They won't have much trouble finding the AMERICA. Any Isle Royale fisherman can point out the reef where she ripped out her bottom. On a calm day, one can see the bow a few feet below the surface and it's a spooky sight, too.
>
> If it's salvage they're after, the Frogs won't find much of that either. A couple of generations of fishermen, without today's complicated skin diving equipment, have seen to that (Herbert J. Coleman, "Frigid Frogs to Tour Ship Sunk Near Isle Royale". Duluth News Tribune July 8, 1956).

A 24-year-old hardhat salvage diver, Jack Coghlan of Port Arthur, visited AMERICA in 1957, calling the dive his "most fascinating experience." Coghlan reported entering the vessel through the "dining compartment" as he described the experience to a Duluth reporter:

> "It's sort of eerie," he said last week. "You can still see dishes on the sideboards, and the tables are piled high on one end of the room."
>
> From there, Coghlan swam down a flight of stairs through a hallway and looked into a passenger's compartment. Silt obscured his vision, since he was working with an underwater light.
>
> More rewarding was his entry into the purser's office, which he accomplished by breaking in the door. Rummaging in an old desk, he felt a mass of paper, thought he was wealthy, and found that the 'banknotes' were old snapshots.
>
> Oddly enough, the pictures were legible and Coghlan has had them copied by a photographer. They included a number of scenes of what appears to be the Chicago waterfront ....
>
> Coghlan said the ship's hull is ringed with debris which has torn or fallen loose. Still in the hold is an ancient Model T Ford which he said seems in good condition. Coghlan took the car's horn as a souvenir.
>
> Another souvenir was a bottle of meat sauce he found in the dining room. He said it was "sort of ripe" (Herbert J. Coleman, Duluth News Tribune April 28, 1957).

Coghlan and the Frigid Frogs early descents on AMERICA renewed talk of possible salvage of AMERICA, although it would be four more years before that interest was coherently voiced and four additional years before the first actual attempt at salvage was undertaken.

Serious talk about raising AMERICA did not come until 1961 when James R. (Jim) Marshall, Pike Lake, Minnesota, took an interest based largely upon reports of the condition of AMERICA from various divers, including members of the Frigid Frogs. He personally did not dive on the wreck until September 1965. Marshall rekindled the interest that had been brewing for three decades. In the next four years the S.S. AMERICA Salvage Company, Inc. was formed by Marshall and a Duluth attorney, Patrick D. O'Brien. Salvage rights were purchased from Paul J. Flynn. The firm acquired the cabin cruiser SKIPPER SAM and modified it for salvage and logistics work. A salvage plan was worked out and permission to salvage was secured from the National Park Service. A cadre of local divers was assembled to assist in the project. Many of the divers were in the Canadian Air Force but stationed at Duluth and had been trained in diving by Marshall through his recreational outfitting business (Holden interview with Marshall 1986; Special Use Permit 6-65, Isle Royale National Park, issued to Marshall, Chippewa Outfitters, Duluth, Minnesota, for the period of Sept. 21, 1965 to Dec. 1, 1965 to conduct salvage operations on S.S. AMERICA, in Windigo Ranger Station files; Duluth News Tribune Sept. 24, 1965).

Appended to the Special Use Permit issued for salvage work on AMERICA were notes indicating that Isle Royale National Park officials had contacted both the Coast Guard and U. S. Army Corps of Engineers in Duluth regarding the vessel. The Coast Guard commented that they had no jurisdiction as long as the wreck and salvage work were properly marked to comply with current rules of the road. The Corps of Engineers said they had no interest in the operation. Neither agency had comment regarding requiring a performance bond for the salvage work (Special Use Permit, 6-65, Ibid).

The salvage corporation's primary interest was to raise AMERICA and return it to the Duluth waterfront where it could be restored over a five year period, and thus transformed into a tourist attraction of historic interest, as well as a unique dining or hostel facility. This is an idea which has now come into vogue on the Great Lakes. Marshall said in 1965 of his thoughts about salvaging AMERICA in 1961:

> "Talk was about as far as it went [in 1961] ... until early this year [1965] when it became apparent that raising the steamer and returning her to Duluth would bring recognition to the city and provide an attraction that people throughout the nation would enjoy visiting" (Duluth News Tribune Sept. 15, 1965).

A Houghton Daily Mining Gazette columnist agreed that AMERICA would be a good tourist attraction saying:

> "It is likely that the AMERICA revived might become an important tourist curiosity in the Zenith City [Duluth] region. Duluth has no such other ventures and the reclaiming from Davy Jones Locker the remains of the CITY OF HANCOCK type ship might not be a bad idea" (Houghton Daily Mining Gazette Sept. 25, 1965).

However, clarification of the National Park Service's position on ownership of the wrecks and its role in preservation and conservation of shipwrecks located within its jurisdictional boundaries, was ultimately the most tangible and lasting result of the salvage attempt, outside of the physical damage done to the wreck itself.

A salvage method was proposed. The plan was worked out by "salvage master" Chuck McClernan. The method consisted of first sealing up the steel hull's major openings. About 50 such openings were identified in preliminary examination of the vessel, including 5 cargo hatches, smokestack opening, a stairway, the dumbwaiter in the galley, the grocery chute, three coal bunkers, and the skylight above the engine room as well as 34 other "minor" openings such as portholes, plus the original hole in the hull. This plan was reviewed and found sound by Marine Iron & Shipbuilding Co. of Duluth and individuals from Fraser-Nelson Shipyard in Superior (Duluth News Tribune Sept. 15, 1965; Holden interview with Marshall 1986).

When preliminary work was done, the salvagers would be able to proceed in raising the vessel by removing an estimated 159,000 gallons or about 1,821 tons of water from the vessel using an air lift. The 10-inch airlift was inserted into the hull through the galley stove flue. Air could be forced at 600 cu. feet per minute through the pipe into the vessel. Salvagers expected to force nearly a quarter million gallons of water out of the hull per hour (Duluth News Tribune Sept. 15, 1965).

When part of the hull reached the surface, the salvors planned to switch over to two 4-inch pumps, which could handle about 160,000 gallons per hour. Once afloat, the SKIPPER SAM would tow AMERICA into the same gravel-bottomed bay that Capt. Smith was headed for the morning of the wreck. There they could check over the hull and make any further repairs necessary. From Isle Royale AMERICA was to be towed back to Duluth, possibly escorted by the Coast Guard Cutter WOODRUSH (Duluth News Tribune Sept. 15, 1965; Duluth News Tribune Sept. 24, 1965; Holden interviews with Marshall 1974, 1986).

AMERICA Salvage, Inc. was not operating in a vacuum without public and political support. Duluth Mayor George D. Johnson and Seaway Port Authority Director Robert T. Smith, both enthusiastic about the project, granted permission to moor AMERICA at Duluth's port terminal over the winter. Also lending support to the salvage project were the Northeastern Minnesota Development Association, Minnesota Arrowhead Association, U. S. Rep. John A. Blatnik, and citizens of Duluth and Superior, many of whom clearly recalled their own trips on the steamer (Holden interviews with Marshall 1974, 1986; Duluth News Tribune Sept. 15, 1965.

Once AMERICA was returned to the Duluth waterfront, plans called for refitting the ship over a five-year period at a cost of about $200,000. The ship's galley, passenger dining salon, engine room, and many cabins were relatively undamaged. The engines were believed to be operational with minimal restoration work, and there was still coal in the bunkers (Duluth News Tribune April 6, 1966; Holden interviews with Marshall 1974, 1986).

Actual work on sealing up the vessel in preparation for refloating began in September 1965 with the salvagers based at Grace Island, Isle Royale, only a half mile from the wreck site. The entire project, from hull survey to fabrication and installation of all patches, and refloating, was expected to take three to four weeks. Work through the first two stages progressed on time or ahead of schedule. Salvors hoped to refloat the vessel by October 20 and have AMERICA in Duluth-Superior Harbor in November (Duluth News Tribune Sept. 24, 1965).

The 1965 salvage report by James Marshall, President of America Salvage, Inc., to the Park gives considerable insight into the diving operations on the wreck (Letter from James Marshall to Superintendent Carlock Johnson, Dec. 3, 1965 on file Isle Royale National Park). The divers discovered about 200 fathoms of chain remaining in the chain locker and removed. The nine main deck openings were sealed with wooden hatches of 2x6-inch boards.

> A great deal of the damaged superstructure was removed .... A large portion of the damaged second deck was removed opening the area over the engine ... and the area around the opening in the deck has been shored .... The remains of the ship's funnel, weighing some seven tons, were severed from the boilers with a cutting torch, and with the assistance of the cruiser, drifted over the side. This exposed the steel room over the engine and boilers. The galley appears undisturbed .... Bad weather set in during September and early October. Finally, the salvors decided to delay refloating AMERICA until the following spring. They stored their equipment at Grace Island over the winter of 1965-66 under special permit (Holden, interviews with Marshall 1974. 1986; Duluth News Tribune Oct. 25, 1965; Duluth Evening Herald Oct. 25, 1965).

Despite the weather, members of the salvage group took a reporter down to explore the wreck. His descriptions are informative of the state of preservation of the wreck in the mid-1960s:

> I observed that the ship is resting on a rock shoal at a severe angle, the bow being 19 inches below the surface and the stern in 85 feet of water.
>
> As we worked our way slowly toward the bow, it was evident that the upper superstructure - which consists of the ship's two topside decks, and pilothouse - had been severely damaged, for debris was strewn in wild disarray throughout the steamer's forward section ....
>
> [Mike] Pinkstaff showed me where the hull was torn, which caused the AMERICA to sink. It consisted of a 3-foot horse-shoe-shaped dent with a 4 and 6-inch tear on each side ....
>
> Pinkstaff and I looked at the ship's big propeller and rudder -- which is turned hard left the same way she was the night she sank -- and then entered a hatch leading to the ship's dining area.
>
> We started working our way forward by ascending an elaborate carpeted stairway -- the carpet is still intact -- leading to a large ballroom.
>
> In the ballroom was a large upright grand piano ... sitting upside-down and slightly damaged as a result of the sinking.
>
> Forward of the ballroom I saw the AMERICA's smokestack, and a little forward of that is a Model T Ford truck resting on the deck. The truck, which was being shipped to a plasterer in Fort William, Canada, is still assembled except for the hood and radiator, which have been taken by skin divers.
>
> My last venture during the dive was a look at the engine room and engines. It's difficult to believe ... but the AMERICA's engines are as new-looking and shiny as the day they were bought. There isn't even marine growth on them (Duluth News Tribune Oct. 17, 1965).

AMERICA Salvage, Inc. applied for an additional salvage permit by letter to Isle Royale Superintendent C. E. Johnson on April 7,1966 to complete the salvage. Salvors planned to complete their task by June 12, 1966 (Correspondence, AMERICA Salvage, Inc. to Supt. C. E. Johnson dated April 1, 1966 and April 7, 1966, Windigo Ranger Station files, Isle Royale National Park; Duluth News Tribune April 10, 1966). A salvage permit was issued.

Inspection of the vessel in the spring revealed only the expected; many of the patches would have to be re-secured. However, bad news came on May 11 when divemaster Chuck McClernan reported "their worst fears had been realized" raising AMERICA was "all but impossible." McClernan and M. W. Gamblin discovered a new hole in the side of AMERICA apparently caused by dynamite placed by "an unknown party" to stop salvage of the vessel (Memorandum from Windigo District Ranger Jon B. Abrams to Superintendent, Isle Royale dated May 16, 1966, Windigo Ranger Station files).

Discovery of the reportedly sabotaged area marked the beginning of the end of salvage efforts. In August 1966, the U.S. Justice Department indicated they had informed the Federal Bureau of Investigation of the reported "bombing" of AMERICA and supposed they would send a demolitions experts to assess the situation. A Justice Department attorney, Harold D. Beaton, contacted AMERICA Salvage, Inc. for permission to survey AMERICA without being held liable for any damage such survey might cause. Permission was granted by AMERICA Salvage, Inc. on August 12, 1966 (Correspondence from U.S. Attorney Harold D. Beaton to James R. Marshall Aug. 9, 1966; correspondence from Marshall, AMERICA Salvage, Inc. to Harold D. Beaton, U.S. Attorney in Grand Rapids, Michigan Aug. 12, 1966, on file Windigo Ranger Station). No information has been available from the Justice Department or FBI concerning the extent or findings of any investigation.

Marshall reported, too, that the damage went beyond the new hole in the hull. He said the explosion caused the ship to "jump" and as it re-settled, the rudder was swung hard over and that there was tearing in the hull along the shaft tube that would prevent use of AMERICA's own engine for propulsion on the return to Duluth (Holden interview with Marshall 1986).

The Submerged Cultural Resources Unit was unable to locate the "bomb hole" in the hull. The bomb incident apparently provided a convenient closing to the salvage attempt. The salvage operation provided the impetus for legal and administrative clarification of NPS policy regarding the submerged cultural resources of Isle Royale. The history of this development is presented in Chapter VII.

Recreational diving grew in the wake of the commercial salvage operations and attendant media coverage. In 1974 a sport diver, who was also an amateur historian and certified scuba instructor, wrote of his impressions and experiences on AMERICA presenting a comparison to the experience Coghlan had on the wreck in 1957. This also serves as an example of the beginnings of observations by sport divers on AMERICA and other shipwrecks at Isle Royale and the region as a benchmark in the changing attitudes of sport divers toward the objects upon which a majority of their recreational interests were focused:

> Many divers have dove on the AMERICA because she is easy to get to, in rather shallow water, and safe from storms ....
>
> The condition of the wreck is very good with ice damage extending to the boiler room. From the boiler room to the bow the ice has taken away the wood superstructure. The bow lies at the edge of a slope which goes down to the North Gap Channel ....
>
> There is much to see on this old wreck, one just does not know where to start exploring. Going down the deck starting from the bow you pass a big deck winch [sic] used once for pulling in the many feet of anchor chain. Just past that there is a hatch and down a ladder you can get to where the crew once slept. There is another point of interest in the bow and this is an air pocket created by the

exhaust air of divers. You can go up inside this air pocket and talk to your buddy, but do not breath the air. There is always enough light to see your way out of the wreck but for close inspection a light and lifeline are needed.

Coming out of the hatch and going back down the deck you come to another hatch. This hatch was the coal bunker. There is hardly anything in it because the ship is lying at such a great angle that the coal has run into the boiler room. The hatch to the coal bunker is nearby.

At the edge of the coal bunker is where the wreckage starts. This is caused by a build up of ice which sometimes can go down to a depth of more than 30 feet. The pilot house is no longer there and many of the cabins are destroyed. The wreckage consists of a lot of wood and pipes.

The main deck starts to take its shape again near the engine room. This is as far down as the ice could go, so from that point on there is very little damage.

Swimming over the top of the ship, the engine room is exposed to view. She had a three cylinder engine. In the front of the engine and on top of the boiler room there is the remains of a Model A truck that was being shipped to Port Arthur. Divers through the years have taken many things off the truck like the tires and engine parts.

On deck two and in the rear of the engine room there is a hatchway that goes into a companionway. This companionway goes out to the side of the ship and then toward the stern. From the companionway, access can be made into the dining area.

Going through the companionway and to the dining area, you come to a pretty big room which was the dining room. All the tables and chairs that were once in the room are lying in the very rear of the room. Because of the great angle [at which] the ship is lying all the tables and chairs just slid to the rear of the room.

From the dining area you can leave the ship by going out through a cargo door. Following the side of the ship down you come to a small deck on the very stern. There is a hatchway on this deck which goes to deck one. Right inside the hatchway there is a piano, in bad shape. On the after deck there is a hatch going down to deck two. It is a little small for a diver to get through but it can be done.

Letting yourself off the stern and sinking to the bottom you have a most awesome and impressive sight as you look up at the huge size of the stern. All of the decks are intact ....

The depth is 80 feet and all around the ship there is wreckage. The rudder and prop are still visible, with the rudder turned hard a starboard. The rudder seems to keep the ship from sliding further into the channel (Engman 1976:1-5).

Although AMERICA was lost without loss of life, there has been one death aboard the vessel, a diving accident. In August 1976 20-year-old Donald G. Lienhardt of New Auburn, Wisconsin, apparently became disoriented while low on air and exploring AMERICA's interior in a small storage area just aft of the galley. The door is wedged partly open. His brother and another friend had not noticed their partner's absence when they left the galley, nor were they immediately concerned when they surfaced without him. All had entered the wreck while low on air. The divers' air reserves were too low to conduct an effective search and rescue effort.

Other sport divers in the area began the search while alerting other dive boats in the area of the problem. Lienhardt's body was recovered an hour and a half later (Houghton Daily Mining Gazette Aug. 23, 1976).

The room in which the fatality took place became popularly known to the diving community as the "forbidden room", and consequently became an attractive nuisance. Many divers pushed the limits of their abilities to visit the "forbidden room." In consultation with NPS managers, a decision was made to remove the partially open door. The door was removed with a large pry bar by lifting the door off its hinges.

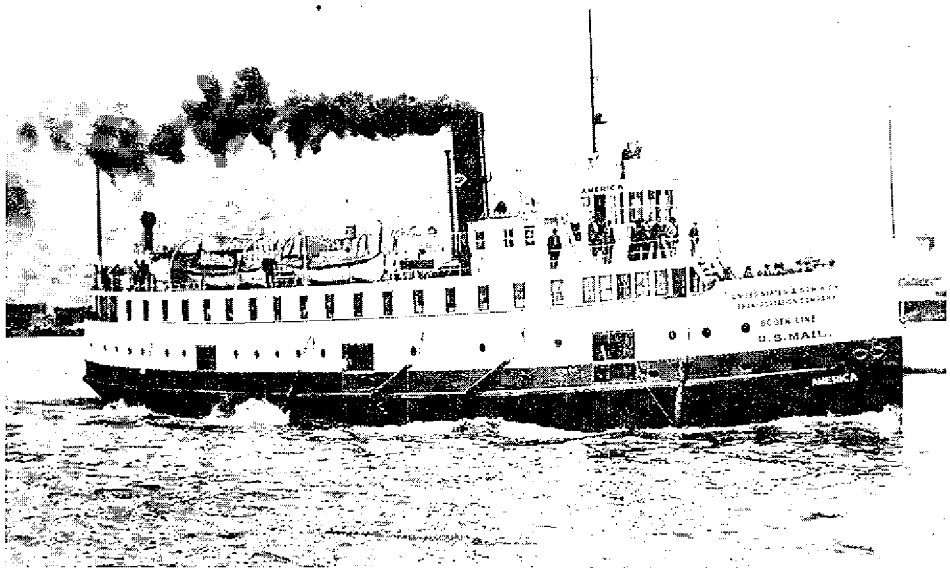


Fig. 4.13. Passenger and package freighter AMERICA. 1905 view at the Duluth Docks. As built configuration prior to alterations. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

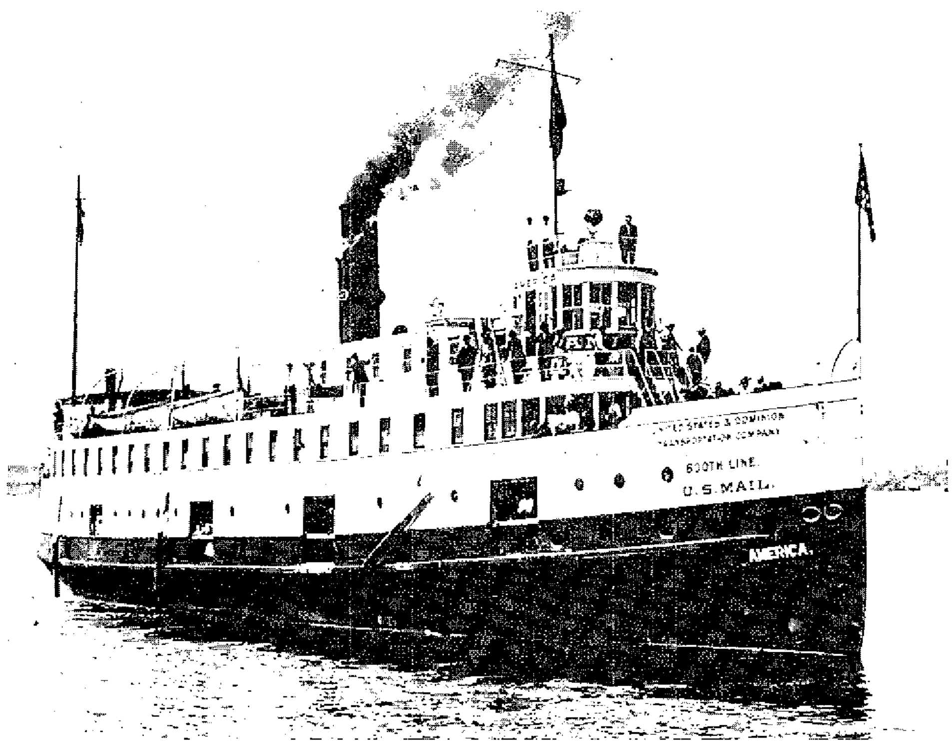


Fig. 4.14. AMERICA showing the appearance of the ship after the 1911 alterations that added 18 feet of length to the hull. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

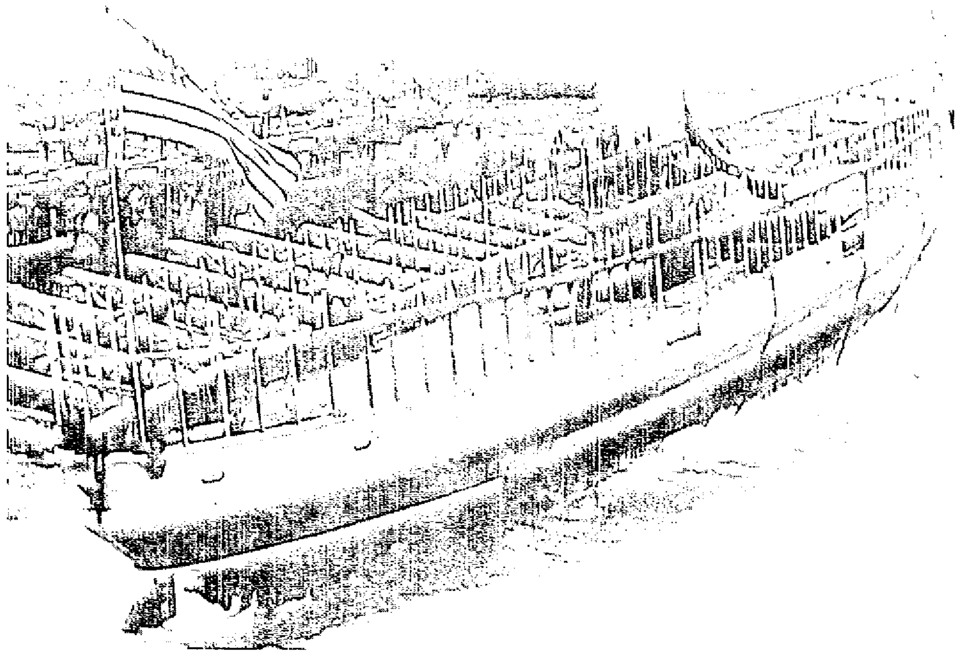


Fig. 4.15. Birth of AMERICA. On April 2, 1898, AMERICA was launched at the Wyandotte yards of Detroit Dry Dock Co. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

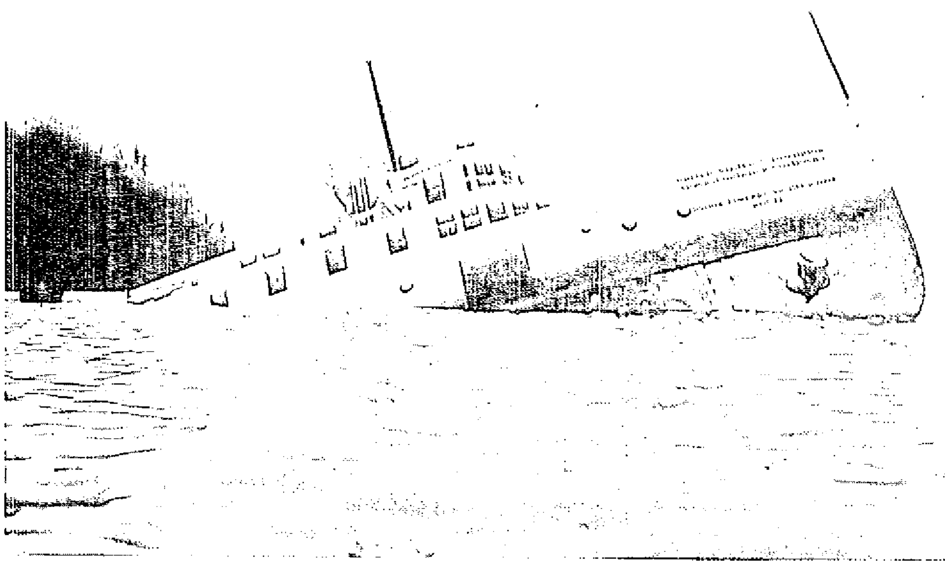


Fig. 4.16. Demise of AMERICA. AMERICA aground in North Gap of Washington Harbor ca. June 7, 1928. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

GEORGE M. COX: HISTORY

Construction

The steel passenger screw-steamer GEORGE M. COX was named PURITAN by the Craig Shipbuilding Co. of Toledo, Ohio in 1901. U.S. Registry No. 150898 (June 7, 1901) listed the owner of the vessel as the Craig Shipbuilding Co., and gave the dimensions: 233 feet long, 40.5 feet wide and 21.9 feet deep. The ship had no masts, two decks, a plain head and round stern. The tonnage capacity under deck was 1169.08; the capacity between decks above the tonnage deck was 378.53 tons, yielding a gross tonnage of 1547.61. A deduction of 495.04 tons was allowed, giving a net tonnage of 1052.

The ship was designed for the overnight passenger service. The first owners, the Holland and Chicago Transportation Co., intended to name the vessel OTTAWA. Before hull 82 was completed, the Holland and Chicago Co. was bought by the Graham and Morton Transportation Co. The new owners named the vessel PURITAN and launched the ship on the afternoon of May 1, 1901 (Detroit Free Press May 2, 1901).

The Craig Shipbuilding Co. owned PURITAN from June 7 to June 28, 1901. Graham and Morton Transportation Co. retained ownership until December 27, 1902, when ownership was transferred to J. H. Graham of St. Joseph, Michigan.

A detailed description of PURITAN was published shortly after the launching in Marine Engineering (1901:458-460). It is one of the best and most complete reports located for any Isle Royale shipwrecks:

> She was built throughout to meet the requirements of the Bureau Veritas Classification Society, with extra heavy scantlings, thus making her one of the strongest vessels of her class afloat. The following are a few of her principal scantlings:
>
> The center vertical keel is 48 inches deep by 17 1/2 pounds, fitted with a 36-inch by 17 1/2-pound rider plate on top of the floors with 4 1/2 by 3 inches continuous angles. The frames are 6 inches by 3 inches by 14 pounds, channels spaced 24 inches apart and continuous to upper deck, with web frames of 12 inches by 22 pounds channel, spaced every 24 feet. Solid floors are fitted on every frame, 20 pounds in the machinery space and 18 pounds elsewhere, and are secured to the vertical keel by 3 inches by 4 inches double angles. Deck beams are of channel section, 10 inches by 22 pounds on main deck, and 6 inches by 14 pounds on upper deck, all spaced 4 feet centers and secured to frames with substantial brackets. Three channel stringers are fitted in the lower hold, one on each side and between decks. The shell plating is as follows:
>
> Garboard 19 pounds to 16 pounds at ends; bilge and side plating, 17 pounds to 14 pounds at ends; shear strake, 60 inches by 20 pounds, and 17 pounds at ends; between deck plating, 10 pounds. The vessel is constructed with two complete steel decks, and is fitted with three gangways on each side for handling freight. The stern post is a steel casting, and the rudder frame and stem are forgings.
>
> The passenger accommodations are very complete, and all conveniences for a large passenger business are provided. The main cabin on the upper deck is finished in mahogany, and has forty-two staterooms, with the dining room at the forward end. The galley and

crew's quarters are directly under the dining room, on the main deck. Aft of the engine room on the main deck is a large smoking room, with connection to the main cabin by a grand stairway, all finished in mahogany, similar to the main cabin. Pilot house and officer's quarters are on the boat deck, on which are also located sixteen staterooms similar to those in the main cabin. The accommodations for second class passengers are under the main deck aft. The steamer has accommodations for 200 first and second class passengers, and is licensed to carry 2,000 excursionists.

The machinery consists of an inverted, direct-acting, triple expansion, surface condensing engine, with cylinders 21 inches, 34 inches and 58 inches in diameter, and 40-inch stroke, designed by the Craig Ship Building Co., and built in their own shops. The high pressure and intermediate cylinders are fitted with piston valves, and the low pressure cylinder with a double ported slide valve. All valves are worked by Stephenson double-bar link motion, and have adjustable cut-offs, actuated by screws in the arms of the reverse shaft. The reversing gear is direct connected with a steam cylinder 11 inches diameter by 16 inches stroke. All pistons are fitted with cast iron spring rings, the high pressure and intermediate bodies also being cast iron and the low pressure being cast steel. Piston rods are machinery steel, secured to piston by tapered ends and nuts, and to crossheads by cottars. Crossheads are cast steel recessed for crosshead pin boxes and fitted with composition slippers. Connecting rods are wrought iron, the upper end being forked with crosshead pins shrunk in. The crank pin boxes are cast steel lined with best anti-friction metal.

The framing of the engine consists of three cast iron housings of box section in front and back, the latter being fitted with guide surfaces provided with water back for circulation of cooling water. The bedplate is cast iron of box section, cast in one piece, with five main journals.

The lower main journal boxes are cast steel, lined with anti-friction metal, as are also the cast iron caps which form the upper part of the bearings. The crank shaft is of wrought iron, 12 inches in diameter with steel crank pins and cast steel webs. Line and propeller shafting is wrought iron, provided with forged couplings and supported by suitable spring bearings. The thrust bearing is of the horseshoe type, with adjustable shoes. The propeller is four-bladed, solid cast iron, 12 feet in diameter and 19 foot pitch.

Owing to the large amount of lime in the waters of Lake Michigan, a surface condenser was fitted to obviate any trouble with the scaling of boilers. The condenser is separate from the main engine, and is of the cylindrical type, with steel shell fitted with composition tube sheets and composition tubes tinned inside and out. The cooling surface is 2,500 square feet

All the pumps are independent of the main engine, and with the exception of the circulating pump, were furnished by Dean Bros. of Indianapolis, Ind. The air pump is of the simplex vertical type, 12 inches by 24 inches by 18 inches; and the main and auxiliary feed pumps are of the Admiralty duplex type, 8 inches by 5 inches by 12 inches. Two duplex pumps, 5 1/2 inches by 5 1/4 inches by 7 inches, and one simplex pump, 4 inches by 4 inches by 5 inches are also fitted for general water service and for pumping from the bilge. Water is circulated through the condenser tubes by a centrifugal pump, with a 10-inch suction and discharge, driven by a 6 inch by 6 inch vertical, direct-connected engine, supplied by the Morris Machine Works of Baldwinsville, N.Y.

> Steam is generated by four water tube boilers with an aggregate heating surface of 7,500 square feet. These boilers were tested to 450 pounds hydrostatic pressure, and are allowed a working pressure of 225 pounds.
>
> The PURITAN is lighted throughout with electricity, generated by two 15 kilowatt direct-connected General Electric Co. generators, located in the engine room. She is also fitted with steam steering engine and a Hyde steam windlass. Her anchors are of the Baldt stockless type, and weigh 2,840 pounds each.
>
> Taken altogether the PURITAN exemplifies the highest class of vessel for the trade in which she is employed, and is a credit to both her owners and builders.
>
> Although she has only been running altogether about six weeks she has already broken the record for the run between St. Joseph, Mich., and Chicago, beating the best time of the whaleback steamer, CHRISTOPHER COLUMBUS, thus ranking her as one of the fastest boats on Lake Michigan. Her time for the run was 3 hours and 11 minutes, making an average of 19 3/4 miles per hour .... She now averages 108 revolutions with 200 pounds of steam.

The triple-expansion engine of PURITAN was rated at 1,700 indicated horsepower (Certificate of Consolidated Enrollment and License, Puritan. May 23, 1924).

Operational History

John H. Graham, of Graham and Morton Transportation Company, was a prominent businessman connected with the passenger pleasure resort service out of Chicago and the fruit traffic from Michigan. Graham and Morton had built a line of palatial steamers primarily for the summer passenger service between Chicago, St. Joseph and Benton Harbor. In addition, the vessels also carried freight between these cities as well as to Milwaukee (Mansfield 1899:2:245).

Graham and Morton Transportation evolved as a stock company in 1880 or 1881 from the partnership between J. Stanley Morton and J.H. Graham, formed originally in the early 1870s. By 1899, the Graham and Morton Transportation Co. had grown to be the largest single business on the docks at Benton Harbor and Chicago, employing more than 100 persons in the summer (Mansfield 1899:2:246).

After PURITAN'S launch in 1901, it made a trial run on Maumee Bay with William A. Boswell as Capt. and Louis Sebastian as chief engineer. On board were George Craig, representing the builders, master mechanic Cady Markely, E.E. Roberts, designer of the four water-tube boilers and who represented the Marine Boiler Works of Toledo, and other invited guests (Hamilton n.d.).

Graham and Morton Co. was anxious for the delivery of the new vessel. When PURITAN left Toledo for Chicago on June 15, carpenters were on board completing their work. The ship was placed on the daily Chicago-to-Holland run shortly after the company took title on June 28, 1901. Typically, PURITAN remained on this run until the end of the fruit season, when it sometimes ran from Chicago to Benton Harbor during the winter (Hamilton n.d.).

The first temporary port of enrollment was Toledo. When the Graham and Morton Transportation Co. took delivery, the port of record according to enrollment documents was changed to Grand Haven, Michigan. W.A. Boswell was the master of record, and remained so when the ship was transferred to the ownership of J.H. Morton on December 27, 1902.

PURITAN was reboilered in 1905. The Roberts boilers were replaced with four newer 11x10-foot Scotch boilers built by Johnston Bros. of Ferrysburg, Michigan (Hamilton n.d.). Recent field observations of these boilers reveal they were constructed with steam drums, an unusual feature for Great Lakes vessels.

A new enrollment was issued for PURITAN in February, 1908, reflecting a 26-foot increase in length. The lengthening took place in Manitowoc under the direction of George Craig, the designer and builder (1908 Certificate of Enrollment; Hamilton n.d.). The revision increased the gross tonnage from 1,547 to 1,762.20, and the net from 1,052 to 1,267. The registered depth increased from 21.9 feet to 26.6 ft. W.A. Boswell was again listed as master. It is unclear whether the depth change indicates an actual structural modification or was an artifact of a change of measurement procedures. There were some vessels structurally altered to accommodate automobiles. More research is needed to clarify this point for PURITAN/COX.

PURITAN was one of several Great Lakes ships summoned to serve in World War I. There were at least five of the Lake Michigan passenger-steamer fleet called to U.S. Naval service: THEODORE ROOSEVELT, CITY OF SOUTH HAVEN, VIRGINIA, MANITOU and PURITAN (Fort William Daily Times Journal April 9, 1918). PURITAN was purchased by the U.S. Navy in April, 1918 and commissioned November 20 of the same year (U.S. Department of the Navy 1970:5:405; Lake Carriers' Association Annual Report 1918:149). The ship's enrollment papers were surrendered October 23, 1918 (Consolidated Certificate of Enrollment and License PURITAN. July 7, 1920). In Naval service, PURITAN was designated SP-2222. It was the third vessel of that name to serve in the U.S. Navy.

The passenger steamers were principally used to bring U.S. troops back home after the Armistice (U.S. Department of the Navy 1970:5:405). PURITAN was modified for naval service at the Krafts Shipyard in South Chicago, where it was fitted out for ocean service and camouflaged.

Most Lakes passenger vessels had to be structurally altered to allow passage to the ocean. Contemporary photographs indicate the bow of PURITAN was severed to allow passage through the canal system to the Atlantic (Fig. 4.19). The cut was made immediately forward of the pilothouse, and both sections were apparently bulkheaded to make the passage, or perhaps the smaller bow portion was simply loaded and carried throught he passage.

The details of PURITAN's military career are unclear. The Dictionary of American Fighting Ships (U.S. Department of the Navy 1970:5:405) indicates the ship served as a troop transport, and it was later reported that the ship had spent some of its time operating in the English Channel (Toledo Blade May 29, 1933). Some sources state that PURITAN, along with other Lake passenger steamers, served as a mine-layer in the North and Baltic Seas (Lake Carriers' Association 1933:35-36). Dana Thomas Bowen recorded that PURITAN was used as a training ship for recruits (Bowen 1952:308). Another writer stated that PURITAN saw no action or service at all, but spent the time laid up in the Boston Navy Yard (Hamilton n.d.). Further historical research is needed to clarify PURITAN's military service.

Apparently, after PURITAN was decommissioned, it was sold to a private company and rebuilt to resume the Lake passenger trade. The rebuilding took place at the South Chicago Drydock in the spring and early summer of 1920 (Hamilton n.d.). PURITAN was redocumented on July 7, 1920 to the Chicago, Racine and Milwaukee Line, whose agent of record was James F. Gallagher of Michigan City, the same agent who served the Graham and Morton Transportation Co. before the war (Consolidated Certificate of Enrollment and License, PURITAN. July 20, 1920).

The newly rebuilt passenger steamer was chartered to the Michigan Transit Co. of Chicago, which purchased the vessel outright in May, 1924 (Consolidated Certificate of Enrollment and License, PURITAN. May 23, 1924).

The Michigan Transit Co. utilized PURITAN in the "Direct Overnight Service to Cool Northern Michigan Summer Resorts" (Advertisement that appeared in the Chicago Herald and Examiner June 24, 1925). Tri-weekly express service left Chicago Mondays, Wednesdays and Saturdays at 6:00 p.m., with the first run of the summer season on June 27. The towns served were: Ludington, Hamlin Lake, Epworth Heights, Manistee, Onekama, Portage Point, Frankfort and Crystal Lake, with service extended to Glen Haven and Traverse Bay on Wednesdays. PURITAN served on this resort run with the steel steamer MANITOU. Both vessels accommodated vacationers' cars (Chicago Herald and Examiner July 8, 1926).

In the severe storm of December 6, 7 and 8, 1927, PURITAN broke from its moorings in Muskegon Harbor and drifted around with no one aboard. Buffeted by 65-mile-per-hour winds, PURITAN dragged its winter moorings -- steel cables fixed to large concrete blocks that had been buried 6 feet deep -- and came to rest against an abandoned pier at East Lake. The huge concrete blocks that were dragged by the ship prevented serious damage to the hull when the ship hit the pier (Detroit Free Press December 9, 1927). The same storm sank the canaller KAMLOOPS on Isle Royale.

The resort and passenger cruise vessel PURITAN was idled in 1929, just before the demand for recreation cruises and passage to the northern Michigan resorts was virtually eliminated by the Great Depression. The ship was docked at Manistee (Hamilton n.d.).

After the idle time at Manistee, PURITAN was purchased by Isle Royale Transportation Co. The Enrollment Document for the purchase (May 22, 1933) registered the name change from PURITAN to GEORGE M. COX. The Isle Royale Transportation Co. was an Arizona corporation headed by the man for which PURITAN had been renamed.

George M. Cox was a millionaire ship builder and brewer from New Orleans, and a large stockholder of the Duke Transportation Company. The new owner had refitted PURITAN in a grand manner. "I never had to shine shoes, but if I did I would try to do it better than the other fellow, and I am going to follow this same procedure with these boats," he said after the refitting and renaming of his company's newest boat was complete. "The boats are elegantly equipped and everything that can possibly be done will be offered for the passenger's pleasure. The ships, however, are going to remain clean -- there'll be no gambling or disorder -- if we have to sink them first. Our purpose is to supply two ships, and perhaps more, where every facility will be offered for clean and wholesome amusement and plenty of good times" (Manistee News Advocate May 25, 1933).

There was much excitement regarding the newly appointed GEORGE M. COX. On May 23, the ship, decorated with a new coat of white paint and carrying the International Code of Signals, left the moorings at Arthur Street in Manistee to move down to the Michigan Transit docks. Hundreds of people visited the ship as it lay at the dock, the crew finishing last-minute preparations for departure on COX's first voyage in more than two years. The ship was slated to leave for Chicago the next morning with George Johnson as captain and Arthur Cronk (appears as Kronk in most other references) of Houghton or Hancock, Michigan, as first mate. The refurbished vessel met with approval from its many visitors and well-wishers. *"Entirely repainted, inside and out, the fine appearance of the ship won the favorable* comment of those who inspected it" (Manistee News Advocate May 24, 1933).

Wreck Event

The first voyage of PURITAN as the newly appointed GEORGE M. COX was also to be its last. On May 25, 1933 the ship left Chicago bound for Port Arthur to begin its new route in the passenger trade between those two cities. Intermediate stops were planned for Houghton and Isle Royale.

The steamer left Saturday May 27, from Marquette at 2:00 a.m. bound for Houghton with namesake George M. Cox and 124 others aboard (Daily Mining Gazette May 27, 1933). The captain was George Johnson of Traverse City and the first mate was Arthur Cronk. There was also an eight-piece orchestra aboard ready to join in the festivities anticipated on the maiden voyage (Manistee News Advocate May 24, 1933).

COX arrived in Houghton and tied up at the Peninsula dock around noon after its ten hour run. The vessel was opened for inspection and hundreds of local residents toured the finely appointed cruise ship (Daily Mining Gazette May 28, 1933).

GEORGE M. COX left Saturday afternoon, May 27, 1933, for Isle Royale, but COX ran hard aground off the west end of Isle Royale sometime before 6:00 p.m. Saturday evening while those on board ate dinner. The steamer MORRIS S. TREMAINE intercepted a wireless SOS message from the stricken ship, and the first word reached Houghton about 8:00 p.m. Word of the disaster was received by Capt. Fred Sollman of the Portage Canal Coast Guard via Ft. William. The Coast Guard left immediately for the wreck site (Daily Mining Gazette May 28, 1933).

Capt. M.L. Gilbert, marine superintendent of the Isle Royale Transit Company in Ft. William, was receiving fragmentary reports of the wreck by wireless from ships in the vicinity. The ship had struck a reef in thick fog, and George M. Cox and three women passengers were reported aboard TREMAINE. Gilbert described GEORGE M. COX to the press as an unusually seaworthy craft with a hull of steel. He went on to reassure those concerned that "the boat was commanded by Capt. George Johnson of Traverse City, a veteran Great Lakes shipmaster." (Daily Mining Gazette May 28, 1933).

On the 28th the story of the wreck appeared in the newspapers. The New Orleans Times-Picayune carried a detailed report prominently mentioning the president of Isle Royale Transit Co., a resident of New Orleans:

> Four persons were injured, one seriously, in the wreck, the first on the Great Lakes this season, but no lives were lost. The four, with George M. Cox of New Orleans ... and a nurse were brought to Fort Williams by the freighter M.S. TREMAINE and placed in a hospital ....
>
> Mrs. Cox said Sunday afternoon that she talked with her husband Sunday morning at Port Arthur, Canada, by long distance telephone and that he suffered no ill effects from his harrowing experience.
>
> The GEORGE M. COX, making her first trip of the season, was en route to Port Arthur, Ont., from Chicago to pick up 250 Canadian residents and take them to the Century of Progress Exposition at the latter city. Thirty-two of the persons aboard on the out bound trip were passengers ....
>
> Plowing through a heavy fog, the steamer, with its passengers at dinner, struck an extended ledge of rock a short distance from Rock of Ages Lighthouse with such force that her engines and boilers were ripped loose. The impact threw the passengers to the salon floors and sent tables and chairs crashing against the walls.
>
> Keepers of the Rock of Ages Light said they saw the spars of the steamer above the low-hanging fog and made frantic but futile efforts to attract the vessel's attention with the siren. A few minutes after the vessel struck she had broken open and filled with water until her top decks were awash.
>
> Only the fact that the Lake was calm enabled the keepers of the light and the crew of the steamer to transfer everyone to small boats and rafts and avoid loss of life.

A description of the wreck was given by the 23-year-old ship's staff nurse, Adeline Keeling, who was taken to Port Arthur with Cox, the injured passengers and crew (New York Times May 29, 1933):

> "There was a heavy thud, followed by a series of crashes," said Miss Keeling. "The passengers were at dinner at the time. I saw a heavy buffet slide across the floor and crash into tables and a partition. I was in my stateroom and was thrown against a door and stunned. The stewardess, Beatrice Cote, helped me to my feet, and was herself knocked down in the second crash. She injured her back.
>
> "There was no panic, but the steamer listed heavily to port and the passengers and crew rushed to starboard. It was impossible to lower the starboard boats because of the list of the vessel, but the port boats were lowered and ferried us all to the lighthouse."

Capt. George Johnson, whose actions had been termed heroic in his hometown newspaper (Traverse City Record Eagle May 29, 1933), recounted the wreck events (Superior Evening Telegram May 29, 1933): "We hit a reef while going at a speed of 17 knots. The impact was severe, causing a large hole to be torn in her side. It listed to 90 degrees and the ship's stern submerged in about four minutes, I should judge." A similar quote of Johnson's appeared the next day in the Daily Mining Gazette (May 30, 1933) with one difference: the speed was given as 10 knots.

Although no casualties resulted from the wreck, some injuries were sustained by crew members. Beatrice Cote, a stewardess from Manistee, Michigan, suffered an injured back; John Gancarz, deckhand from Freesoil, Michigan, injured his legs, hand and shoulder. George Williams had a head injury that was a scalp wound. Alex Mack, from Portland, Maine, broke a leg and injured his hand (Superior Evening

Telegram May 29, 1933). Other reports indicate that Mack's injuries were severe burns, rather than a broken leg. George M. Cox himself was among the injured (Manistee News-Advocate May 29, 1933), but the inclusion of Cox on the injured list may have resulted from his accompanying the injured to the hospital. Other sources state that Gancarz' injuries were severe scalds (Fort William Daily Times Journal May 30, 1933).

Heroic deeds had been observed during the stranding and evacuation of COX: Rita Little refused her seat with the other women in the lifeboat and assisted Deck Mate M.L. Gilbert in loading three more lifeboats before leaving the deck. Alex Mack, with a broken leg, also gave up an early seat in the lifeboats and only left after all the women had been taken off the stricken vessel. Bar steward Zoeller tied a rope around himself and searched the ship to insure no passengers remained trapped (Manistee News Advocate May 29, 1933).

Departure from the stricken ship was orderly;the crew was apparently well disciplined. There was some confusion, but no panic after the crash. Members of the crew moved among the passengers and quieted their fears (Manistee News Advocate May 29, 1933). Wireless messages were immediately sent out and the radio was manned until the water quieted the transmitter. The ship was safely abandoned in 40 minutes under the direction of Capt. Johnson, who was the last to leave the ship (Traverse City Record Eagle May 29, 1933). The removal of 89 passengers and 32 crew from COX makes this one of the largest mass ship abandonments and rescues recorded in the history of Lake Superior.

Five life boats were lowered on the port side; the boats on the starboard side were not launched because of the extreme port list. The passengers were loaded into the ship's lifeboats and towed to Rock of Ages by lightkeeper John Soldenski's motor launch. The passengers took turns warming themselves in the limited quarters of the lighthouse, and they were served hot coffee by the wife of the lightkeeper (Cleveland News May 29, 1933).

The operational procedures of the U.S. Coast Guard at Portage Canal Station and aboard the cutter CRAWFORD offer some insight into the COX rescue operations. About 8:00 p.m. the Portage Station received the following telegram. from Port Arthur: "Steamer GEORGE M. COX aground on Rock of Ages. In bad shape. Want assistance" (Letter from F.C. Sollman, Officer in Charge, Portage Station to John Hanson, Bureau of Navigation and Steam.boat Inspection June 7, 1933). Within 10 minutes a lifeboat and crew left the station. The Portage crew arrived at the wreck site at 2:15 a.m. the morning of the 28th. All passengers and crew had been nemoved from the wreck and were safe on Rock of Ages.

The Portage crew transported 43 persons from the lighthouse to Washington Island hotel dock on Isle Royale and returned to Rock of Ages. Captain Johnson requested the removal of baggage from the wreck, and 71 bags, suitcases and other baggage items were taken aboard the lifeboat and transported to the lighthouse, arriving there at 8:40. Twenty crew members were transported from the lighthouse to CRAWFORD with some of the baggage, then 12 more of the COX crew were transported to Washington Harbor.

The Coast Guard cutter CRAWFORD received word of the wreck at its dock at Two Harbors at 6:10 p.m., May 27, from TREMAINE as it was transmitting a message to the Port Arthur radio station addressed to the Portage, Michigan Coast Guard Station. CRAWFORD left immediately making all due speed. During the trip the ship's log indicates that the speed was increased when additional weights were placed on the governor to increase the engine's revolutions. The officers of CRAWFORD assumed that human lives were at stake.

CRAWFORD arrived on site at 5:35 a.m., May 28, and anchored in 3 fathoms of water. Five minutes later the officer of the North Superior Coast Guard was aboard to brief the officers of CRAWFORD. Captain Johnson was consulted on the disposition of the passengers and crew. Johnson responded that he wanted them taken to Houghton, Michigan. The COX crew and passengers were loaded aboard, and the cutter proceeded to Washington Harbor to pick up the people who had been transferred there. The Coast Guard lifeboat from Grand Marais had engine trouble and was towed to the Singer Dock in Washington Harbor by CRAWFORD. The ship encountered dense fog on the way to the dock, finally arriving at 8:55 a.m. In an hour, all remaining people were loaded and CRAWFORD was underway to Houghton. The total aboard was recorded in the CRAWFORD log as 113 (Log of the U.S. Coast Guard Patrol Boat CRAWFORD May 27, 28, 1933).

Almost immediately, speculation and opinions regarding the crash were offered to the press. Captain John Hope Clark of ISLE ROYALE, COX's planned running mate, stated that COX had to cope with currents especially strong at that time of the year, in addition to fog conditions.

> It is said that the light at Rock of Ages reef is equipped with a theoretically efficient fog whistle, but it is located in a so-called "silent zone," so that even if the whistle is operating, it may not be heard more than two or three miles away (Manistee News Advocate May 29, 1933).

The area of Rock of Ages reef, where the wreck occurred, was generally known to be a particularly hazardous region. When the cutter CRAWFORD approached the reef on its rescue mission, the engines were slowed and the radio direction finder was used for navigation because the area was recognized as having a local magnetic attraction, so it was not advisable to rely on compass course for the last 15 miles approaching the light. In addition, because of the fog conditions, a double watch had been posted on the bow (Log of CRAWFORD, Sunday May 28, 1933).

Early reports indicated that COX's first officer was in charge when the wreck happened, but the captain had taken over and directed the evacuation of the ship (Traverse City Record Eagle May 29,1933). There had been praise for the officers of the sunken steamer (e.g., Detroit Free Press May 30, 1933), but there would also be many questions. A federal inquiry was convened to answer them.

The federal inquiry was held in Houghton and directed by Capt. John Hanson, steamboat inspector, and Alfred Knights, boiler and machinery inspector. Both men were from Marquette and represented the U.S. Bureau of Navigation. They would be joined by Capt. F.J. Meno of Detroit, supervisor of the eighth district. The inquiry convened May 30, 1933, the same day the stranded GEORGE M. COX was abandoned to the underwriters as a total loss (Daily Mining Gazette May 30, 1933).

The first witness called before the inquiry was Capt. Johnson, who testified that First Mate Arthur Kronk had changed the course he had set without his authority after the ship had cleared Portage Lake Ship Canal (Detroit Free Press May 31, 1933). Captain Johnson stated he set the course for Fort William at NW 1/4 N, which is the charted course from the canal to the Canadian port city. He then retired and left the first mate in charge. Johnson remained in his cabin until 5:00

p.m. when they encountered fog on a calm sea. The Daily Mining Gazette (May 30, 1933) carried the captain's testimony:

> "The sounding of the Rock of Ages fog siren was well determined," Captain Johnson said, "at 5:20 p.m., exactly one hour before it piled up on the reef. Continuing on a course one point north of the charted course, the vessel proceeded at a moderate speed until 6:10 p.m. when the fog siren on Rock of Ages became more distinct," the master testified.
>
> "Discovering that we were near abreast of the light, owing to a greater speed than I had anticipated, we received an alarm signal from the Rock of Ages lighthouse and immediately I put the wheel hard to starboard and steered west for eight minutes .... At 6:18, feeling assured we were at least two and one half miles westward of the lighthouse, I hauled slowly to the northwest in order to get a bearing on Rock of Ages Light. We struck at 6:20 p.m." Visibility at the time the COX hit the reef was about one-quarter of a mile or about 1,500 feet, according to Capt. Johnson, who said the boat's speed at that time was about 10 miles per hour.

The change of course was not the only problem attributed to Kronk in the testimony. Kronk was allegedly one of the first of the crew to get into a lifeboat after the wreck. "One witness said that Kronk set out with one woman in his boat, but that he was ordered back to the steamer and additional passengers were placed in the boat" (Detroit Free Press May 31, 1933).

Others substantiated the captain's recounting of the events. John Nelson, the wheelsman on duty when the vessel left the canal, and M.L. Gilbert, Jr. agreed with the captain's testimony. "Nelson stated that when the COX left the canal he was steering northwest one-quarter north, and about 55 minutes out from the canal he was directed to change the course to northwest one-half north. When he was asked who gave him that order, Nelson answered: 'Mr. Kronk'" (Detroit Free Press May 31, 1933).

First Officer Kronk was called to testify late in the day, and he had not finished by the time of adjournment at 9:15 that night. The inquiry reopened at 8:00 the next morning:

> The first mate admitted that the course had been changed from NW 1/4 N to NW 1/2 N after leaving the canal, but he had not been questioned regarding who was responsible for the change. He said that he sighted top of Rock of Ages lighthouse about 5:00, and the light bore NNW when first seen, and it appeared about three miles away.
>
> After sighting the light Kronk stated that he reported to the master, who took charge of navigation after that time. He said that the captain hauled to the west for about five minutes and then brought the ship back on a WNW course.
>
> Questioned by Captain Hanson regarding the lowering and manning of the life boats after the crash, Kronk admitted that the life boat of which he was in charge was the first over the deck, and that he was the first officer off the boat. The inquiry was adjourned at this point in the interrogation (Daily Mining Gazette May 30, 1933).

Some additional information on the course change appeared in another paper:

> Captain Johnson was again questioned Tuesday night [May 30] and said he asked Kronk about the change in course when he assumed command at 5 p.m.
>
> "I asked why he changed the course," the captain told the investigators, "and he replied that I had advised him to steer chart courses whenever possible to obtain the correctness of our compasses on all chart courses."

Johnson's testimony brought up the question of the accuracy of the compasses aboard COX and the influence of local deviations, two questions that concerned the investigators:

> Replying to this line of questioning, Capt. Johnson admitted that the GEORGE M. COX steered a good course over the entire route from Manistee to Chicago and north as far as Houghton. In the vicinity of Isle Royale, Captain Johnson said he believed there were some variations due to local magnetic disturbances, but when questioned admitted that he had not looked up the charted variations for that course on the map. First Mate Kronk said that in his opinion there was a one-eighth deviation to the west in the COX's compasses on a northerly course (Daily Mining Gazette May 30, 1933).

During the second day of the investigation (Wednesday May 31), Kronk maintained that he had remained at his post until the last, and that he assisted in lowering and loading lifeboats before leaving the ship and departing for shore with 17 men in his lifeboat (Detroit Free Press June 1, 1933). He also maintained that he did not change the course of COX while in command between the time they had left Portage Lake Ship Canal and the time he turned the ship over to Capt. Johnson (Daily Mining Gazette June 1, 1933).

Emotions were running high during the investigation. Kronk had gotten into an "impromptu fistic argument" with Capt. M.L. Gilbert, vice president and general manager of the Isle Royale Transit Co. The encounter took place in the lobby of the Douglass House Hotel, where the investigation was being held (Daily Mining Gazette June 1, 1933).

Later during the afternoon questioning, stress of the proceedings were reflected:

> While being re-questioned this afternoon, Mr. Kronk created some commotion when he broke down and cried, and, slamming his fist down on a desk, shouted that he was being "framed by a dirty bunch of crooks!" (Detroit Free Press June 1, 1933).

The findings of the COX investigation were not announced until July 8, 1933. The board found both Capt. Johnson and First Officer Kronk guilty of "reckless navigation in a fog and inattention to duty." Both men were stripped of their officer's papers by the U.S. Steamboat Inspection Service (Daily Mining Gazette July 9, 1933; Manistee News Advocate July 10, 1933). Because no time period was mentioned, presumably the revocation of their papers was permanent. The COX inquiry decision marked the second time Kronk had lost his papers; they had previously been suspended for 90 days for negligence in the loss of the freighter KIOWA in 1929 (Detroit Free Press June 2, 1933).

Salvage

GEORGE M. COX had been reconditioned at a cost of $80,000, and was valued at $150,000 when lost (Traverse City Record Eagle May 29, 1933). Other sources place the value of the vessel at $200,000 (Daily Mining Gazette May 30, 1933). The ship was declared a total loss; uninsured liability to the company was about $40,000 (Daily Mining Gazette May 30, 1933).

Beginning the day after the wreck, groups of sightseers cruised out to the wreck, and many photographs were taken of the stranded ship, its bow poised 110 feet in the air. Some furnishings and other items were removed from the wreck while it could still be boarded. Six high-backed oak chairs ended up in the Douglass House of Houghton, the same location where the wreck investigation took place (Daily Mining Gazette April 26, 1980). The chairs had been removed by members of the Hancock Naval Reserves and were placed in the Naval Armory until the building was taken over by Michigan Tech. in 1980 (Daily Mining Gazette July 22, 1980). These chairs are now part of the museum collection of Isle Royale National Park.

Four men were left on guard at the site until the company decided the disposition of the wreck (Manistee News Advocate May 29, 1933). Records of professional salvage efforts are scanty. The salvage tug STRATHBUOY visited the site on the 29th or 30th and reported: "the bottom of the steamer was torn out, the engines jolted from their moorings and the vessel is listing toward deep water, with the likelihood of sinking in the first heavy storm" (New York Times May 29, 1933). The salvage barge STRATHMORE may have also operated on site.

Some salvage was carried out with its recovered materials being stored in the Booth Fisheries Dock at Port Arthur. On September 5, 1933, the running mate of COX, ISLE ROYALE, cleared Fort William on the last run of its season loaded with the equipment salvaged from COX (Canadian Railway and Marine World Oct. 1933:495).

Three of the men who were left to guard the site were returned to Houghton on June 2 to testify in the federal inquiry. A seaplane was chartered to make the run to the island and retrieve the crewmen. Their reports indicate they were undertaking some light salvage operations while guarding the wreck. They reported that the compass and charts had been recovered along with some gas masks. The plane also brought 400 pounds of baggage from the island with the crewmen (Daily Mining Gazette June 2, 1933). It is most likely the luggage had been recovered since the departure of CRAWFORD, and was the result of the guards salvage activity.

The wreck was abandoned to the underwriters on June 6, 1933 (Daily Mining Gazette June 6, 1933). The Enrollment and License for the Coasting and Foreign Trade (number 31) for COX was surrendered in Chicago on July 18, 1933. There was a May 17 endorsement of a preferred mortgage for a total of $95,000 due to mature June 1, 1933 (National Archives Record Group 41).

GEORGE M. COX remained in position on the reef until early July. The strong box, reportedly containing more than $200,000 in stocks, bonds, money and jewelry, was salvaged by two Portage Entry men, Arthur and Emil Tormala. The safe was raised from 35 feet of water and taken to Marquette, Michigan July 11 (Daily Mining Gazette July 11, 1933). They reported the ship was breaking up fast and had already broken in two; the stern was sinking.

The advent of SCUBA diving 25 years later brought heavy attrition of artifacts from the wrecksite. The wreck sites of Isle Royale became diving attractions in the 1960s and '70s. Local divers held formal artifact collecting expeditions in the mid-1970s. An example, relating to COX, is the Minnesota School of Diving pamphlet telling of their recoveries in August of 1972:

> Thirty-nine years after her descent, a team of twenty sport divers from Minnesota School of Diving explored the wreckage [of GEORGE M. COX]. They dove in 1 1/2 to 2 hour intervals three times a day, almost every week-end in August of 1972. Found were tea kettles, silverware, dishes, port holes, running lights and a multitude of other souvenirs ... all evidence of the hard crash that night in 1933 on the Rock of Ages Reef.

Most portable artifacts have been removed from the site. Despite the losses of portable artifacts, COX is still a primary diving attraction at Isle Royale and was rated as the second most visited diving site at Isle Royale National Park (Stinson 1980:15).

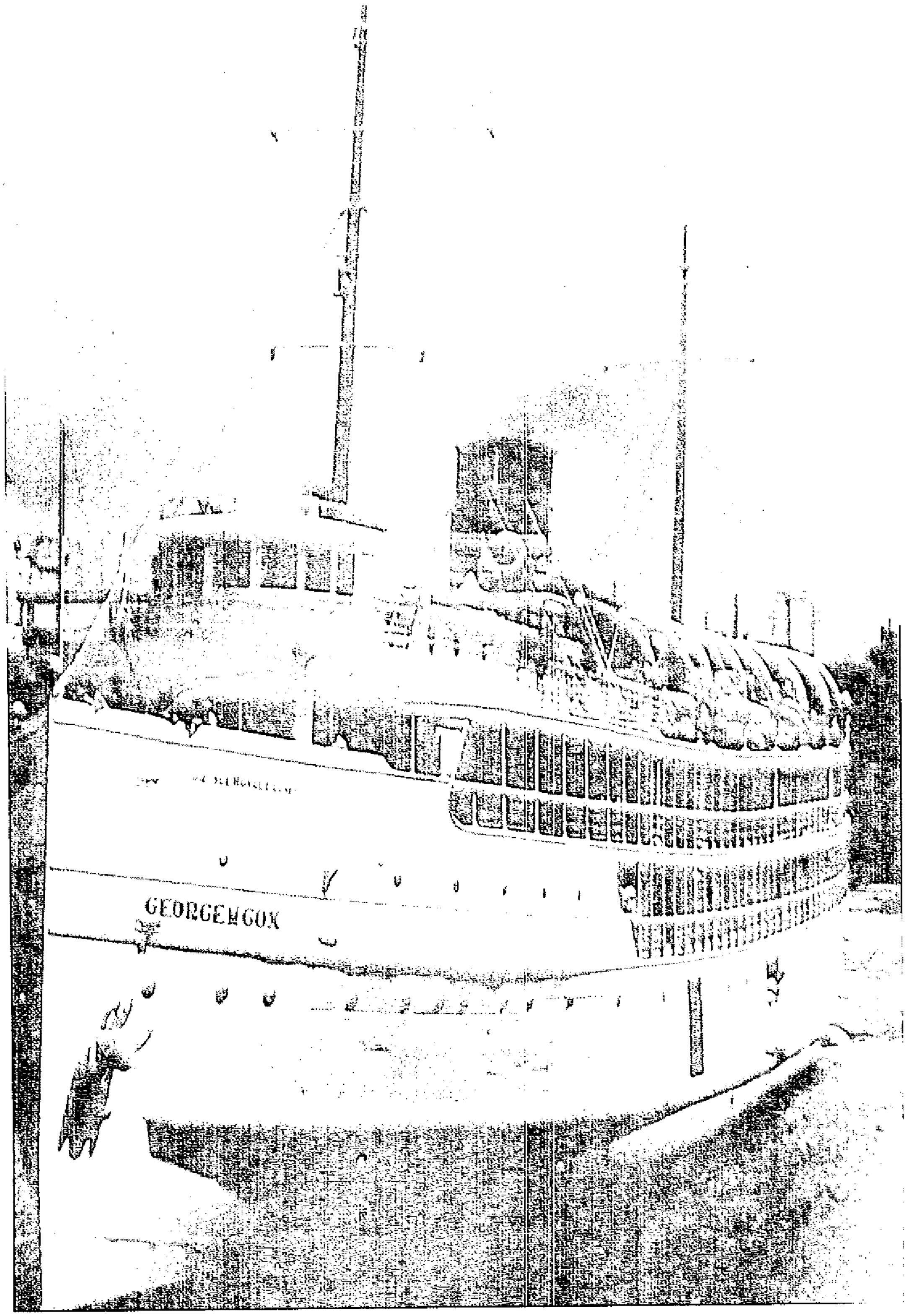


Fig. 4.17. GEORGE M. COX after the 1933 refit for the new Isle Royale Line. Appearance at the time of loss. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

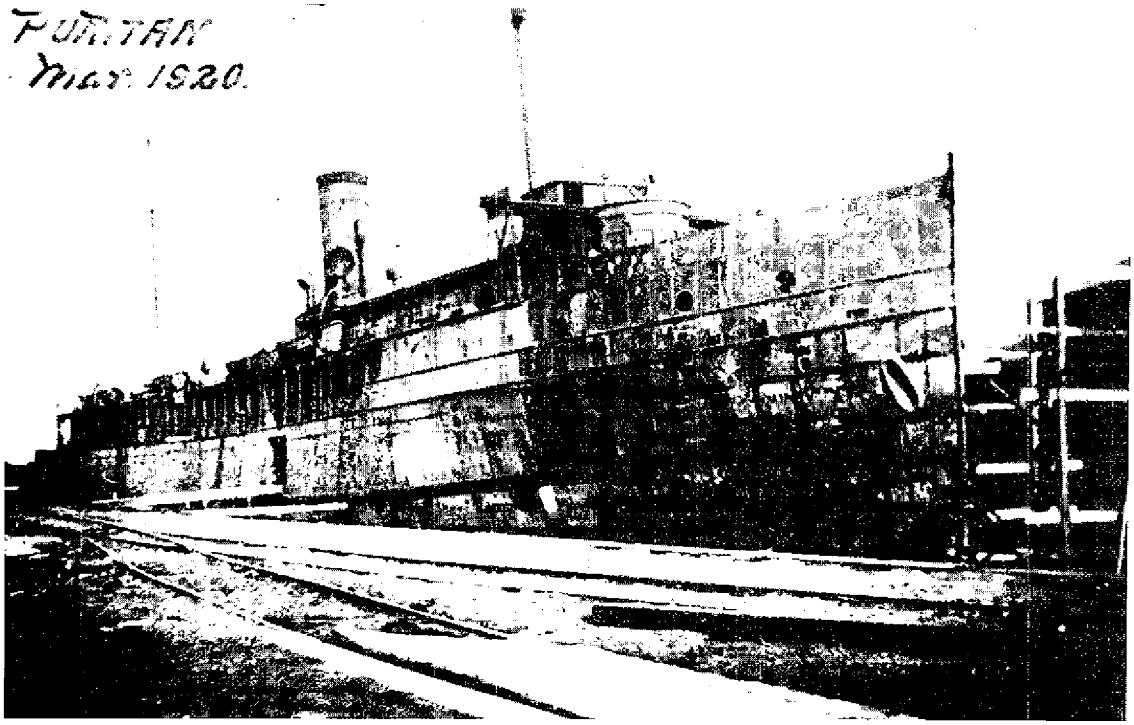


Fig. 4.18. GEORGE M. COX as PURITAN in March 1920 after service in World War I. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

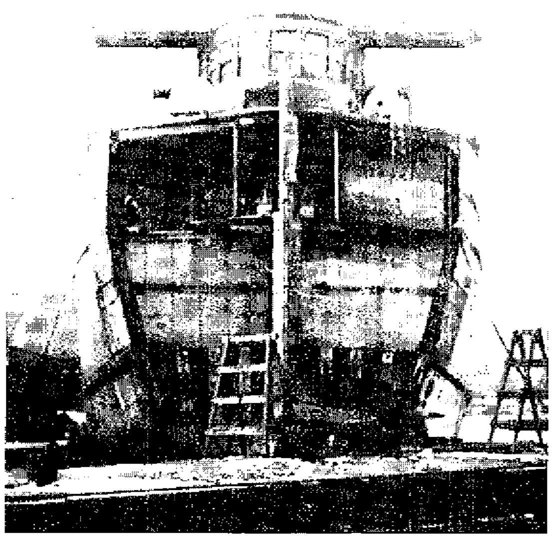


Fig. 4.19. PURITAN with the temporary bulkhead in place to allow passage through canals for ocean service in World War I. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

Fig. 4.20. GEORGE M. COX hard aground at Rock of Ages, Isle Royale ca. May 27, 1933. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

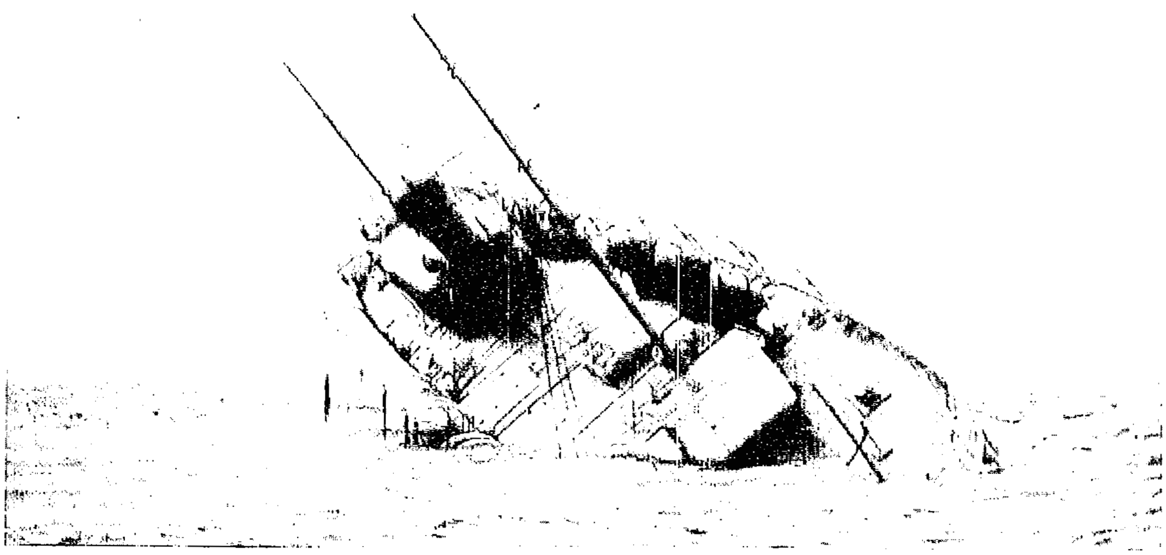


Fig. 4.21. Stern view of COX aground at Rock of Ages. Note starboard lifeboats in place. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

CHESTER A. CONGDON: HISTORY

Construction

CHESTER A. CONGDON was built as SALT LAKE CITY for the Holmes Steamship Company of Cleveland, then managed by W.A. Hawgood. The new steamer was of the 10,000-ton capacity class and measured 532 feet in length, 56 feet in beam with a depth of 26 feet. The gross registered tonnage was 6371.49, and net tonnage was 4,843. While under construction, the Chicago Ship Building Company numbered the hull 74. The steel bulk freighter had 32 telescoping hatches 9 feet wide, on 12-ft. centers, with three compartments of 3,700, 3,100 and 3,400 tons, for a total capacity of 10,200 tons. The ship carried a crew estimated at 19.

The Chicago Ship Building Company departed from its tradition of launching its vessels on Saturdays when SALT LAKE CITY slid down the ways; it splashed into the Calumet River on Thursday, August 29, 1907. The new bulk freighter was given U.S. Registry Number 204526 when it was enrolled September 11, in Cleveland.

The huge, steel bulk freighter was powered by a triple-expansion engine with cylinders of 23.5, 38 and 63 inches on a 42-inch stroke. The engine received its steam from two induced-draft Scotch boilers 14 feet 6 inches x 11 feet 6 inches. Both the engine and boilers were built by the American Shipbuilding Company of Cleveland. The engine produced 1765 indicated horsepower.

Operational History

The first owner of SALT LAKE CITY was the company that had it built: the Holmes Steamship Company of Cleveland, Ohio. The Holmes Company operated the boat until 1911, when it was sold to the Acme Transit Company of Ohio, managed by H.B. Hawgood (May 13, 1911 Certificate of Enrollment).

On February 2, 1912, SALT LAKE CITY ownership was transferred to the Continental Steamship Company of Duluth, G.A. Tomlinson, President. A change of name to CHESTER A. CONGDON was registered by D.W. Stocking, Secretary of the Continental Steamship Company, on April 1, 1912. Chester A. Congdon was a prominent Duluth lawyer and financier who had made a fortune in mining and grain interests.

On August 10, 1912, CHESTER A. CONGDON ran aground while waiting for fog to clear. The ship drifted onto a shoal about 4 miles north of Cana Island on Lake Michigan, and damaged several plates (Lake Carriers Association 1913:18; 1912:9).

CONGDON ran aground again in October 1915. The ship was drawing 19 feet 6 inches of water, and it rubbed both bilges hard while going through Grosse Pointe channel during a period of low water. The grounding sheared several rivets, which opened some seams and the vessel began leaking (Bulletin of Lake Carriers Association Nov. 1915:62; May 1915:18).

Wreck Event

The newspaper that contained the first report of the wreck of CHESTER A. CONGDON carried the news on page 10; the headlines and front pages that day were devoted to the news that World War I had ended (Fort William Daily Times Journal Nov. 7, 1918).

The voyage that would end with one of the most costly marine disasters on the Lakes began on November 6, 1918. At 2:28 a.m. CONGDON left Fort William, Ontario, downbound to Port McNicoll with a cargo of 380,000 bushels of wheat (Lake Carriers Association 1918:142). Other sources list the cargo as 400,000 bushels (Fort William Daily Times Journal Nov. 12, 1918), and 350,000 bushels (Cleveland Plain Dealer, Nov. 8, 1918). The grain had been loaded at the Ogilvie and Pacific elevators (Fort William Daily Times Journal Nov. 12, 1918). CONGDON had done a 1-day turnaround. The ship arrived on November 5 and cleared downbound on the 6th (Duluth News Tribune Nov. 6, 1918).

CONGDON proceeded a little way past Thunder Cape, where the ship encountered a heavy sea whipped up by a southwest gale. At 4:00 a.m., Capt. Autterson turned his ship and retreated 7 or 8 miles to calmer water, anchoring until 10:15 a.m. By then the wind had abated, although the sea was still running. The captain ventured out again, but after passing Thunder Cape, a thick fog set in. A course was set for Passage Island at 10:40 a.m., and the ship held a speed of 9 knots. The captain's intention was to run for 2.5 hours at that speed and stop if the fog held (Lake Carriers Association 1918:142-143). "I figured on stopping on account of fog until we could locate something. At 8 minutes after 1:00 in the afternoon she fetched up--grounded (from the captain's account, Fort William Daily Times Journal, Nov. 12, 1918).

The ship's officers had not heard the Passage Island fog signal before they struck the southerly reef of Canoe Rocks (Lake Carriers Association 1918:143). Captain Autterson described the events that followed:

> We immediately lowered boats and sent one boat over to Passage Island, about 7 miles, to try and secure some assistance from the lighthouse keeper, if possible. We were on Canoe Rocks. Then the second mate took another boat, a fisherman's launch, from Canoe Rocks into Fort William. He had two fishermen with him. The launch became disabled, and they did not reach Fort William until 6:00 Thursday morning (Nov. 7) (Fort William Daily Times Journal Nov. 12, 1918).

The second mate brought the first news of the wreck to Fort William. Apparently, CONGDON had no wireless aboard, or it was disabled when the ship struck. The historical accounts indicate no messages were transmitted from CONGDON.

As soon as word of the disaster reached Fort William, J. Wolvin, manager of the Canadian Towing and Wrecking Company dispatched the wrecking barge EMPIRE and the tug A.B. CONMEE to the site. The tug SARNIA, with additional equipment, was being prepared to follow soon (Fort William Daily Times Journal, Nov. 7, 1918).

First reports of damage to the stricken ship indicated that the vessel, although damaged, might be saved. "Her forepeak, Nos. 1 and 2 starboard tanks and No. 1 port tank are full of water" (Cleveland Plain Dealer, Nov. 8, 1918). It was hoped that lightering would be all that was necessary to refloat the vessel. The lightered grain was to be placed aboard the barge CRETE (Cleveland Plain Dealer Nov. 9, 1918).

The most serious obstacle to refloating CONGDON would prove to be the weather. When the lightering tugs and barges initially left for the site, the weather had been "calm and thick" (Cleveland Plain Dealer Nov. 8, 1918), but this did not last long. Two days later, by Friday, strong winds had blown up. The crew was removed from the wreck sometime that day, November 8, and was placed aboard the barge EMPIRE. As the wind blew from the southeast at gale force, reaching a speed of 55 miles per hour (Lake Carriers Association 1918:143, Cleveland Plain Dealer Nov. 10, 1918), the crew was sheltered on the barge in protected waters at Isle Royale (Port Arthur Daily Chronicle Nov. 8, 1918).

No loss of life resulted from the wreck. One serious injury, however, did occur before the lightering operations were concluded, due to the fierce gale that drove the salvage vessels and crew to shelter at Isle Royale. Wireless operator Thomas Ives of the barge EMPIRE was transported to the hospital in Port Arthur with a mangled thigh, which was smashed when he caught his leg in a hoisting gear. He was taken to port on one of the attending tugs (Port Arthur Daily Chronicle Nov. 7, 1918).

The messages of the wreck that reached land on November 9 relayed the news that CONGDON had broken in two, and that the stern had sunk in deep water. The tugs had stood by as long as possible, but there was nothing they could do, although they stayed at the site until heavy seas were breaking over the wreck (Fort William Daily Times Journal Nov. 9, 1918). The steamer had broken in two aft of the No. 6 hatch sometime Friday night (Nov. 8th). The forward end remained on the reef in 20 feet of water, but was in very bad condition (Fort William Daily Times Journal Nov. 12, 1918; Lake Carriers Association 1918:143; Cleveland Plain Dealer Nov. 10, 1918). The 36-man crew of CONGDON returned to Fort William, arriving on the tug CONMEE Saturday morning, November 9 (Fort William Daily Times Journal Nov. 12, 1918). The captain, along with Superintendent Close who had arrived from Duluth to investigate the accident, both visited the wreck on Sunday morning and salvaged personal effects from the bow section.

The ship was declared a total loss. The newspapers noted that four-fifths of the cargo would be lost (Fort William Daily Times Journal Nov. 12, 1918). The crew arrived in port in time to participate in the Nov. 11, armistice celebrations. The survivors of the CONGDON wreck paraded in the streets carrying the ship's flag, and a large crowd fell in behind them (Fort William Daily Times Journal Nov. 11, 1918). "We expected to be somewhere on Lake Huron today," said one of the crew, "instead of back again at Fort William" (Fort William Daily Times Journal Nov. 12, 1918).

The wreck of CHESTER A. CONGDON was a tremendous financial loss. When declared a constructive total loss, officials placed the value at more than $1.5 million. Although the owners carried insurance of $365,000 on the hull and $369,400 in disbursements, the wheat cargo alone at $2.35 per bushel was worth $893,000 (Lake Carriers Association 1918:143). Contemporary accounts labeled CONGDON the largest loss ever sustained on the Great Lakes, surpassing the loss of HENRY B. SMITH, wrecked in 1913 (Lake Carriers Association 1918:138; Canadian Railway and Marine World 1918:567; Cleveland Plain Dealer Nov. 10, 1918).

CONGDON's cargo of wheat had been owned by the Wheat Export Company (Canadian Railway and Marine World 1918:567). The lightering operations were only able to remove about one-fifth of the cargo, some 50,000 to 60,000 bushels. The amount remaining was described in the Fort William Daily Times Journal (Nov. 12, 1918):

> What it means in wheat--four-fifths of the whole cargo of 400,000 bushels is unsalvageable, meaning a total loss of 320,000 bushels. In money--at $2.24 a bushel, $716,000. In flour--net weight, 97,950

barrels, or 195,900 bags. Made into number 1 pure white flour, allowing 33 percent shrinkage, 100 pounds of wheat equalling about 66 pounds of pure white flour, this four-fifths lost cargo represents 79,200 bushels, or 158,400 bags with a retail flour value of $918,720. In bread--number of standard loaves that could be made from this amount of wheat, 14,139,200 loaves. Allowing 9 inches as the length of a standard loaf of bread, the lost wheat on the CONGDON, if converted into loaves, would reach 6,025.75 miles, or more than twice the distance from Montreal to Vancouver. Computing that one person can subsist on a loaf of bread a day, this amount would be enough to feed the present population of the Dominion for two whole days, or afford sufficient (loaves) for one meal for the whole of the population of Great Britain and Ireland.

Salvage

John Bell, an agent for the Great Lakes Transportation Company, and who investigated other Isle Royale wrecks (MONARCH and GLENLYON), announced on November 29, 1918, that James Playfair, apparently a private investor, had purchased CONGDON and intended to raise the wreck in the spring (Lake Carriers' Association 1918:143).

By late November, the bow was reported in 50 feet of water (Fort William Daily Times Journal Nov. 29, 1918). The Lake Carriers Association stated that recoveries of forward-end equipment had already been made (1918:142-143). Playfair reportedly paid $10,000 for the wreck, outbidding U. Wolvin, who had done the original salvage work (Port Arthur News Chronicle Dec. 13, 1918). This same report said that when Playfair's crew arrived at the wreck site (presumably in December), "they found that it had completely disappeared, having washed off the rock on which it rested."

CHESTER A. CONGDON was one of 45 steel and iron vessels that became total losses on the Great Lakes between 1902 and 1918. CONGDON was the largest of those lost during that time. In 1918 alone, the year of CONGDON's demise, a total of 21 vessels was lost from all causes in the Great Lakes. There were 10 wooden steamers, 1 steel bulk freighter (CONGDON), 6 barges, the forward end of 1 steel passenger steamer, the forward end of a steel bulk freighter and 2 new mine sweepers belonging to the French government lost that year (Lake Carriers Association 1918:141).

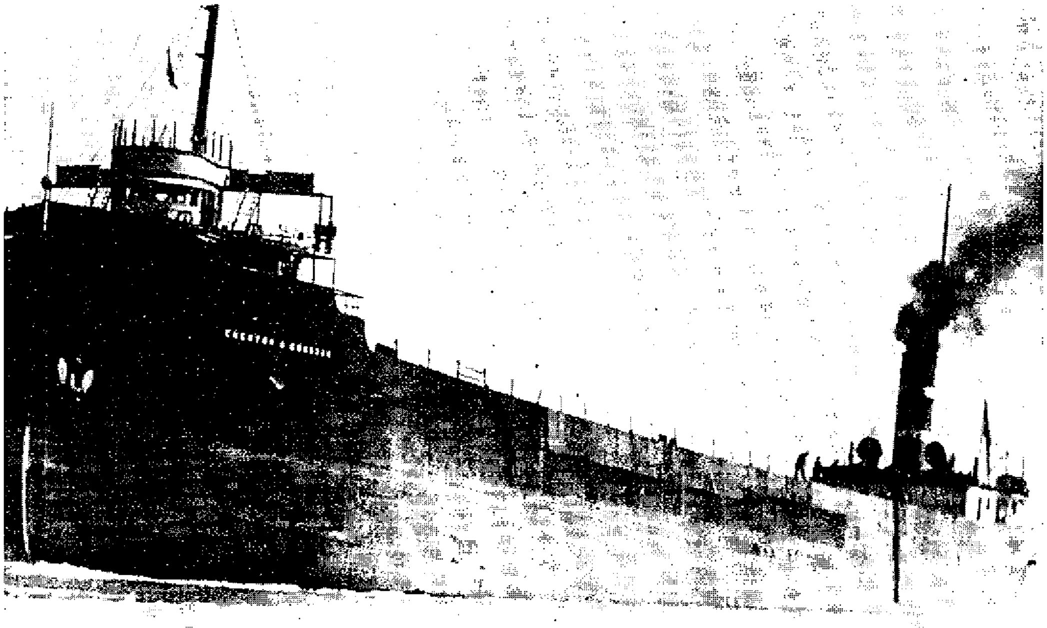


Fig. 4.22. 532-foot long bulk freighter CHESTER A. CONGDON as it appeared at the time of loss in 1918. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

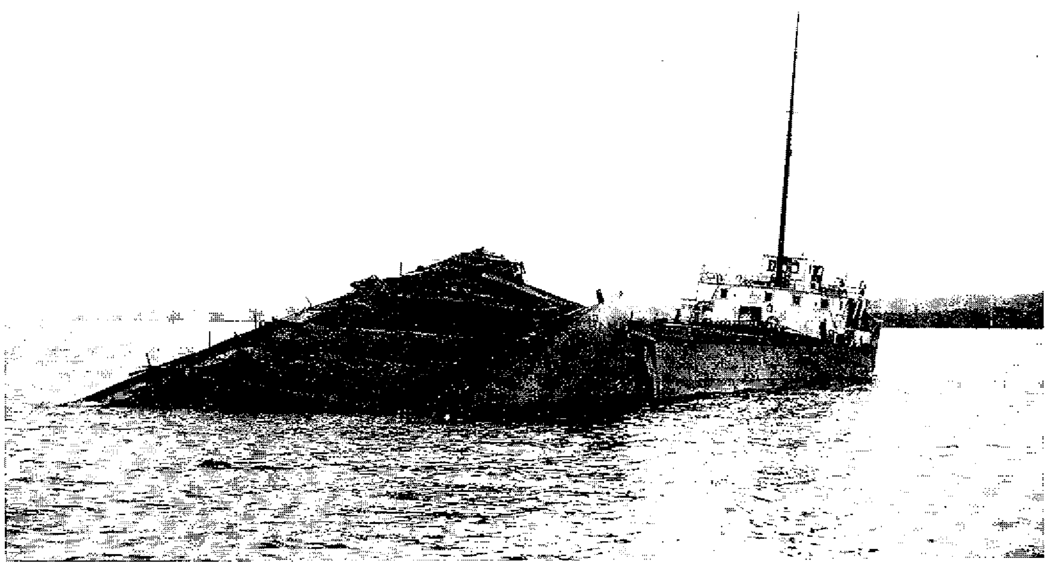


Fig. 4.23. CHESTER A. CONGDON aground at Canoe Rocks, Isle Royale November 1918. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

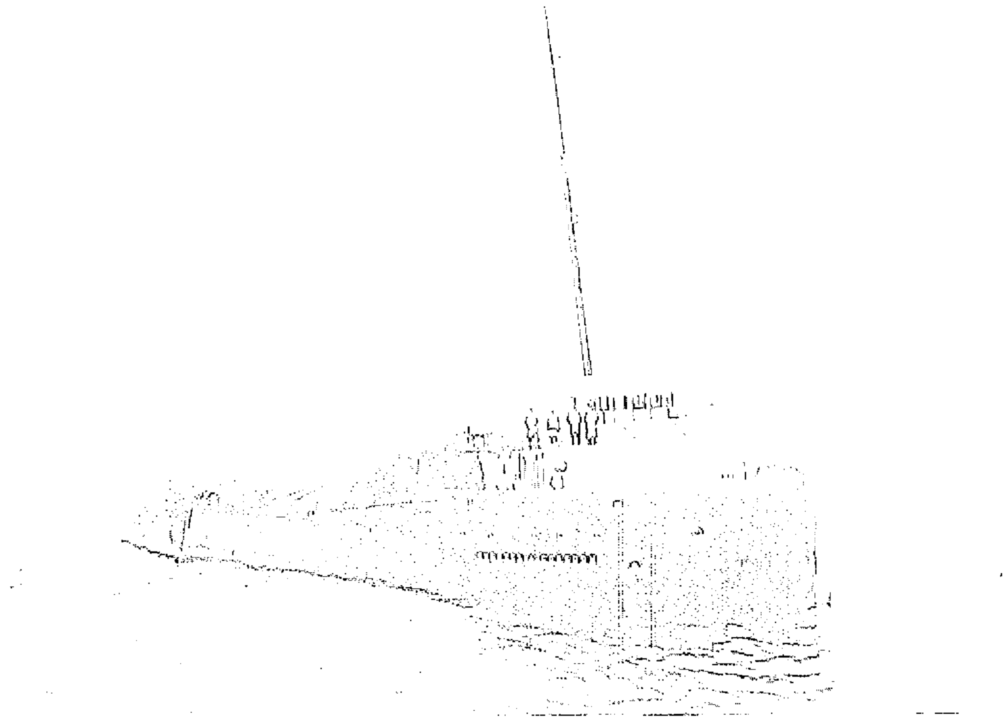


Fig. 4.24. CHESTER A. CONGDON aground. View is from the bow showing the break in the hull aft of the Number 6 hatch. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

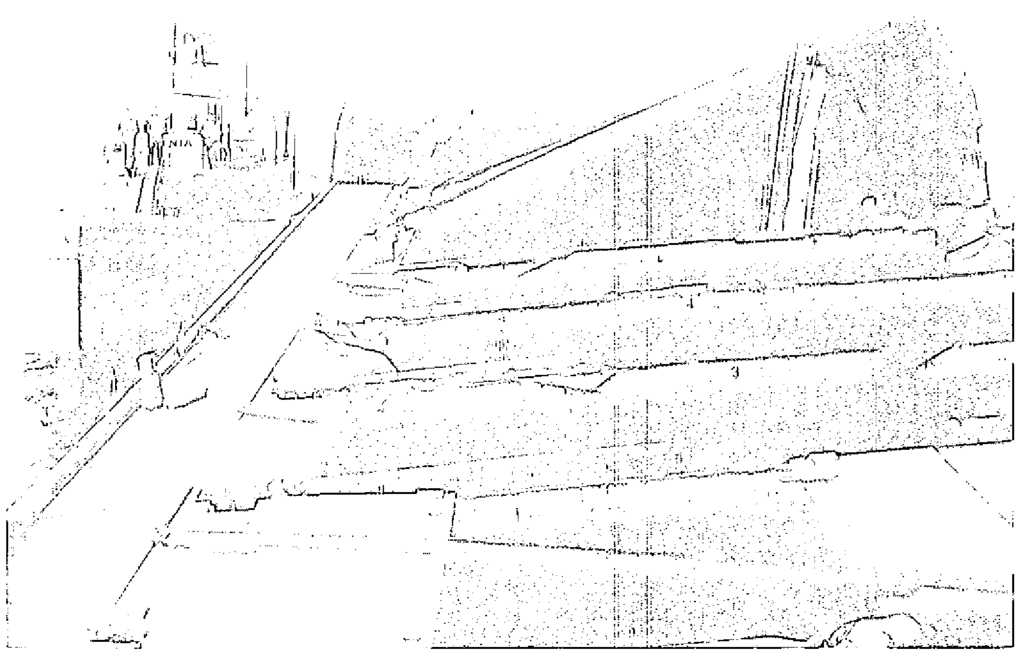


Fig. 4.25. View from the deck of the grounded CHESTER A. CONGDON. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

EMPEROR: HISTORY

Construction

When the steel bulk freighter EMPEROR was launched on December 17, 1910 (Port Arthur Daily News April 8, 1911), it was the largest ship ever built in Canada (Duluth News Tribune April 9, 1911). It was built as hull number 28 by the Collingwood Shipbuilding Co. of Collingwood, Ontario, for James Playfair's company, the Inland Lines Ltd. of Midland, Ontario. Playfair would eventually build up a substantial fleet of Lakes carriers, and EMPEROR was his first large vessel. Evidently Playfair had a penchant for giving his ships names that related to royalty, for in later years he would own vessels with names like EMPRESS OF MIDLAND, EMPRESS OF FORT WILLIAM and MIDLAND KING (Greenwood 1978:53).

The length of EMPEROR was 525 feet, breadth 56.1 feet, and depth 27 feet. Molded depth was 31 feet and the draft could go as deep as 27 feet. The gross tonnage was 7,031 and the registered tonnage was 4,641. The original registry number assigned to the vessel at its home port of Midland was 126,654. The Transcript of Register states EMPEROR had one deck, two masts, was schooner-rigged with a plumb bow and elliptical stern.

The new ship was built of steel and designed on the arch-and-web frame system of construction to create an unobstructed cargo hold under the 30 hatches. Each of the hatches was 9x36 feet wide and placed on 12-foot centers. There was an ore chute at each hatchway (Railway and Marine World Jan. 1911:89). The ship had 11 bulkheads; the engine room was 67 feet long.

The hull was equipped with 7 side-ballast and water-bottom tanks with a capacity of 5,021 tons (Transcript of Register). The tanks were directly connected with 7" steel suction pipes. A combination header connected to sea valves and ballast pump allowed the ship to rapidly take on or discharge ballast water. There was no separation between the side and bottom tanks.

The pilothouse, captain's and mates' quarters were forward; boilers and engine were aft with the crew's quarters. Between the forward and aft superstructures, the deck was clear, free of spars and other obstructions in order to allow rapid loading and unloading of its bulk ore cargo (Canadian Railway and Marine World Feb. 1911:188).

EMPEROR was powered by an inverted, triple-expansion steam engine built by the Collingwood Shipbuilding Company. The engine had cylinders of 23, 38.5 and 63 inches on a 42-inch stroke, and received steam at 180 pounds of pressure from two Scotch boilers 15.5 feet in diameter and 12 feet in length. The engine produced an indicated horsepower of 1,500 (Transcript of Register) at 82 revolutions per minute. Registered nominal speed was 10 knots. By the time the vessel sank, its normal speed loaded was 11 knots.

The last recorded major hull modifications were done in 1944. The Canada Steamship Lines Company installed new side tanks and tank tops at a cost of $140,000 (Toronto Globe and Mail June 5, 1947).

Operational History

EMPEROR was launched December 17, 1910, but was not ready to go into commission until April 1911 (Port Arthur Daily News April 8, 1911). By the time the ship was ready for its first trip, the captain selected was G.W. Pearson, and G. Smith was chosen to be the chief engineer for the season (Canadian Railway and Marine World March 1911:283).

The huge bulk carrier's first season commenced with a major incident. The ship broke its main shaft in Thunder Bay, Lake Huron, and was towed to Detour, Michigan (Canadian Railway and Marine World June 1911:573; Port Arthur Daily News May 26, 1911).

The broken shaft on the first trip out was not the most serious mishap to befall EMPEROR during its first season. While anchoring in the Canadian canal at Sault Ste. Marie, the ship rode over its anchor, causing it to tear a hole in the bow. The freighter sank the few feet to the bottom blocking the channel. It was released, and after temporary repairs were made, proceeded on to Midland, Ontario (Canadian Railway and Marine World Nov. 1911:1085).

A court found the canal employees to blame for ordering the flooding of the lock without inquiring if the vessel was ready. The court stated it believed that it was customary for the master of a vessel to sound one blast of the whistle as a signal to the canal authorities to begin flooding. Although the officers were exonerated, the responsibility was placed on the watchman on board who "happened to be a deckhand and, therefore, irresponsible" (Canadian Railway and Marine World Dec. 1911:1187). The court added that it believed it necessary for masters of all vessels to have copies of the regulations governing the operation of locks and canals.

In May 1916, James Playfair sold EMPEROR to the Canada Steamship Lines Ltd. of Montreal, Quebec. Playfair was listed as the sole owner of the 64 shares of the ship (Transcript of Register).

Another incident occurred October 29, 1926, when EMPEROR was grounded on Major Shoal near Mackinaw City, Michigan. The ship was released unharmed at 4:00 that afternoon after jettisoning 900 tons of ore (Detroit Free Press Oct. 27, 1926). It is not known how EMPEROR dumped the ore.

The 1926 ore season closed November 17. The season had been the busiest on record for the industry at Hamilton, Ontario, with an average of 10 ore carriers a month unloading at the docks of the Steel Company of Canada. The last ship of the season to bring down a cargo that season was EMPEROR (Detroit Free Press Nov. 20, 1926).

In 1936, EMPEROR lost a rudder (Toronto Evening Telegram June 4, 1947). A man was washed overboard at the same time. EMPEROR ran aground in 1937 off Bronte, on Lake Ontario, and was soon released (Toronto Evening Telegram June 4, 1947.

Wreck Event

EMPEROR struck Canoe Rocks off Isle Royale June 4, 1947 and sank in about 30 minutes. Three officers and nine crew were lost. The following account was developed from the official investigation of the disaster conducted by Canadian officials on June 6 and July 2 and 3, 1947:

EMPEROR had brought up a load of coal and unloaded at the coal docks at Ft. William. The freighter had immediately moved from the coal docks to the Port Arthur Iron Ore Dock to load ore. The loading of ore took six to seven hours. The first mate had supervised the loading and took the watch after they cleared the breakwall.

The doomed ship was laden with 10,429 tons of bulk iron ore (removed from the Steep Rock Mine) stowed in its five holds when she cleared Port Arthur at 10:55 p.m., June 3, downbound for Ashtabula, Ohio. The ship's draft was 21 feet 3 inches forward and 21 feet 9 inches aft.

The steamer was in seaworthy condition and well-equipped with suitable charts and sailing directions for the intended voyage. EMPEROR was also carrying a gyro compass, echo meter, sounding machine, ship-to-ship and ship-to-shore telephone and the "latest modern type of Marconi direction-finding equipment," in addition to the usual compasses and other equipment. EMPEROR, however, did not carry a full crew. There was no third mate.

The weather was good, the wind light and visibility excellent. These favorable conditions held for the short voyage. The navigation lights of Passage Light and BLake Point should have been clearly visible. Passage Island Light should have been visible from Trowbridge Light outside Thunder Cape, and Blake Point Light should have been visible for at least an hour before the wreck occurred.

The watch sequence established that Capt. Eldon Walkinshaw had the watch until midnight when the first mate, James Morrey, took over. He had the watch from midnight to 6:00 a.m., and spent that time seated in a chair in the front of the wheelhouse. Evidence brought out that Morrey was in charge of loading the vessel in port before departure during most of the 6 hours he normally would have been off duty and, as a result, was probably overtired during his watch and fell asleep.

According to the testimony of J. Leonard, wheelsman, who was on duty the watch before the accident, the courses were plotted by the first mate at Thunder Cape. The course steered from Welcome Islands to Thunder Cape was 138 degrees true with a 2 degree alteration to pass the steamer BATTLEFORD. Leonard, who was inexperienced in the upper Lake region (this was his first time steering downbound from the Lakehead), believed the course was altered to 98 degrees true abreast of Trowbridge light. The mate did not take a four-point bearing, a bearing on the light, nor did he use the radio beacon on Passage Light. Leonard went off watch at 4:00 and stated Passage Island Light was 10^{o} off the port bow. He turned the wheel over to J. Prokup. The mate did not check the course at the watch change.

There was no record of the ship's course until it passed Welcome Island at the mouth of Thunder Bay. At Thunder Cape Light, the normal downbound course should have been set to 98 degrees true; however, the court determined that the course was not set until the ship was abreast of Trowbridge Light, some 3 miles beyond Thunder Cape Light.

EMPEROR struck Canoe Rocks shortly before 4:15 a.m. According to various accounts, the ship stayed afloat from 20 to 35 minutes.

By the time the first reports of the wreck appeared in the newspapers the survivors were already in Fort William, having been rescued by the U.S. Coast Guard crew aboard the 125-foot, 250-ton cutter KIMBALL, under the command of Lt. C.R. Clark. KIMBALL had been in the vicinity of Isle Royale repairing navigation lights, and was headed to the Coast Guard base at Cleveland by way of Canoe Rocks when the distress message from EMPEROR was intercepted. It took them about 35 minutes to reach the wreck (Houghton Daily Mining Gazette June 4, 1947).

KIMBALL picked up 21 survivors and the body of the first cook, Evelyn Shultz, of Owen Sound, Ontario. The survivors were brought to the Fort William City Dock on the Kaministiquia River at 8:30 a.m. They were taken from there to the Salvation Army Hostel. Some of the survivors moved to the Royal Edward Hotel. By the evening of the 5th, all would be residing there with Canada Steamship Lines picking up the bill (Fort William Daily Times Journal June 6, 1947). The company gave each wreck survivor $100 for clothes and essentials. The survivors were transported to EMPEROR's downbound destination aboard a Canadian Pacific Railway sleeping car provided by Canada Steamship Lines.

Soon after the cutter arrived, the survivors began to relate stories of their grim struggle. There had been no panic after the ship struck. Eleven of the crew were still missing, including the captain, who was last seen on the bridge of his wrecked ship (Winnipeg Free Press June 4, 1947).

Two lifeboats were launched, one from each side of the ship, but both ran into difficulties. The one on the starboard side lost a bilge plug, and when the 10 sailors aboard were rescued, they were knee-deep in water. The port lifeboat pulled away from the wreck but was sucked under by the ship when it went down. Four men were clinging to it when KIMBALL arrived. The suction from the sinking ship also pulled crew members below the icy waters—some said they had been drawn down 30 to 40 feet as the freighter sank. Second Mate Peter Craven of Port McNicoll, Ontario said he was pulled under twice by the suction (Winnipeg Free Press June 4, 1947).

Seven men were rowed to safety on Canoe Rocks by the starboard lifeboat that returned to pick up other survivors. the men on the rocks were taken off by a motorboat launched from KIMBALL. Two men, suffering from shock and exposure, had to be carried aboard the cutter (Port Arthur News Chronicle June 4, 1947; Montreal Gazette June 5, 1947).

Exposure to the waters of Lake Superior is serious at any time during the year. On the day the wreck occurred, there was little relief for those lucky enough to get out of the water because the air temperature read in the mid-30s on that "summer" day. In fact, it was the coldest June 4 reading in Michigan's history (Houghton Daily Mining Gazette June 4, 1947).

> It was lucky that we were on the west side of Isle Royale," Lieutenant Clark of KIMBALL said. "We had intended to go along the east side. We received the call about 4:00 a.m. and we were underway at 4:17, and were picking up survivors at 4:50. I was told by one of the survivors that suction took one of the lifeboats under. The two halves of the EMPEROR must have sunk in a hurry (Port Arthur News Chronicle June 4, 1947).

When KIMBALL left the site with the survivors, the only trace of the ship above the water was the mast jutting some 15 feet above (Minneapolis Star June 4, 1947). However, pictures taken after the wreck show the top of the pilothouse was exposed.

Chief Engineer Merritt Dedman, a 63-year-old veteran of 32 years on the Great Lakes, was awakened when the ship struck and told the following story to the press:

> I didn't have to have anyone tell me something seriously was wrong. I threw on my clothes and went down to the engine room. I listened as I ran down a passage. The engine started to race and I knew then that the propeller was gone. It was a case of waiting with our fingers crossed until the captain gave the order to abandon ship. He wasn't long; about 10 minutes, I would say. (Dedman got into the starboard lifeboat and found himself up to his knees in water.) We picked up several men in the water and cruised around until we were picked up by the U.S. Coast Guard Cutter (Port Arthur News Chronicle June 4, 1947).

Peter Craven, the second mate, related his experiences during the sinking:

> As the ship began to list sharply the captain gave his abandon ship order. The first boat was lowered and floated without too much trouble and men piled down ropes to get in while others jumped into the water. I jumped in and managed to get in the second boat but she was capsized by suction of the sinking ship. Most of the missing were in or about this second boat. Down we went. When I came up I reached the surface a moment before the boat came up overturned. (He climbed on the boat with Louis Gale and Ed Brown.) We were a wet, cold bunch as we waited for the rescue ship to reach us. I'm still shivering. Gee, that water was cold (Port Arthur News Chronicle June 4, 1947).

Bill Randall, a wheelsman, was on watch near the bow of the ship. He also gave his account to the newspapers (Port Arthur News Chronicle, June 4, 1947): "It was pitch black and I couldn't see a thing, but I knew something serious had happened. I noticed the ship begin to sink almost immediately at the bow." He knew it was "only a matter time" before they went under. "I would say the men kept remarkably calm. I don't think they realized we were sinking as fast as we were. When the time came to abandon ship, things began to happen so fast that no one had much time to get scared." He said water was "up to the winches" when the order to abandon ship was given. He saw the captain rush from the wheelhouse as waves came over the side and toppled him on his back. "I didn't see him after that" (the same source states that not one of the survivors saw Capt. Walkinshaw in the water).

Randall noted one pathetic scene. He saw Paul Perry, a watchman, walking at the stern with his suitcase in his hand. Apparently Perry could not swim, for he made no attempt to jump overboard with the others. "He didn't say a thing. He just stood there and went down with the ship."

Only one account located mentioned exploding boilers. Night Steward Art Laframboise said he was cooking a meal when the ship struck. He rushed out and helped launch a lifeboat.

> I helped pull two men into the lifeboat, and they were still jumping from the sinking freighter when the boilers exploded. Instead of drawing us in, the force of the explosion pushed us out .... That was lucky. I was careful to steer the lifeboat straight away from the ship as she went down, otherwise, if we had been traveling in a parallel direction, I don't think we'd have made it. A few hundred feet ahead

we saw a rock sticking out of the water, so we made for it and discharged our cargo. Then we went back to pick up some more survivors .... By this time the ship had gone down. On the way over to the Coast Guard cutter we picked up the body of the first cook, Mrs. Shultz. Her clothes were torn and I figured she went down with the boat, and then was blown to the surface when the boilers exploded (Montreal Gazette June 5, 1947).

The Albrecht account below contradicts what Laframboise thought happened to Shultz. Albrecht was on the aft deck with all three of the women when the ship went down and saw them aboard a lifeboat. This was apparently the port lifeboat that capsized from the suction of the ship sinking.

Nick Tonita would remember his first voyage as a sailor. "I jumped over the side. I went under pretty deep and when I came up I hit my forehead on the overturned lifeboat. Then I swam to a mattress and stayed on it until the other lifeboat picked me up. The water was like ice" (Fort William Daily Times Journal June 4, 1947).

The Minneapolis Star (June 4, 1947) carried the experience of Ernest Albrecht, 18, a coal passer who was the youngest of the 21 survivors. Albrecht was preparing to go to bed when he learned the ship was going down. When he heard the news he dressed rapidly, grabbed a life jacket and rushed to the afterdeck, where he helped lower the two lifeboats. He waited until the three women cooks were aboard and started to follow them.

> Before I got into the boat I was standing by the after house. Then the ship gave a lunge and water came gushing over like a waterfall. The port lifeboat was thrown against the after house bulkhead, with several persons in it. I thought my time had come as the boat threatened to pin me to the cabins, but luckily I was just bruised and cut a bit. The next thing I knew I was in the water, floating with the jacket. The port lifeboat was overturned and a few feet away. I couldn't swim in that water, it was so cold, so I drifted to the boat and hung on it until I saw the cutter coming.

Emil Savereux, deck hand, said, "I was bounced out of my berth from a sound sleep when the crash came." He added, "I ran down into the dunnage room. There the second mate told the men to put on life belts and prepare the lifeboats to be lowered. I then jumped into the water ... a sinking section of the ship drew me and the second cook, Mabel Cochrane, under the water. The suction was bad, but I fought my way to the surface and came up in a life ring .... I was later picked up by a lifeboat and brought to safety (Fort William Daily Times Journal June 4, 1947).

The survivors were a hardy lot. Young Albrecht, who was just starting his career as a Lakes sailor, said from his hospital bed that he was planning to ship out again in a few weeks. Perhaps he summed up the attitude shared by some of the other survivors, and many of those who had made their living on the Great Lakes, when he said, "We can't let one little shipwreck get us down" (Fort William Daily Times Journal June 4, 1947).

Shortly after the survivors returned safely to Fort William, the search for the missing was resumed. KIMBALL's Lt. Clark and his crew of 12 left port about 11:00 o'clock the morning of June 4 to "hunt around Canoe Rocks for survivors and bodies" (Port Arthur New Chronicle June 4, 1947).

Alan J. Linfoot, general agent, announced that Canada Steamship Lines had chartered another vessel, COASTAL QUEEN, owned by the Northern Engineering Company, to go to the wreck site to continue the search and also to attempt recovery of bodies still trapped on board the wreck. COASTAL QUEEN had a diver, E.J. (Doc) Fowler, aboard. Fowler was a veteran diver who was employed by Pigeon River Timber Company and was on loan to C.S.L. (Fort William Daily Times Journal June 5, 1947). Small launches were also aboard QUEEN to enable the many small bays and inlets of Isle Royale to be searched. The charter vessel left at 6:00 p.m. (reported elsewhere as 3:00 p.m.) on the 4th and diving operations were planned for that evening (Montreal Gazette June 5, 1947; Toronto Globe and Mail June 5, 1947; Fort William Daily Times Journal June 5, 1947).

KIMBALL's crew found the body of another woman during the search they conducted after returning to the site the afternoon of the disaster. It was identified as that of Marie Tobachuk, a porter. She was found about 4 miles from the site, floating upright, supported by her life jacket (Fort William Daily Times Journal June 5, 1947). The Coast Guard returned her to Fort William that evening (Montreal Gazette June 5, 1947). The two lifeboats and a company raft were also reported in the same general area.

At first there was some confusion regarding the number and identity of the missing from the wreck. The official company list of the dead and missing released from its corporate headquarters in Montreal named only 11 persons. Company officials in Fort William stated that there were indeed 12 missing or dead. The 12th missing crew member was J. Prokup (also Proykop and Prohupof), a wheelsman. Prokup had replaced J. Sepchuk, who left the ship the night before it sailed. Sepchuk had surprised everyone when he walked into the company headquarters on the day of the wreck to pick up his pay (Toronto Globe and Mail June 6, 1947; Montreal Gazette June 5, 1947).

EMPEROR's crew usually consisted of 35, but two men were left behind when it departed Fort William on its last trip (Montreal Gazette June 5, 1947).

Malcom Melsaacs (or McIsaacs, Winnipeg Free Press June 5, 1947) and Melville Anderson were the two men on the normal EMPEROR crew roster not aboard when the ship took its last voyage. Anderson, a wheelsman, had been suffering from eye trouble and stayed ashore (Fort William Daily Times Journal June 5, 1947). A day earlier, the same paper stated that a fireman and third mate were not on the ship.

This would have been Melsaacs second trip on the Lakes. His luck had changed for the better. As a salt-water sailor, he was torpedoed three times during the war (Fort William Daily Times Journal June 4, 1947).

James Buzzie was not as fortunate as those who had missed the boat. Buzzie, who was among the missing, shipped aboard EMPEROR as a coal passer on June 3 -- the ship's last night afloat (Fort William Daily Times Journal June 4, 1947).

Capt. Norman Reoch, operating manager of Canada Steamship Lines, told the newspapers that his company's ships had the most modern safety devices obtainable, and apart from that,

> "EMPEROR was one of the most seaworthy ships in the company's lines. We feel that our fleet is one of the best-maintained fleets on the Great Lakes. There has been more safety practice on the Great Lakes in the past 10 years than ever before, in view of the fact that

operators are endeavoring to obtain lesser premiums on insurance rates--and with telling results" (Toronto Globe and Mail June 5, 1947).

Reoch's comments were in response to those made by Harry Davis, president of the Canadian Seaman's Union (Toronto Globe and Mail June 5, 1947). The night of the wreck, Davis had called for an immediate investigation into the sinking, and demanded that the C.S.U. be represented on any board set up that would probe the worst Lake tragedy in 5 years. "Too many Lake ships are far too old to be sailing with such heavy cargoes as ore, and altogether too many safety regulations are being violated. It is high time to call a halt to the needless tragedies." He stated that the union had always fought for adequate safety regulations and would continue to do so. "We of the union mourn the loss of these men along with their relatives. We consider, however, that the best memorial to those lost in this tragedy is to ensure such future calamities shall not take place" (Montreal Gazette June 5, 1947). Captain Reoch, however, labeled the Davis statement as that of "an opportunist," and stated that Lake ships are inspected periodically by the British Corp Register (a classification society) and approved by the Steamship Inspection Service, Ottawa (Toronto Globe and Mail June 5, 1947).

Three investigations were soon opened regarding the cause of the disaster. One was begun by the U.S. Coast Guard under the direction of Lt. Cmdr. S.D. Larue, inspector, from Duluth. The Coast Guard was required to make an investigation, because the incident happened in U.S. waters. The other inquiries were the ones by the Steamship Inspection Branch of the Canadian Transport Department (this would be a preliminary investigation, with a formal inquiry to follow), and the Canada Steamship Lines, to be conducted by H.R. Baxter, of Toronto, shore captain for the company (Toronto Globe and Mail June 6, 1947). There may have been a fourth inquiry; it was reported that the Fort William coroner was also investigating the cause of the accident (Houghton Daily Mining Gazette June 5, 1947).

The most informative document of the many inquiries into the wreck is that of "The Preliminary Inquiry into the Circumstances concerning the Sinking of the S.S.EMPEROR; Conducted by Capt. W.N. Morrison, Supervisor and Examiner of Masters and Mates for the Department of Transport, Province of Ontario on the 6th day of June 1947" (Canadian Archives). Ten of the survivors were interviewed under oath and the questions and answers are contained within this document.

The Canadian Legislature expressed its concern over the wreck. More navigational aids were urged in the Commons as a result of EMPEROR's loss. T.L. Church led the discussion. Church declared that there were no aids to navigation on the Lake at the spot where the ship struck the reef, and he asked what the government was going to do to protect shipping. Transport Minister Chevrier replied that if Church knew the facts, he would not make the statements he did (Montreal Gazette June 6, 1947).

Apparently the Canadian Seaman's Union also conducted an inquiry on the wreck. A report of its findings was released June 18, and excerpts and company responses appeared in the press (Montreal Gazette June 19, 1947). In the union's report, T.G. McManus, national secretary, charged that an officer of EMPEROR had disregarded warnings that the ship was nearing dangerous rocks, and that, due to "rusty davits, the crew had difficulty in launching lifeboats." According to McManus, survivors of the sinking told the union that the ship had been sailing short one mate since the beginning of the season, and the chief and second mates had shared the missing mate's wages between them. The union charged further that, contrary to the regulations of the Canada Shipping Act, no lifeboat drills had been held aboard EMPEROR that season. McManus went on to say that "facts revealed by investigations conducted by the union" had moved the union to request the government to include C.S.U. representatives in the government inquiry board that was investigating the sinking. The union wanted unlicensed survivors to be called as witnesses during the inquiry.

Capt. Norman J. Reoch issued a statement in response to the union's report on behalf of Canada Steamship Lines (Montreal Gazette June 19, 1947). He declared the report "false and irresponsible."

The formal investigation to be done by request of Transportation Minister Chevrier was announced (Montreal Gazette June 19, 1947). Justice F.H. Barlow of the Supreme Court of Canada presided, Capt. F.J. Davis and Angus G. McKay acted as assessors, Hugh Plaxton of Toronto acted as counsel for the Transport Department. The investigation opened at the Osgoode Hall, Ottawa, July 2. Representatives of the Canadian Seaman's Union had been invited to attend.

The court findings were announced July 26 (in Court Documents):

> Honourable Lionel Chevrier, Minister of Transport, today announced the findings of the investigation into the stranding and sinking of the S.S. EMPEROR in Lake Superior on June 4 last with the loss of 12 lives. The report places the blame for the wreck on James Morrey, the first mate, "who did not keep proper watch." In this connection, the report expressed the opinion "that the system which prevailed, which required the first mate to be in charge of the loading of the ship during the period when he should have been off duty, resulted in his becoming over-tired, suffering as he was from loss of sleep." James Morrey was drowned when the vessel sank.
>
> The ill-fated vessel had loaded 10,429 tons of iron ore and had sailed from Port Arthur at 10:55 p.m. on June 3. The captain was in charge of the watch till midnight when the first mate, James Morrey relieved him for the midnight until 6 a.m. watch. The evidence indicated that the first mate was overtired and the report emphasizes the fact that "James Morrey was a man of wide experience on the Great Lakes, that he was most efficient, and that he had an excellent record previous to this unfortunate accident."
>
> Recommendations of the Court of Investigation are as follows:
>
> 1. We recommend that some system be evolved, either by employing a third mate or otherwise, if feasible, to prevent a mate or other officer from taking charge of a ship when he is suffering from loss of sleep or is in a state of exhaustion by reason of his duties. We find that the eight-hour day prevails with the engine room officers and crew but not with the officers in the forward end. We cannot understand why the eight-hour day should not prevail throughout the ship, and we would so recommend.
>
> 2. The evidence does not disclose, and so far as we know there is no requirement by which a ship is equipped with a system of electrical gongs, throughout the ship, to be used in case of a disaster, such as collision, fire or grounding. We recommend that a regulation be passed requiring all Lake vessels to be so equipped.
>
> 3. In our opinion, the evidence does not disclose that sufficient lifeboat and fire drills were held to familiarize the changing crew with their proper stations and proper duties, in order that the

> same may be carried out speedily and efficiently. We recommend that lifeboat drill and fire drill be held weekly during the summer season and that at least twice during the navigation period, apart from the spring inspection, that lifeboat drill and fire drill be held in the presence of and under the supervision of, an officer from the Department of Steamboat Inspection.
>
> 4. In view of the submissions made we have given consideration to whether or not wooden lifeboats should be used. We are of the opinion that wooden lifeboats are far superior to any other.
>
> The evidence submitted before the Court of Investigation showed that the vessel was in a good and seaworthy condition as regards hull, machinery, lifesaving and other equipment. All necessary charts and sailing directions were on board and in addition, the following equipment in excess of Department of Transport regulations had been installed: gyro compass, echo sounding machine, ship-to-shore radio telephone and radio direction finder.
>
> The Board of Investigation fully exonerates the master, Captain Eldon Walkinshaw, and says: "We are of the opinion that under all the circumstances he did everything possible most promptly and efficiently." He sent out a distress signal by radio immediately after the vessel struck, in response of which the United States Coast Guard vessel KIMBALL, located nearby, came to render assistance. In this connection, the report says "We cannot commend too highly the action of the captain and crew of the KIMBALL for the prompt assistance which they rendered." As a result, 21 of the crew were saved. Most of those who lost their lives were in the second lifeboat which was being launched and was sucked down when the EMPEROR sank.

Newspaper stories at the time of EMPEROR's loss compared the high shipwreck concentration at the northeastern end of Isle Royale to Keweenaw Point and Whitefish Point, which had been known as the "Graveyard of the Great Lakes" (Port Arthur News Chronicle June 4, 1947). Most of the wrecks that occurred at Keweenaw Point were ships driven ashore during storms. The wrecks on Whitefish Point have been due primarily to vessels converging into the narrow channel leading out of the Upper Lake, and then colliding, usually during fog. The Isle Royale wrecks have been principally attributed to a "combination of storms and mistaking the travel routes, the latter, in former days particularly, being due to magnetic disturbances which sometimes affect the steamer compasses in that area" (Port Arthur News Chronicle June 4, 1947.)

The loss of EMPEROR was the worst disaster on the Great Lakes since the year 1942, when three incidents were recorded: 25 drowned in a launch in Georgian Bay, 14 elsewhere in a tug, and 18 in a barge in Lake Erie. EMPEROR's demise was the first event on Lake Superior resulting in a loss of life since 1940, when the steamer ARLINGTON went down in a gale with the loss of one crew member. The worst year on Lake Superior prior to the EMPEROR wreck was 1927, when KAMLOOPS disappeared in a storm with 22 crew aboard (Houghton Daily Mining Gazette June 4, 1947). The worst year since the turn of the century on the Great Lakes was 1913, when a 2-day November storm wrecked 13 vessels, and 240 people drowned. It was estimated that, since the turn of the century, more than 100 ships have gone down on the Great Lakes, and more than 2,000 seamen have lost their lives (Winnipeg Free Press June 4, 1947).

EMPEROR was the most recent large ship to be wrecked on Isle Royale.

Salvage

The first diver to view the remains of the EMPEROR was E.J. (Doc) Fowler. On Thursday, June 12, 1947, Fowler made three dives of about 30 minutes duration in an attempt to recover some of the bodies of those still missing from the wreck (Port Arthur News Chronicle June 14, 1947). The dives had been planned to take place during the original search operations carried out by COASTAL QUEEN after the wreck, but weather conditions did not allow them to be done.

There are no records of commercial salvage on EMPEROR. Soon after the advent of scuba diving, EMPEROR became a popular diving attraction in Lake Superior. The continued exploration of EMPEROR led to the discovery of what Fowler sought. In 1975, the clothed and preserved remains of one of the crew was discovered by sport divers in the area of the engine room (Houghton Daily Mining Gazette Sept. 2 and 3, 1975). The body was discovered by members of the Inland Divers Club of Duluth and was reported to the National Park Service. Park headquarters said that no further diving attempts to recover the remains were planned due to the depth and the difficulty in reaching the remains (Daily Mining Gazette Sept. 3, 1975). The remains were reportedly removed by Canadian divers and sunk in deep water. Occasional reports of additional remains have reached the Park Service. However, none have been verified.

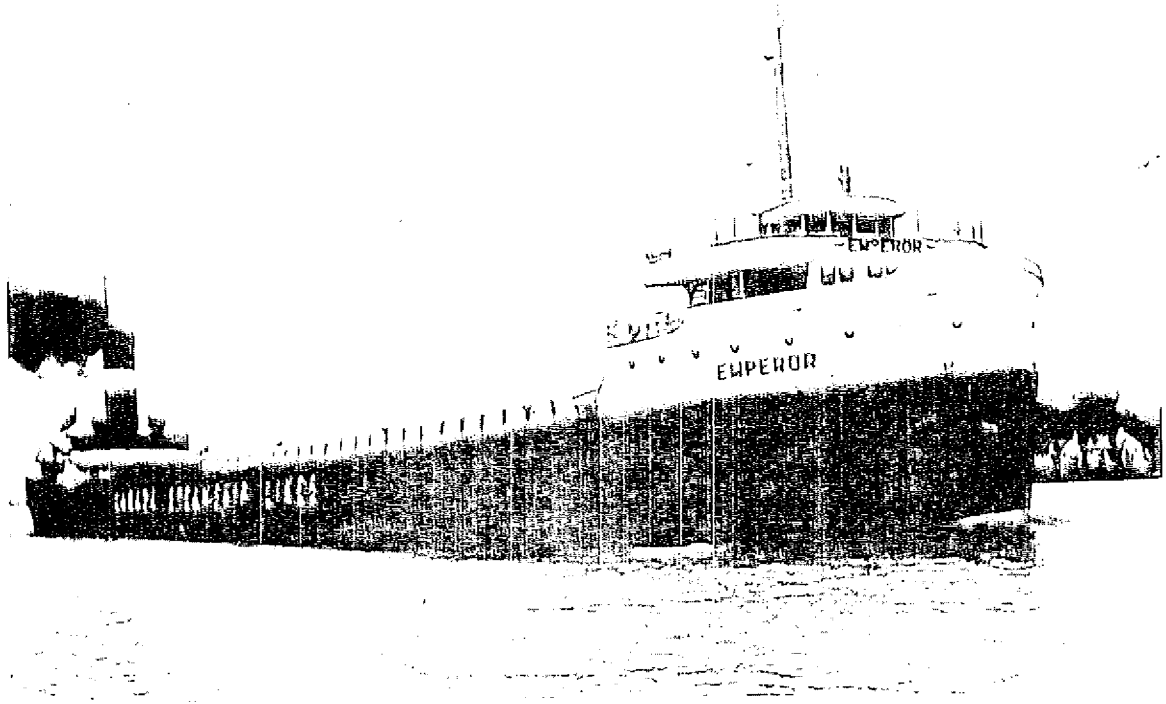


Fig. 4.26. 525-foot long, Canada Steamship Lines' bulk freighter EMPEROR, the largest ship built in Canada at the time of launch. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

Fig. 4.27. Port side view of EMPEROR as it appeared when lost in June 1947. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

KAMLOOPS: HISTORY

Construction

KAMLOOPS was built in England by Furness Shipbuilding Co., Ltd. at its shipyard at Haverton Hill on Tees in 1924. Built for Steamships, Ltd. of Montreal, Canada for use in the Great Lakes package trade, the single-screw, steel freighter was designed as a canaler, with dimensions appropriate for passage through the Welland Canal system. Its primary intended function was to transport package freight, but it could also carry bulk cargo.

The specific vessel type in the Great Lakes known as "canalers" began with the opening of the Welland Canal in 1829. These vessels were built close to the maximum dimensions that would allow their passage through the locks. The original locks required a ship's length to be less than 110 feet, the beam no more than 22 feet, and a draft of less than 8 feet. The Welland Canal was expanded to accommodate a 9-foot draft in 1850, and a 10-foot draft in 1872 (Murphy 1966:393). By 1887, improvements permitted vessels up to 256 feet long, 44 feet wide with a draft of 14 feet (nearly double in length over those of 1829) to clear the locks and canal system from Lake Ontario to Montreal (Mills 1910:226-7).

KAMLOOPS had a length between perpendiculars of 250 feet, molded breadth of 42 3/4 feet and a molded depth of 26 1/2 feet. Its deadweight capacity was 2,400 tons on a 14-ft. draft (Canadian Railway and Marine World July 1924). KAMLOOPS was of the vessel type built to the maximum possible canal dimensions.

At each improvement of the locks, the older vessels became obsolete because of their increasing competitive disadvantage with the larger ships. Had KAMLOOPS not wrecked on Isle Royale in 1927, it might have become outdated when the canal improvements begun in 1913 were completed. The Welland Canal in 1932 allowed vessels to pass measuring 715 feet long with a draft of 30 feet. The locks could accept vessels with a beam of 80 feet (Murphy 1966:394). However, LETHBRIDGE, the sister ship of KAMLOOPS, survived until it was scrapped in 1961, two years after the larger Saint Lawrence Seaway opened (Greenwood 1973:125).

Steamships Ltd., the company that ordered both sister ships built, was a subsidiary of Canada Steamship Lines, Ltd., and all of its principal company executives were also officers of Canada Steamship Lines. Steamships, Ltd. was incorporated in November 1923, stating its purposes as "to carry on the business of transportation of passengers, freight, etc., towing, wrecking and salvage in or over any of the navigable waters within or bordering on Canada, and to or from any foreign port, and various other businesses connected therewith" (Canadian Railway and Marine World August 1924:422-3).

The first of the two new ships slid down the ways on May 20, 1924, after being christened KAMLOOPS by Agnes Black, daughter of the Canada Steamship Lines superintendent. LETHBRIDGE followed on June 14. A fairly complete description of KAMLOOPS was published in Canadian Railway and Marine World in July 1924 (p. 370):

> KAMLOOPS is built on the longitudinal system of framing, with upper, shelter, and forecastle decks. The double bottom, extending all fore and aft, and the peak tanks, are arranged for water ballast, and a water-tight cofferdam is fitted at the sides of [the] fore hold to give added protection to the cargo to meet the severe conditions of the

service. The captain's accommodation and chart-room are in house on [the] forecastle deck, with [the] steering wheel in [the] teak Texas house above. Special attention has been given to the accommodation[s] for the officers and crew in [the] forecastle, and engineers and firemen in [the] deck-house aft. The whole of the accommodation is heated by steam radiators, and electric lighting is to be installed. A powerful steam windlass is fitted in [the] forecastle, and special pockets are arranged in the hull to house the anchors. The cargo gear, consisting of 4 sampson posts, each having one 5-ton derrick, is operated by one 8x12-inch and two 7x10-inch steam cargo winches, and mooring arrangements are carried out by means of four 6x10-inch steam mooring winches. A hoisting gear, consisting of 13 winches driven through shafting by a double-cylinder vertical steam engine, will be fitted in the upper 'tween decks for discharging cargo. A steam steering gear will be fitted in [the] after 'tween decks and controlled by shafting from [the] wheelhouse forward and boat deck aft. The propelling machinery consists of a set of triple expansion inverted marine engines, having cylinders of 18, 30, and 50 inches diameter, and a stroke of 36 inches. Steam is supplied by two single-ended boilers 13.6 feet in diameter by 11 feet long, working at a pressure of 185 lbs.

The Canadian Transcript of Register (Nov. 7, 1926, Montreal) gives additional information on KAMLOOPS' registry record and construction. Apparently, the ship remained under British registry No. 154 until 1926. There is a mistake in the recording of the official number on the Transcript of Register, as two registration records exist for KAMLOOPS in the Public Archives of Canada. One register with overstamps reads: "Registery Of Shipping May 26 1926 Marine and Fisheries"; "Registery of Shipping Dec 27 1927 Marine and Fisheries"; and "Registery of Shipping Jun 30 1937 Dept. of Transport" (RG 12 Vol. 3028) gives the official number as 147682. The other, apparently a later version of the Transcript of Register, with two overstamps, reads: "National Revenue Canada 20 Jan 1926 Registrateur Maritime Montreal, P.Q." and gives the official number as 147,687. The earlier one (147,682) is probably correct.

According to the registers, the ship had two decks and two schooner-rigged masts, fore and mizzen, and was classed as clincher-built, with an elliptical stern. The hull contained five bulkheads, four of which were water-tight, and six water-ballast tanks with a capacity of 699 tons. The depth of hold from the tonnage deck to ceiling at midships was 24.3 feet, with the depth from the top of the deck at the side amidships to the bottom of the keel 26.65 feet. The hull had a very sharp chine. The round of bilge was 8.3 tenths of a foot.

The triple-expansion engine and the Scotch boilers were made specifically for KAMLOOPS by Richardson, Westgarth and Co., Ltd. of Hartlepool, England, and rated at 1,000 indicated horsepower. The engine could push the ship at an estimated speed of 9 1/2 knots.

The tonnage particulars give a perspective on hull volume configuration. A total of 2,226.09 tons are recorded under the tonnage deck. In addition, the forecastle measured 49.72 tons, and the deck houses 125.73 tons, including two tons for access of hatchway. Thus the ship's gross tonnage totaled 2401.54. Deductions yield a register tonnage of 1,747.79 tons.

KAMLOOPS completed its builder's trial on July 5, 1924 and proceeded to Copenhagen to load the first cargo, which was bound for Montreal. The ship went on to Houghton, Michigan. The vessel, along with its sister, would run regularly between Montreal and Fort William, Ontario carrying package freight west and grain east (Canadian Railway and Marine World Oct. 1924:527).

Operational History

KAMLOOPS' first season on the Lakes started late, when its maiden upbound passage began on September 13, 1924 (Detroit Free Press Sept. 14, 1924) under Capt. William Brian and engineer T.W. Verity (Great Lakes Red Book 1925: 51). The new package freighter had arrived from Copenhagen shortly before its sister ship LETHBRIDGE, which reached Montreal on September 18 (Canadian Railway and Marine World Oct. 1924:527). A cargo of pebbles was brought from Denmark for the Calumet and Hecla Mining Company in Calumet, Michigan. Here the crew which sailed on the maiden voyage was replaced by a crew of Lake sailors (Calumet News Aug. 24, 1924; Dec 14, 1927). KAMLOOPS passed Port Colborne on the Welland Canal on September 22 downbound for the first time (Detroit Free Press Sept. 23, 1924).

The first season set the pattern for KAMLOOPS, whose owners continued to operate as long as possible each season. The canaller weathered a severe storm on its last downbound run of the 1924 season on December 13 and 14 when winds of 50 to 60 miles per hour and a temperature of 6^{o} below claimed at least one vessel believed wrecked near Eagle Harbor on the Keewenaw peninsula. After the storm, KAMLOOPS, along with MIDLAND PRINCE, MIDLAND KING AND LETHBRIDGE, each with a load of grain, were all reported downbound on Lake Superior, while other vessels were laid up in the shelter of Isle Royale (Marquette Daily Mining Journal Dec. 15, 1924). The four ships soon became trapped by ice in the St. Mary's River, and two tugs of the Great Lakes Towing Company were dispatched to assist them. Those four vessels were the last of the 1924 season to pass through the locks (Marquette Daily Mining Journal Dec. 17, 1924).

The 1925 season began for KAMLOOPS in April, when it cleared Sault Ste. Marie on the 20th at 3:30 upbound, and again on the 23rd downbound (Detroit Free Press April 21, 23, 1925). In October the freighter was held up with 10 others of the grain fleet during a downbound run by the grounding of W. H. DANIELS in the Welland canal aqueduct (Detroit Free Press Oct 12, 1925). The remainder of the season was uneventful.

The first downbound run of the 1926 season began May 3, when KAMLOOPS cleared Detroit at 3:00 am (Detroit Free Press May 4, 1926). The ship ended its third season like the first -- stuck in the ice. This time there were not four ships stuck in the St. Mary's River ice, but more than 100. The 100 ships were caught in the channel near Neebish Island on December 3, the same location where KAMLOOPS had been trapped earlier. That event was the largest ice jam in the history of upper Lakes shipping, according to contemporary references. The soft ice halted all progress of the steamers, and even the powerful tugs made only slow headway through the slush that in places was 12 feet thick. The problem was increased by the fact that there were about 2,000 people aboard the jammed ships, and supplies ran short (Detroit Free Press Dec. 4, 1926).

The weather worsened, and a 35-mile-an-hour northeast wind pushed the temperature to 12 below zero, turning the slush to ice. Every available tug in the vicinity was summoned, and the steel car ferry SAINTE MARIE was brought out to assist in the struggle to free the trapped fleet. Truck loads of food were shuttled to the ships by the tugs (Detroit Free Press Dec. 5, 1926).

On December 5, seven inches of snow fell, further complicating the rescue effort, which at this time was assisting 40 upbound and 65 downbound boats in the channel. The shortage of coal became critical on some vessels, and efforts were begun to purchase coal from the upbound carriers because none was available at the Sault. During this blockade more vessels left Port Arthur loaded with grain to get their last run in before the ice got too thick to be broken by the harbor tugs (Detroit Free Press Dec. 6, 1926). These vessels fell in behind those already ice-bound in the St. Mary's River.

The upbound fleet was released the next day, but the number of trapped downbound vessels grew to 70. The principal obstruction was COULEE, which was stuck nearly crosswise in the channel. Ten thousand tons of coal were purchased by the Lake Carriers' Association, whose members were losing an estimated $50,000 a day as a result of the ice jam, although Sault merchants were making $15,000 a day from providing supplies to the inert grain fleet (Detroit Free Press Dec. 7, 9, 1926).

By December 7, the number of blocked Lake carriers reached 90. Experts arrived in growing numbers, as representatives of companies and the now idle grain elevators joined the effort. COULEE was released, but the next ship in line, GENERAL GARRETSON, became trapped, halting further rescue efforts for that day (Detroit Free Press Dec. 8, 1926).

The trapped grain carriers, now more than 100, began moving down the river December 8, but were held up for another 12 hours (Detroit Free Press Dec. 9, 1926). Twenty-six freighters were freed on December 9 (Detroit Free Press Dec. 10, 1926). However, KAMLOOPS was not one of the fortunate vessels, being 39th in line (Detroit Free Press Dec. 9, 1926). In a list of vessels freed from the ice on December 10 that was published in the Detroit Free Press (Dec. 11), KAMLOOPS is not mentioned, and therefore must have been released on the 11th after being trapped in the ice for 9 days. It was KAMLOOPS last voyage of the 1927 season.

Open water was visible April 7 for the first time of the 1927 season at Port Arthur, when an ice breaker opened a channel for the downbound freighters (Cleveland Plain Dealer April 8, 1927). KAMLOOPS cleared Sault Ste. Marie upbound for the recently opened Port Arthur during the first run of the new season on April 20 (Cleveland Plain Dealer April 21, 1927). The vessel was reported in Fort William on April 22, and had cleared downbound on the 23rd (Cleveland Plain Dealer April 23, 24, 1927). KAMLOOPS cleared the Sault at 9:00 a.m. on the 25th (Cleveland Plain Dealer April 26, 1927).

KAMLOOPS was technically under new ownership the 1926 season. On October 11, Canada Steamship Lines bought the vessel from Steamships, Ltd. On October 28, 1926 the registry listed a mortgage dated October 19, for $50,000,000 (although the amount seems unlikely) loaned at 6 percent yearly interest by Montreal Trust Company.

The dealings between steamship companies and the various financial institutions have not been researched by historians. The relationship between Steamships, Ltd.

and Canada Steamship Lines, Ltd. should interest historians studying the development of capitalist enterprise on the Lakes, for the officers were the same for both companies, and the addresses of their principal places of business were the same. The details of this arrangement should shed light on the business practices of ship owners of the period.

Wreck Event

The last trip of the 1927 season would be KAMLOOPS' final trip. The doomed vessel cleared Port Colborne, Ontario on the Welland Canal upbound on December 1 at 9:30 AM (Detroit Free Press Dec. 2, 1927). The ship passed Detroit at 11:30. Apparently KAMLOOPS passed through the Soo on December 4 in the company of QUEDOC, a 345-foot bulk freighter (Owen Sound Daily Sun Times Dec. 13, 1927). From Saulte Ste. Marie, Capt. Brian wrote his wife in Toronto, saying that the weather was very bad and that he was going out to anchor his ship (Ibid. Dec. 14, 1927). Mrs. Brian expected her husband home for the winter season six days later on Saturday, December 10.

The giant freeze-up of vessels the year before was still fresh in memory as the 1927 navigation season drew to a close. A rumor had circulated from Buffalo that Lake ships, fearing another blockade, would end their season on November 30, but executives of Canada Steamship Lines denied the rumor. A company official was quoted in the Fort William Daily Times Journal on November 29: "We will run our ships as long as the weather holds good, and as long as there is grain to carry. The experience we had last year does not deter us because we realize that a thing like that may not happen again for another 50 years." The executive's declaration would prove ironic on two counts: Company vessels would be lost in 1927, and others would end their season icebound in the very same channel as the year before (Detroit Free Press Dec. 15, 16, 1927).

The day following the executive's statement, a 36 mile-an-hour northeast wind began, causing the upbound vessels to shelter overnight on November 30 at Whitefish Point and the Welcome Islands. The temperature was 8^{O}F. at Duluth, 10^{O}F. at Port Arthur, and storm warnings were raised at the Soo. The temperature continued to drop as a massive cold front advanced from the northwest (Sault Daily Star Dec. 1, 1927). This cold front would be closely followed by a worse storm.

Insurance rates were raised at midnight, November 30, reflecting the increased risk of late-season navigation. The rates were raised again on December 5, and underwriters ceased all coverage by midnight on the 12th. Navigation aids and lightkeepers were removed from the Lakes by that time (Sault Daily Star Dec. 1, 1927; Owen Sound Daily Sun Times Dec. 1, 1927).

Meanwhile, the Booth Fisheries' steamer AMERICA was reported to have arrived at Port Arthur on December 3, ice-covered after passing through the storm. The vessel carried a load of salt and was to return to Duluth with a cargo of salted herring (Port Arthur News-Chronicle Dec. 3, 1927).

The storm increased as the second front arrived, sweeping Lake Superior with high winds on December 5. Upbound vessels, including KAMLOOPS, had been delayed and anchored at Whitefish Bay. The downbound grain fleet had weathered the storm at Fort William. VALCARTIER, the first ship to reach the Soo, arrived heavily laden with a thick coating of ice, and reported temperatures of 40 degrees below during the storm (Sault Daily Star Dec. 6, 1927).

The financial pressure of the December 5 increase in the insurance rates had prompted furious activity at the Lakehead grain port. Eighteen ships of the grain fleet were loaded by the Port Arthur elevators, which worked at maximum capacity to clear the fleet before the insurance rates went up. All but three made it before the rate changed (Port Arthur News Chronicle Dec. 6, 1927).

Storm signals were raised once again on December 7, as a northeast wind began blowing at 20 to 30 miles per hour. The temperature dropped to 10 degrees below at Port Arthur. The passenger steamer ASSINIBOIA was loading flour to begin its downbound voyage as soon as the weather cleared (Port Arthur News Chronicle Dec. 7, 1927). The next day the same paper announced that no vessels had entered Port Arthur or Fort William for the last 36 hours (Ibid Dec. 8). The winds would soon exceed 60 miles per hour, and later 80 before the storm subsided.

The storm became a major blizzard. The weather remained at sub-zero levels with lows of 10-38 degrees F. below zero reported. The gale was responsible for at least eight deaths in Alberta. More than 30 people on land lost their lives during this storm (Detroit Free Press Dec. 10, 1927), which was so severe that train service between St. Paul, Winnipeg and Minneapolis was suspended on the 7th (Fort William Daily Times Journal Dec. 8, 1927.

The situation on the Lakes grew worse as the storm raged the 7th and 8th. Damage reports began filtering in on the 9th: the bulk freighter AGAWA was aground in Lake Huron, being pounded to pieces; all efforts to rescue the 23 stranded crew members were thwarted by the weather. At least 20 other vessels were in distress or missing. Seven downbound grain ships were overdue at Detroit. Winds of 84 miles an hour broke four vessels and a passenger steamer from their moorings at Detroit. An unidentified boat (which turned out to be the bulk freighter E.W. OGLEBAY) ran aground at Shot Point; MARTIAN, another bulk freighter, ran aground in Thunder Bay; ALTADOC was aground at Keweenaw Point. In Lake Erie three steamers ran aground with a total of 81 men aboard (Detroit Free Press Dec. 10, 1927). In all, five vessels were eventually declared a total loss by the underwriters— KAMLOOPS was among the missing.

The steel package freighter WINNIPEG arrived in Port Arthur on Friday the 9th with the news that the crew had seen KAMLOOPS at Whitefish Bay on Tuesday (Dec. 6). When the storm first broke, WINNIPEG had laid up in Whitefish Bay, but left during a lull. At the upper end of the Lake, thick fog slowed its progress and an anchor was set. The early morning light revealed that WINNIPEG was only a few hundred yards from rocks and had just narrowly missed becoming a casualty of the storm. WINNIPEG arrived in port covered with tons of ice on the deck, white with frost.

A crewman of WINNIPEG described his five-day ordeal (Port Arthur News Chronicle Dec. 10, 1927):

> I have never seen anything like it in my 20 years of sailing. The storm was bad enough, but to get a combination of gales, fogs, and 20° below zero weather all at the same time is something that has given many a mariner nerves this last few days.

The same report stated that a gang was at work unloading the ship and cutting away tons of ice so that "the steamer, like a good many more, will make 'one more trip' to the east before the close of navigation."

By December 12, grave concern was mounting regarding the fate of KAMLOOPS, which was now overdue at Ft. Willliam. No word of the ship had been received other than that brought by WINNIPEG; KAMLOOPS carried no wireless. [Wireless was not required on all Lake ships at this time, although many carried them as safety equipment. Wireless was required on all vessels carrying 50 or more persons (Sault Daily Star Ontario Dec. 14, 1927).]

At least three other vessels were missing: SASKATOON, a Canada Steamship Lines package freighter; BROOKTON, a bulk freighter also owned by CSL; and the tug CHAMPLAIN (Owen Sound Daily Sun Times Dec. 12, 1927). All but KAMLOOPS would soon be located.

News of another victim of the storm circulated: LAMBTON, a steel canaller similar to KAMLOOPS, was discovered wrecked on Parisienne Island in Lake Superior (Sault Daily Star Dec. 12, 1927; Fort William Daily Times Journal Dec. 12, 1927)

The ordeal of the survivors of the wrecked vessels ALTADOC, AGAWA and LAMBTON give a view of the conditions that KAMLOOPS faced. The Coast Guard dory that attempted the removal of ALTADOC's crew became frozen in the ice, and was freed only after 16 attempts by the cutter CRAWFORD to break a lane to the boat. AGAWA's crew was trapped aboard without food or heat for three days, and during that time the stranded vessel was covered with ice 4 to 6 feet thick. The captain, who retired after that voyage, reported being battered by 40-foot waves that swept away the smokestack, spars and top deck (Detroit Free Press Dec. 12, 1927). Two suicides were reported aboard LAMBTON by crew members unable to withstand the severe conditions. These deaths, reported as suicides, may have been attempts to swim to shore.

A search for KAMLOOPS began in earnest December 12. ISLET PRINCE, commanded by A.E. Fader, began searching the north shore (Ft. William Daily Times Journal Dec. 12, 1927). The government tug MURRAY STEWART left from the Soo to join the search (Sarnia Canadian Observer Dec 13, 1927). W.J. King, assistant manager of Canada Steamship Lines, announced his company was in communication with officials in Ottawa, and had requested the use of a government plane to aid the search (Owen Sound Daily Sun Times Dec. 12 1927).

Speculation on the whereabouts of KAMLOOPS centered on Isle Royale. Captain R. Simpson of QUEDOC arrived at the Soo and discovered KAMLOOPS still on the unreported list. He gave the following account (Owen Sound Daily Sun Times Dec. 13, 1927):

> The QUEDOC passed upbound December 4. Beside her was the KAMLOOPS upbound loaded with package freight, with 21 [sic] men aboard, and captained by William Brian. The QUEDOC was leading and the KAMLOOPS was one-quarter of a mile astern. At ten o'clock Tuesday night [Dec 6], the lookout on the steamer QUEDOC suddenly saw a dark mass ahead, and gave the alarm immediately. The QUEDOC turned sharply to avoid running head on into the rocks at the same time blowing the danger signal to the KAMLOOPS. A north gale was blowing, there was a heavy sea, and it was rough going. The visibility was poor, on account of frost fog, and it is not known if the KAMLOOPS saw the rock or heard the signal. The KAMLOOPS has not been seen or heard of since. She had no wireless aboard.

Finally the weather cleared, and there was no wind on December 12 when the last grain carriers of the season departed the Canadian Lakehead (Owen Sound Daily Sun Times Dec. 13). All departing vessels had been alerted to watch for wreckage. Searching vessels benefited from the fair weather, however, there was still no trace of KAMLOOPS (Sault Daily Star Dec. 13, 1927).

A report circulated that the lost ship KAMLOOPS was aground at Keweenaw Point. Brock Batten, the CSL general agent at Port Arthur, reported that the Coast Guard at Eagle Harbor had been requested to search the Point. Evidently that agency had been contacted by the Chicago-based marine insurance underwriters (Port Arthur News Chronicle Dec. 13; Calumet News Dec. 13). The cutter CRAWFORD was unable to respond because of heavy ice in the harbor, and damage to its props incurred during the rescue of the ALTADOC crew. The Keweenaw was searched by lifeboat to no avail (Detroit Free Press Dec. 14, 1927; Houghton Daily Mining Gazette Dec. 14,1927; Calumet News Dec. 14, 1927; Sault Daily Star Dec. 15, 1927). The Keweenaw was searched by the tug CHAMPLAIN (Ft. William Daily Times Journal Dec. 14; Owen Sound Daily Sun Times Dec. 14, 1927). Both searches would prove futile.

Apparently, the rumor that KAMLOOPS was aground on Keweenaw Point had originated at the American Soo, relayed to Buffalo, and then to Chicago, from whence it was forwarded to the steamship company (Port Arthur News Chronicle Dec. 14). The search for KAMLOOPS on the Keweenaw Peninsula was unsuccessful, and the ship's whereabouts remained unknown.

Three hundred square miles of water and more than a thousand miles of rugged coastline had been searched with negative results (Owen Sound Daily Sun Times Dec. 15 1927). As hope for the safe return of KAMLOOPS and its crew dimmed, speculation of Lakes sailors and captains began to appear in the regional press. "Either her cargo shifted and she keeled over, or she ran aground on some rocks and was wrecked" (Ft. Wm. Daily Times Journal Dec. 14, 1927). Another paper (Houghton Daily Mining Gazette Dec. 14, 1927) added:

> Marine men agree that the only hope for the safety of the KAMLOOPS is the chance it might have made a successful run to the north Canadian shore where it either ran ashore or is laying to in some isolated harbor, probably frozen in or has run aground somewhere on the Keweenaw.

KAMLOOPS was carrying a heavy cargo. Included in the cargo was valuable machinery, made in England for the Thunder Bay Paper Company (Ft. William Daily Times Journal Dec. 14, 1927). There was also a full deck load on board. Captain Harry Lavers of the steamer J. FRATER TAYLOR described seeing KAMLOOPS during his downbound trip (Owen Sound Daily Sun Times Dec. 14 1927):

> I passed quite close to the KAMLOOPS somewhere between Caribou Island and Michipicoten Island, and while it was blowing fairly hard at that time, I did not think there was any danger, although I thought about her safety after we had passed her. There was another freighter going with her, but she was some little distance away, and I could not say what boat it was, but I know that one of the two boats was carrying quite a heavy deck load, and I am of the impression that it was the one nearest to us, which would be the KAMLOOPS.

The ship seen by Lavers accompanying KAMLOOPS must have been QUEDOC.

The deck load described may have been a factor in the sinking of KAMLOOPS. Ice was discussed as a possible factor in its loss, as the possibility of finding a trace of the ship or of the survivors making it to shore grew more grim (New York Times Dec. 15, 1927):

> It is believed that the missing vessel, fighting against the mountainous waves which swept Superior last week, foundered when the weight of ice formed by the huge waves as they dashed against the vessel in sub-zero weather made the ship unmanageable and brought disaster while she was far from port or sheltered inlet.

A "well known mariner" later added (Sault Daily Star Dec. 17, 1927):

> The KAMLOOPS went up the Lake with a deck load of fence wire ... and I am of the opinion that this is what swamped her. The wire was piled high, and water washing over the deck would immediately freeze there. It would be impossible to remove it, and the cargo and ice would make one huge, heavy and solid mass. It would be impossible to remove the ice or the deck load under such conditions. Other boats have nearly come to grief in Lake Superior from the same cause. I suggest this as being responsible for the loss of the KAMLOOPS, and I believe I am right. The KAMLOOPS became over weighted with the wire and ice and turned over and sank.

The speculation of the mariners of the Lakehead was somewhat different (Port Arthur News Chronicle Dec. 16, 1927):

> Unless something unforeseen has happened, broken steering gear or sprung plates, the KAMLOOPS could have made some beach or shore line, is the general opinion of mariners. The KAMLOOPS was a staunch vessel, heavily loaded perhaps, but nonetheless the ship could have been able to weather the storm, or seek shelter. Mariners do not think the Captain of the KAMLOOPS would allow sufficient ice to form on their decks to put her in danger of sinking. He probably knew his position and, if danger of that kind had arisen, it is more than likely the Captain would have made a run for shore to beach his vessel, is another opinion.

As more time passed without a trace of wreckage, and hope was reluctantly abandoned, the general feeling grew that KAMLOOPS would remain a Lakes mystery (Sault Daily Star Dec. 14, 1927). The Coast Guard ceased its search of the Keweenaw in the face of heavy seas and ice, and suggested concentrating efforts on the shores of Isle Royale and Manitou Islands (Houghton Daily Mining Gazette Dec. 16, 1927). The ISLET PRINCE, which had seen no wreckage, was called back to port by CSL officials. Evidently, no planes were employed in the search for KAMLOOPS (Port Arthur News Chronicle Dec. 15 1927). MIDLAND PRINCE and MURRAY STEWART had also been unsuccessful (Owen Daily Sun Times Dec. 13, 1927).

Company officials, however, remained optimistic. Alex Auld, Canada Steamship Lines superintendent in Toronto, issued a nress dispatch, saying "We have every hope of hearing from the KAMLOOPS yet." He pointed out there was no probability of the ship's food supplies giving out and, as it had no wireless, there was nothing to indicate it was not lying in some sheltered spot inaccessible from land. Auld also said there was "not the slightest" possibility that the boat's cargo had shifted, causing the ship to turn turtle (Ft. William Daily Times Journal Dec. 16, 1927).

Isle Royale and Manitou Island represented the last shred of hope for the searchers. Captain Henry Gehl of the tug CHAMPLAIN believed every bay of Isle Royale should be inspected. "I would like to give the Isle the once-over to be certain. It might be that some member or members of the crew got ashore and are wandering about the island. It must be made certain that no one is on the island before the search for the missing steamer is given up as hopeless" he said (Port Arthur News Chronicle Dec. 16, 1927).

Capt. Gehl was not alone in his belief that survivors might be on Isle Royale. Another tug captain, Sam Wright, said that practically every tug captain, mate and engineer was ready to start a close search of the shore of Isle Royale, and the waters and islands between Port Arthur and the big island, to ascertain the fate of the freighter KAMLOOPS. Wright believed that the missing ship would be found ice-locked on the inner side of Isle Royale between Washington Harbor and Gull Rocks, a stretch of 15 miles of sheer rock where there is no shelter for ships, or else in one of the numerous bays and island-sheltered nooks that extend from Gull Rocks to the outer point of the island (Port Arthur News Chronicle Dec. 17, 1927). The prospect of finding survivors still alive on Isle Royale was considered remote (Daily Mining Journal, Marquette Dec. 16, 1927).

The Fort William agents of Canada Steamship Lines informed the Eagle Harbor Coast Guard that they planned to charter the Dominion Towing and Salvage tug JAMES WHALEN. The tug was to leave Port Arthur on Friday, December 16, to search for KAMLOOPS, proceeding to Isle Royale first and then to Keweenaw, circling the end of the peninsula and Manitou Island (Daily Mining Journal, Marquette Dec. 17, 1927).

One newspaper report, if accurate, changes what is known of the last days of KAMLOOPS. According to the Port Arthur News Chronicle, December 17, 1927, the crew of MARTIAN said that it had almost collided with KAMLOOPS in heavy fog on December 9. This is the only reference located regarding any such occurrence, and may be a case of mistaken identity.

Further efforts to find the missing boat would be undertaken by the company. Tug JAMES WHALEN, carrying extra food and warm clothing, left Fort William on the night of December 19, three days later than announced, to search for KAMLOOPS (Owen Sound Daily Sun Times Dec. 20, 1927). Indications are that this search was a combined mission, for the tug would also pick up lighthouse keepers ending their season (Ibid Dec. 21, 1927). The reason for WHALEN's delay from the first notice of its pending search on December 16 was not stated in this reference. Apparently it was involved in channel clearing operations (Owen Sound Daily Sun Times Dec. 22, 1927).

Company officials received a telegram from JAMES WHALEN on December 21 saying the tug had made a circuit of Isle Royale without finding any trace of the missing steamer. "That the KAMLOOPS was flung against some jutting boulder, cracking in two and sinking almost immediately, now appears the logical solution to the mystery" (Houghton Daily Mining Gazette Dec. 22, 1927).

JAMES WHALEN, with two Canada Steamship Lines captains aboard, searched around Manitou Island and off Keweenaw on the south shore of Lake Superior. The tug returned to Port Arthur about 10:00 p.m. on the 22nd and reported no trace of

KAMLOOPS. WHALEN's return marked the official close of the 1927 navigation season (Port Arthur Daily News Chronicle Dec. 23, 1927; New York Times, Dec. 24, 1927).

During JAMES WHALEN's search for KAMLOOPS, public concern mounted. Citizen pressures to find the missing canaller grew, as did the number of rumors. Letters and editorials on the ship appeared in newspapers in increasing numbers. One popular editorial topic was the need to change regulations to require that all boats carry wireless equipment (e.g., Sault Daily Star Dec. 23, 1927; Port Arthur Daily News Chronicle Dec. 23, 1927).

Assertion of the continued possibility of the ship being ice-bound in a remote area was frequently mentioned in letters to the editor (e.g., Owen Sound Daily Sun Times Dec. 24, 1927). The suggestion that the government should patrol the coast by airplane again appeared. Pressure was also exerted on the government to continue the search with ice-breaking tugs, although none were available at the west end of the Lake. Telegrams had been sent by the Port Arthur Chamber of Commerce and private businessmen to the Minister of Marine and Fisheries in Ottawa, urging that government tugs be employed. These people were assured by the Ministry that it had been in constant touch with the owners of the vessel "with the idea of leaving nothing within reason undone to ascertain the whereabouts of the missing ship" (Port Arthur News Chronicle Dec. 20, 21, 1927).

Rumors circulated widely. The charge that the Canada Steamship Lines was dropping the search and not doing all it could was raised in Fort William and Port Arthur. The company responded through W.J. King, assistant manager of the company (Owen Sound Daily Sun Times Dec. 22, 1927):

> The feeling that Canada Steamship Lines were not pushing the search for the KAMLOOPS as vigorously as they might, was said by W.J. King to be absolutely without foundation, and that on the contrary, everything humanly possible was being done to find some trace of the vessel and its crew.

On December 23 the rumor that KAMLOOPS had been located by some fishermen caused a great deal of excitement in the Lakehead port cities. Supposedly the missing ship was ashore on Manitou Island. JAMES WHALEN was once again chartered by Canada Steamship Lines, this time for a "roving commission" (Detroit Free Press Dec. 25, 1927). Again, there were two Canada Steamship Line captains aboard to supervise the search (Sault Daily Star Dec. 24, 1927). The captains had been authorized by the company to visit any part of the Lake that in their opinion should be looked over, to keep the tug out as long as there was any hope, and otherwise direct operations.

> "They have full liberty to go wherever their judgement dictates and to stay out as long as they think there is any use. They can even go as far east along the south shore as Marquette," said Brock Batten, agent for the Canada Steamship Lines.
>
> Isle Royale waters will again be visited by the WHALEN, making the third time they have been inspected on behalf of the owners of the KAMLOOPS (Port Arthur News Chronicle Dec. 24, 1927).

The Canada Steamship Lines head offices at Montreal flew its flag at half mast on Dec. 24, 1927, a gesture in memory of KAMLOOPS' crew (Ft. William Daily Times Journal Dec. 24, 1927).

JAMES WHALEN was out three days on the final active search for KAMLOOPS. It returned at 5:00 p.m. on December 26, again without sighting a trace of the missing vessel. It had been a thorough search, primarily due to a period of calm weather. The principal search area was around Manitou Island. The only signs of life had been a wolf and an eagle. WHALEN had circled Pie Island and Angus Island opposite Thunder Cape. The Canoe Rocks area of Isle Royale was also searched. In all, more than 500 miles were traveled in the search, which was the first time Christmas Day stillness had been pierced on mid-Lake Superior (Owen Sound Daily Sun Times Dec. 27, 1927; Port Arthur News Chronicle Dec. 27, 1927; Sault Daily Star Dec. 27, 1927).

On December 22, 1927, Arthur Magnan, registrar for the Canadian Marine and Fisheries, Registry of Shipping, closed KAMLOOP's official registry.

The losses of the season were summarized and the Marquette Daily Mining Journal provided a picture of what mariners of the next season might expect (Dec. 24, 1927):

> The bet with the Storm King lost again, the navigation season has come to a close with the wreckage of five steamers and hundreds of thousands of bushels of grain wasted on Lake Superior's and Lake Huron's bleak waters and shores; one ship, the KAMLOOPS, presumably on the bottom of Lake Superior with 20 men, two women and valuable cargo; and the expense of another ice blockade on the debit side of the shipping ledger.
>
> The fad of last-tripping claimed four victims this year, landmarks which will be pointed out in 1928 when the merciless wire ticks out again the order for "that last cargo".

Events of 1928: Discovery of Members of the Crew of KAMLOOPS.

By the beginning of the new year, there was little mention of the loss of KAMLOOPS. In January the Ontario Workman's Compensation Board judged the crew lost and were waiting for receipt of the official report so compensation to the widows and children could begin (Owen Sound Daily Sun Times Jan. 12, 1928; Detroit Free Press Jan. 17, 1928). It was known that there were two women aboard KAMLOOPS during its final voyage. Jennet Grafton and Alice Bettridge were the first and assistant stewardesses. This was to have been the last season on the Lakes for Grafton; it was the second season for 22 year-old Bettridge (Owen Sound Daily Sun Times Jan. 12, 1928).

The opening of the 1928 navigation season began April 17, when JAMES WHALEN began breaking ice at the Lakehead port (Ibid. April 17, 20). The Canada Steamship Lines planned to have the first ships out of port begin looking for evidence of their missing vessel. The company intended to systematically search the north shore of Lake Superior and the entire shore line of Isle Royale. The cutter CRAWFORD would be dispatched from Eagle Harbor to begin its search as soon as the weather and ice conditions allowed movement. Some writers held to the slim hope that some of the crew may have survived the winter.

Ship crews were not the only ones on the lookout for KAMLOOPS' wreckage. A number of pilots flew into Port Arthur and reported seeing wreckage, at first thought to be the missing vessel. The wreckage was not that of KAMLOOPS but LAMBTON (Fort William Daily Times Journal May 16, 1928).

Insurance claims on the missing vessel were settled in February. The net collection of the insurance on the ship was $214,009.05 (Letter from the Montreal Trust

Company to Canada Steamship Lines, Feb. 8, 1928, Queens University Archive, Kingston). The hull and machinery were insured for a total of $168,100 (Letter from Montral Trust Co. to Canada Steamship Lines, Feb. 4, 1928). There were 13 companies carrying hull and machinery insurance and 20 companies involved with disbursements insurance on KAMLOOPS.

On May 26, the electrifying news that the fishermen of Isle Royale had found bodies believed to belong to the crew of KAMLOOPS reached the newspapers (Calumet News May 26, 1928; Detroit Free Press May 27, 1928). The cutter CRAWFORD, which postponed entering the drydock in Duluth at Marine Iron and Shipbuilding for repairs, went to investigate. Two bodies had been reported found by David Lind (Duluth News Tribune May 27, 1928).

The U.S. Coast Guard Cutter CRAWFORD, flying its flag at half-mast, returned the sailors of the missing freighter to Port Arthur. Captain Christianson and executive officer Lt. Woods of CRAWFORD provided the details of the recovery.

> The bodies, both wearing life preservers with "KAMLOOPS" stenciled on them, were reported located near Twelve O' Clock Point on Amygdaloid Island (sic) on the north shore of Isle Royale. They were found along with wreckage of the lost steamer. Fragments of superstructure, including the top of the wheelhouse, a spar with a flag on which was printed KAMLOOPS, and a lifeboat were found in the area between Green Isle and Hawk Island.
>
> Captain. Christianson stated that the wreckage includes all of the boat's hatches, half a lifeboat and five or six pairs of oars. The beach is covered with medicine, candy, tooth paste, and foodstuff carried by the steamer. The reason the steamer was not found until Saturday was because ice on the little bays is just beginning to melt. Indications are that the steamer KAMLOOPS can not be very far from Isle Royale (Duluth News Tribune May 28, 1928).

It is unlikely the bodies were on Amygdaloid Island. It would have required a southwest wind, rare in the winter, for the bodies to have drifted toward Amygdaloid Island. Many contemporary sources erroneously reported Amygdaloid as the location of the bodies. Apparently, Twelve O' Clock Point was believed by some to be to located on Amygdaloid Island -- it is actually located near Todd Harbor on Isle Royale.

The same paper reported that four other ring buoys, marked "EDWARD CHAMBERS," were found among the wreckage. It was believed that these were carried aboard KAMLOOPS as cargo (also reported in The Evening Telegram [Superior] May 28, 1928).

At Sargent's Funeral Parlor, where the bodies were taken, they were searched for any evidence that might indicate the identity of the sailors. There was no material to furnish a clue on one body; the other, however, did produce an identification:

> It is thought that the name of one of the men is J. Journeault, for on his body was found a letter, addressed to him in care of the Sault Canal post office, written in French. In his pockets also were found a $10 bill and a check for $60 made out in his favor by the Canada Steamship Lines (Fort William Daily Times-Journal May 28, 1928).

Journeault's body was sent to L'Islet, Quebec for burial. The unidentified sailor was buried in Riverside Cemetery at Port Arthur. Brock Batten, Canada Steamship Lines representative, made burial arrangements. He selected the caskets for both men and secured the cemetery plot for the unknown sailor (Port Arthur News Chronicle May 28, 1928). Batten made every effort to show respect for the unidentified employee. The funeral was held at the Riverside Cemetery, and the minister of the First Presbyterian Church officiated. The pallbearers were four Canada Steamship Lines captains (Ft. William Daily Times Journal May 29, 1928).

The discovery of the bodies and wreckage prompted the Canadians to mount an air search of the area to locate the other crewmembers and the wreck itself (Owen Sound Daily Sun Times May 29, 30, 1928). Ontario government hydroplane NIGHTINGALE searched the Amygdaloid Island coast, but located no additional wreckage. The pilot reported much ice still in the bays of the area, which delayed the deployment of a search party. In this account, Capt. Martin Christiansen of the coastal steamer WINYAH reported seeing wreckage in the area between Hawk and Green islands. The captain also speculated that the wreck was in deep water, and accounted for the fact that the ship sank on the north side of the island because of a possible mishap to the rudder (Port Arthur News Chronicle May 31, 1928).

A detailed description of the probable location of KAMLOOPS was published in the Calumet News (June 1, 1928; cf. Houghton Daily Mining Gazette June 1, 1928). This report indicated the loss was not Amygdaloid Island, as was frequently reported in the press. Captain Christianson of CRAWFORD was quoted as believing that the wreck was "lying on a rock just off Twelve O'Clock Point on Isle Royale, within 300 feet of the little unnamed bay where [were found] the bodies of two members of the crew and considerable wreckage identified as that of the KAMLOOPS ... in rather shallow water and the ice packs of the winter had torn off the roof (of the pilothouse)."

Legislative ramifications of the loss of KAMLOOPS were being felt at this time. The sinking of the CSL steamer was used as an example of the need for additional lifesaving stations at the upper end of the Great Lakes and also to substantiate the argument for the requirement of wireless sets on all commercial vessels. Those arguments were presented to the House of Commons by D.J. Cowan of Port Arthur-Thunder Bay and R.J. Manion of Fort William (Port Arthur News Chronicle June 1, 1928).

American interests were also represented in the discussion of the opening and closing of the Great Lakes navigation season. D.P. Quinlan was sent by President Calvin Coolidge to investigate the controversy that came about when small shippers on the Lakes charged that the operators of the larger fleets and the Great Lakes Carriers' Association delayed the opening of the 1928 season to benefit themselves. There were 80 civil suits against the operators pending in Cleveland (Duluth News-Tribune June 19, 1928).

Quinlan indicated the government would control the opening and closing dates of the navigation season and would provide equal rights to all vessel operators and to safeguard as much as possible the lives of seamen and vessels. KAMLOOPS was used as the example of a wreck that might have been prevented if governmental restrictions had been in effect.

> It is the belief of Mr. Quinlan that weather conditions in the future will control the opening and closing of navigation. Heretofore, it has been a practice among large vessel owners to insert in their shipping contracts clauses which declare the date of navigation open or closed. Many of these contracts are made without reference to

> weather conditions .... The findings of the government inspection will be presented to the Secretary of War who will issue executive orders to district U.S. engineers relative to navigation dates (Duluth News-Tribune June 19,1928).

On June 4, six more bodies of KAMLOOPS' crew were found, again by fishermen. News of the discovery was relayed to the port cities from Isle Royale by the captain of WINYAH. Brock Batton of the Canada Steamship Lines dispatched the tug CHAMPLAIN to recover the remains, which were found close to Twelve O'Clock Point (Ft. William Daily Times Journal June 5, 1928; Port Arthur News Chronicle June 5, 1928). The tug had four CSL captains aboard to supervise the search, and shipped a gasoline launch for searching the shallow bays and inlet. The bodies were decomposed, but one appeared to be that of a woman (The Calumet News June 5, 1928).

At first, the woman, reportedly found attired in nightclothes, was believed to be stewardess Netty Grafton of Southampton (Owen Sound Daily Sun Times June 6, 1928). The woman was later identified as Alice Bettridge, the assistant stewardess, an identification based on the fact that the body had a set of natural teeth; it was known that Netty Grafton had false teeth (Port Arthur News Chronicle June 7, 1928). The report that Bettridge was found in her nightclothes was denied. Brock Batten stated, "She was fully dressed and wore a sweater and a coat (Ft. William Daily Times Journal June 7, 1928). This evidence supports the belief held at the time by many that the.bodies found were the occupants of a lifeboat that made it to shore. All had been found with lifebelts.

Three other bodies were identified based on pocket contents (Owen Sound Daily Sun Times June 7,1928; Port Arthur News Chronicle June 7, 1928; Port Arthur News Chronicle June 8, 1928). The identified bodies were returned to their families for burial, except for Gauthier, whose address could not be determined. The two unidentified sailors and Gauthier were buried in the Riverside Cemetery in a central plot over which the Canada Steamship Lines erected a bronze tablet commemorating the wreck victims (Ft. William Daily Times Journal June 6, 13, 1928). Although reported, the tablet was apparently never erected.

A ninth body was found inland some distance from shore, believed to be the remains of Honore (Henry) Genest, first mate. The body had no lifebelt, although one was found in the vicinity. It was surmiséd that the first mate was able to make it to shore and remove his lifebelt before succumbing to the elements (Ft. William Daily Times Journal June 14, 1928).

The theory that some of KAMLOOPS' crew may have made it to shore, and there died of exposure, gained support. Those who adhered to this view argued for a complete search of the inland region of Amygdaloid Island (Houghton Daily Mining Gazette June 7, 1928).

Capt. H.J. Brian, brother of the captain of KAMLOOPS, was influenced by this possibility. When he was not able to identify his brother among the bodies found, he mounted an independent search party to find his brother's body. The tug RUTH B, captained by George Burns, was chartered (Port Arthur News Chronicle June 13, 1928).

Brian's search was based on some strong evidence. The fact that a lifeboat had been found and the bodies had lifebelts on indicated there was at least some warning of the disaster. Searchers had reported finding papers in the pockets of the victims as well as other items that had not been water-soaked. Most believed they perished from the cold and not hunger, because of the large amount of food found on the shore (The Calumet News June 15, 1928).

Brian's search took place June 14 and 15. He and his search party returned to Port Arthur on June 16 to report they had found no further remains (Owen Sound Daily Sun Times June 16,1928). The private searchers did, however, report finding evidence of what they believed to be "shelters and resting places that might have been erected by members of the crew of the wrecked steamer" (Port Arthur News Chronicle June 16, 1928). He stated to the newspaper that a shelter of shrubs and brush was found 400 feet from the shore, and Henry Genest was found in it. There was also a quantity of candy, particularly peppermint lozenges, also in the shelter.

> "I am positive that no bodies are along the shore line, after a thorough search. I came to Port Arthur with the idea in mind that they would all be found in the bush, and I go away with the same belief. I am positive the entire crew got away safely from the KAMLOOPS and that they had lived, some of them possibly, for days."
>
> A fisherman living near Todd Harbor, the place where most of the wreckage came ashore, informed the searchers that on a night in December, the date of which he is not certain, he heard a ship, not far in the distance give four blasts of her whistle. At 3:30 o'clock next morning, the fisherman says the whistle blew continuously about an hour.

The CSL Company had sent a party of five "experienced bushmen" to search the island, who were apparently still in the area during the Brian search and returned after Brian had issued his report (Ft. William Daily Times Journal June 15, 18, 1928). The party returned to Port Arthur and Brock Batten issued the following report (Port Arthur News Chronicle June 19,1928):

> This party made a very thorough search of the whole vicinity .... They went up and down the shore line for a couple of miles on either side of the apparent location of the wreck and they went inland a couple of miles, over the same frontage. Their report is that they saw no trace whatever of any of the crew having survived the wreck and spent any time on shore.

Capt. Brian did not respond directly to the statement of the other searchers. However, he did give some additional comments after the Canada Steamship Lines statement was published (Owen Daily Sun Times June 20, 1928):

> Captain Brian says that in his own search he found a set of false teeth and a woman's wig, which he was informed tallied with Miss Grafton. Miss Betteridge [sic] had natural teeth. The captain thinks that the finding of the wig and teeth would suggest that they were from one of the bodies already recovered. He is of the opinion that one of the bodies having male attire and already buried is that of Miss Grafton of Southhampton.
>
> Explaining further his belief that many of the crew reached shore alive, Captain Brian offers the statement that he found articles from the wreckage of the boat carried up onto the shore, farther he says than they could have been washed by the waves, and also in condition to suggest that they had been tampered with by human hands. Had these human hands been of the fishermen who remained late on the island, reports of their finding would have early reached

> the outside world last fall. No such reports have been heard. The articles in question were principally boxes of candy, and the captain believes some of them were used as food.

The discrepancies between Brian's reports and the searchers hired by Batten only added to the mystery shrouding KAMLOOPS' loss. Apparently the public felt that Canada Steamship Lines was not doing everything possible to recover the missing crewmen, and was perhaps even hiding something.

Brock Batten, who served as company spokesman and director of the search and recovery operations undertaken by Canada Steamship Lines, issued a statement to the newspapers detailing the efforts that had been made to learn the fate of the missing crew. The account of Batten's comments to the press was carried in the Port Arthur News Chronicle (June 21, 1928):

> Mr Batten particularly explained why the officials of his company feel certain all members of the KAMLOOPS' crew met their death when the steamer went to its doom, and why they do not credit suggestions that they reached shore alive to perish afterwards of hunger and exhaustion.
>
> Asked particularly with regard to Henry Genest .... "It is possible Genest did reach shore alive," said Mr Batten. "The evidence seems to indicate that he was tossed up on the bank and succeeded in walking or crawling a short distance back. I do not believe he was, however, the occupant of a life boat. He was more likely washed over from the ship. This is the opinion of our captains, who have had the experience to know what might be happening at such a time. We all believe the most plausible explanation with regard to the others whose bodies have been found is that they were working at the lifeboat which has been found among the wreckage when they were engulfed. We do not believe they ever entered the lifeboat. If they did the chances were all against them getting ashore, because of the backwash of the waves and the nature of the shore line. One man in a safety suit might be thrown up where he could get a footing if he were carried by a particularly high wave, but those in a boat could not be so fortunate. Genest apparently was the only one on the KAMLOOPS who had donned a safety suit. If any of the others had done so, their bodies would most likely have been found as they would thereby at least have been kept floating. The safety suit would keep a man afloat, but would not save him from exhaustion or exposure to the cold. It was thirty below zero at that time and snowing.
>
> Asked with regard to reports that shelters have been found at Isle Royale which might have been used by members of the missing crew, Mr. Batten pointed out that Isle Royale for many years had been a camping and tourist resort and the working ground of fishermen, and the finding of a rude shelter had no significance. It might have been built by anyone at any time.
>
> Batten listed the various search and recovery parties that the company had dispatched: the MIDLAND PRINCE, the week-long survey of the north shore by ISLET PRINCE; Tug WHALEN searched when it went out to get the lightkeepers and circled Isle Royale closer to shore than MIDLAND PRINCE was able to reach; WHALEN searched a second time, going all the way to Keweenaw; CRAWFORD made two trips to the island to recover bodies and made limited searches each

time. The last search expedition was by the five men who searched the island.

> They reported to us yesterday they had carefully examined fifteen miles of shore line and on a front of four miles, two miles either side of the wreck, had worked inland for about two miles at distances apart of only 10 feet and could find neither bodies nor evidence that anyone from the KAMLOOPS had been ashore to live. They are of the opinion that there is no reason to continue the search.
>
> ... friends of the missing ones and the public may rest assured that every effort is being made, as it has been made, to continue fullest information regarding the crew of the missing steamer, and to hide nothing (Port Arthur News Chronicle June 21, 1928).

The next day the same paper ran an editorial comment on Batten's statement that gives some insight into the public sentiment (Port Arthur News Chronicle June 22, 1928):

> Even though the statement comes at what we consider a rather late date, it will nevertheless be welcomed by the public. The attitude taken by the officials of the Canada Steamship Company toward the public was not by any means satisfactory. The loss of the ship involved much more than the interests of the company .... The public was entitled to a frank statement of what the company was doing, the extent of the search that was taking place at the time it was being made.
>
> ... But this knowledge was not given them. The whole proceeding was surrounded with mystery.
>
> The same unsatisfactory procedure was followed when the U.S. cutter CRAWFORD brought the dead bodies of two of the ill-fated crew of the KAMLOOPS to Port Arthur. Orders were issued to dock attendants to close the docks and not permit any person to approach. The undertakers were given orders to give out no information. The newspapers were compelled to get information from whatever source they could in regard to the finding of the bodies. When other bodies were brought to port, every possible precaution was taken to prevent information getting to the public.
>
> This attitude of the company could not but arouse suspicion in the public mind that there was something to hide. However unfounded this suspicion might be, it continued, and Mr. Batten can count himself extremely fortunate if it is dissipated by the statement he just made of the measures taken by the company to deal with the situation when it first arose and subsequently when the remains of the unfortunates were found.

Batten's statement did not dissipate the public feelings, at least with some of the people directly involved. Captain Brian, who had returned to his home town of Kingston, returned to Port Arthur a few days later to mount another search of the island for his missing brother and the other crewmen (Ft. William Daily Times Journal June 22, 1928).

The final search for the bodies of the crew of KAMLOOPS left June 23 for the wrecksite. Captain Brian who organized the search had little to say regarding the expedition other than that he had procured the participation of James Higgens of the Canadian Forestry Department to take charge of the actual operations in the woods and that he planned to be out with the party of seven men for six days.

> When asked to explain his belief that there were bodies to be found in the woods, proving that some of the crew of the KAMLOOPS reached shore alive, Capt. Brian said he needed nothing more than the recent official statement from the Canada Steamship Lines, wherein it was admitted that the body of Mate Henry Genest had been located 100 yards from shore under conditions which indicated that he had reached there alive (Port Arthur News Chronicle June 23, 1928).

Capt. Brian and the search party returned to Port Arthur after six days. Nothing was found to shed further light on the fate of the steamer and its crew (Detroit Free Press June 30, 1928).

An official crew list has never been located. Press reports of the number aboard included 20, 21, 22, 27 and 29; the most frequently cited totals for the crew were 20 and 22. A roster of 20 people was compiled from crew lists published in the Port Arthur News Chronicle on December 15, 1927, and again on June 6, 1928 and the Fort William Daily Times Journal of Dec. 15, 1927:

Captain William Brian, Toronto (Kingston)
First Mate Henry Genest, St. Thurbie
Second Mate J. Poitres, L'Islet
Watchman P. Lalonde, no address
Watchman J. Journeault, L'Islet
Wheelman Leon Laroche, St. Antoine
Wheelman Victor Latham, Sarnia
Deckhand R. Tooley, Toronto
Deckhand M. Mckay, Fort William
Deckhand G. Gauthier, Quebec
Deckhand A. Morton, Toronto
Chief Engineer J.A.C. Hawman, Collingwood
2nd Engineer R.E. Eashney (Dashney), Coldwater
Oiler Robert Owen, Toronto
Oiler Fred Brown, Collingwood
Fireman Andy Brown, Collingwood
Fireman Harry Wilson, Port Arthur
Fireman Sam Lamont, Phelpeston
Steward Netty (Jennet) Grafton, Southampton
Assistant Steward Alice Bettridge, Southhampton

There was no mention of the KAMLOOPS tragedy in the press until the following year. In January it was reported that a note from one of KAMLOOPS' crew had been found a month earlier. Louis Coutu, a trapper, found a bottle containing the note at the mouth of the Agawa River in Canada. The first news of the find reached Sault Ste. Marie by way of another trapper, who reported the note said, "We are freezing to death." At first considered a ghastly hoax, the family of Alice Bettridge identified her writing on the note (Detroit Free Press Jan. 22, 1929; The Evening Telegram [Superior] Jan 22, 1929).

Coutu arrived in Sault Ste. Marie soon after the news of his discovery. At first he refused to divulge the contents of the note, saying "the people of the Sault don't give me anything for nothing. If they want something I've got, they can pay for it or go without." The trapper eventually did turn the note over to Capt. Brian. Brian took it to the parents of Alice Bettridge, who identified the writing as that of their daughter (The Evening Telegram [Superior] June 22, 1929).

Through the efforts of Thom Holden, the text of the Bettridge note has come to light from interviews with Alice Bettridge's relatives. In November 1976, two brothers, a sister, and a sister-in-law were interviewed in Sarnia and Southhampton. Apparently the exact contents of the note were not published by the contemporary press. Surviving relatives of Alice Bettridge recalled the note saying, "I am the last one alive, freezing and starving on Isle Royale. I just want mom and dad to know my fate. Alice Bettridge." Present whereabouts of the note are unknown. Family members believe it no longer exists.

Discovery of KAMLOOPS

The location of KAMLOOPS remained one of the mysteries of Lake Superior until August 21, 1977. On that date Minneapolis sport diver Ken Engelbrecht spotted the dark shadow of the wreck during an exploratory dive searching for KAMLOOPS. Engelbreht, along with dive partner Randy Saulter of Mounds View, was carrying out a systematic search in the area known as Twelve O'Clock Point. The dive team had been directed to the possible site of the wreck by Roy Oberg, captain of the VOYAGEUR II. Oberg had made a fathometer tracing several years earlier in the area that indicated a shipwreck lying on its side (Press release by Ken Engelbrecht and Thom Holden, 1977).

The wreck was found while diving off Ken Merryman's boat HEYBOY, on the second day of the search. On earlier dives, bits of cargo, such as a brass barrel and a ladder, were sighted. Then, "enough pipe to fill a semi-truck." On the last dive of the weekend, Engelbrecht, at a depth of 195 feet "saw this really big shadow, the KAMLOOPS, and this other shadow coming out of it, which was the flagpole. I got a really big rush and started trucking over there" (Minneapolis Star Oct. 13, 1977).

The next dives on the wreck were done September 5 and 6, 1977, but there was some doubt that the wreck was indeed KAMLOOPS.

> The real proof, he [Ken Merryman] said, came after the second dive when pictures, on close inspection, showed the ship's name peeking out through the years of accumulated rust and underwater debris on the freighter's stern ...
>
> The wreck lies on a steep slope. The stern is toward shore, about 195 feet below the surface at its shallowest point. One of the first things the divers check is the condition of the rudder and propeller; they seem to be intact.
>
> The divers go to the back deck and examine a large wooden wheel. It's apparently an auxiliary steering wheel for emergencies, because the main steering equipment would be in the pilothouse near the bow of the ship ....
>
> They note that the glass in a skylight over the engine room is intact, snap some more pictures and move forward along the 250-foot ship ....
>
> They see other artifacts: The inside of a cabin, a string of new shoes to be sold in some Canadian store, a drum with steel cable neatly rolled on it, a running light that looks in good condition.
>
> They can't make it to the pilot house at the front -- it's too deep. But they get about two-thirds of the way forward and they can

see the pilothouse, with its top shorn off [its roof was found in the 1920's along with other debris].

The best theory about the sinking ... according to Holden, is that the ship lost its steering and drifted at the mercy of the storm.

"It's quite possible that the final disaster occurred because of a massive ice buildup" on its deck caused by waves crashing on the freighter and freezing in the bitter cold, he added. He emphasized that the theory isn't proven ....

Merryman said what they've been able to inspect of the ship bears that theory out. "All the other wrecks around Isle Royale have their bows smashed up and pointed to shore," Merryman says. The KAMLOOPS has her stern to the shore and it's intact. The bow, 270 or more feet below the surface, retains its secret (Minneapolis Star Oct. 13, 1977).

Later dives by those and other divers add to what is known of the last moments of KAMLOOPS. A party led by John Steele filmed the wreck in 1978. This expedition discovered that the engine telegraph was set at the "Finished With Engines" position, indicating the engines may not have been operational at the time of sinking, or that the vessel was laid to before the disaster. Steele's party made the following speculations based on their observations:

In the position of her last sighting and in the raging storm, a guy wire attached to the port side of KAMLOOPS' stack snapped or tore free. The stack, no longer secure and positioned only by gravity, toppled to the starboard side shearing off the ventilators and crashing overboard breaking through the starboard railing atop the stern cabin.

The coal fired, forced draft engine could not function without the stack. The crew was forced to "finish" the engines. If there had been power available, they would have been put on "Standby" not "Finished With Engines." KAMLOOPS' power plant was shut down before she sank. With no power, she was at the mercy of the raging storm and the northeast gales tossed and blew her toward Isle Royale.

She hit Isle Royale broadside, smashing her starboard bow. Temporarily, she remained fixed on the reef, quickly taking on water she rapidly sank bow first to rest at the foot of the reef.

The crew probably thought themselves safer aboard rather than facing the icy seas and sub-zero temperatures. They probably hoped she would remain foundered on the reef, leaving a potential for rescue. However, the opened cabin door may indicate a hasty departure of crew members as they realized their doom .... The other twelve crew members probably remain trapped in the stern house, yet to be opened (Schuette 1979:41).

Because of the hazards involved with conducting air dives to the depth of KAMLOOPS, particularly in frigid water, a decision was made by the Submerged Cultural Resources Unit not to document the site using dives. In 1985 the opportunity to visit the site was offered by Michigan State University/Sea Grant using the sea link submarine from the Research Vessel SEWARD JOHNSON. SEWARD JOHNSON was not able to deploy over the site so the focus of their visit was turned to other research objectives. In 1986 a very successful mission was carried out on KAMLOOPS using two miniaturized Remote Operated

Vehicles. The latter was a joint venture of the National Park Service and National Geographic Society.

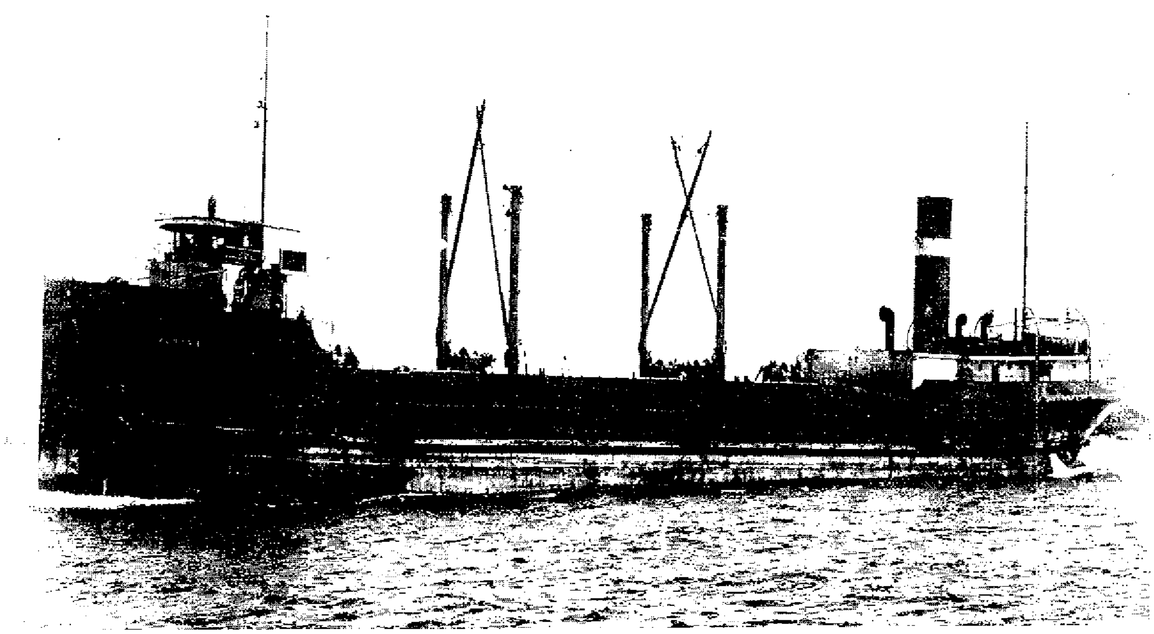


Fig. 4.28. KAMLOOPS, a canaller built for the package freight trade as it appeared at the time of loss. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

DUNELM: HISTORY

Construction

DUNELM was a steel package freighter built by the Sunderland Shipbuilding Company of Great Britain. The ship was registered at Sunderland, Official number 123950. The propeller was built in 1907 for Dunelm, Ltd., also of Great Britain. Hull No. 246 had a keel length of 250 feet, beam of 43.2 feet and a depth of 23.5 feet, and was built to pass through the Welland Canal. DUNELM was 2,319 gross tons and 1,481 net tons with a capacity of about 3,000 tons (Toledo Blade Dec. 8, 1910).

The British-built steamer was powered by a triple-expansion engine with cylinders of 19.5, 33 and 54 inches in diameter on a 36-inch stroke. The two Scotch boilers were 12.6 feet x 11.6 feet. The engine was built by Northeastern Marine Engine Works.

DUNELM, although never registered in Canada, was managed by James Playfair in association with the Canadian companies Richlieu & Ontario Navigation Company of Montreal, and Inland Lines, Ltd. of Hamilton, Ontario. In 1913 these were merged with Canada Steamship Lines, Ltd.

There has been little research into the operational history of DUNELM, other than the incident that occurred at Isle Royale. It is known, however, that DUNELM was wrecked en route from Sidney, Nova Scotia, for England in 1915. The boat was primarily involved in the trading between the Canadian Lakehead and the lower Lake ports (from notes on file at the Institute for Great Lakes Research).

Wreck Event — Stranding at Isle Royale

Underwriters were notified on December 7, 1910 that the Inland Navigation Company package freighter DUNELM, downbound from Ft. William to Goderich, Ontario with a load of wheat flour (Toledo Blade Dec. 10, 1910; Wreck Register, Record Group 12 Vol. 1007:121), was ashore at Isle Royale. The first reports of the stranding were received in Port Arthur by wireless from the steamer F.B. SQUIRE; apparently DUNELM was not equipped with a wireless (Daily Mining Gazette Dec. 9, 1910). The position of the stranding was first given as Blake Point near where MONARCH was lost in 1906 (Detroit Free Press Dec. 8, 1910). DUNELM, like some other shipwrecks of Isle Royale, was wrecked on its last scheduled trip of the season.

The stranded vessel was reported in bad shape, and James Playfair summoned the Canadian Towing and Wrecking Company of Port Arthur to its aid. DUNELM was in command of Capt. C.R. Albinson, with J.A. Nicol as chief engineer and a crew of 18. The first reports gave no indication of whether there was loss of life (Toledo Blade Dec. 8, 1910).

The captain and 21 crew all arrived at Port Arthur on the afternoon of December 9 aboard the tug WHALEN, with reports of the condition of their vessel. The wreckers had been driven away by heavy weather. The steamer was lost in a snowstorm while trying to get through Passage Island gap. Fourteen feet of water stood in the engine room, but the hull compartments were dry. "They report the steamer is resting easily on the rocks, but in an exposed and dangerous position should a heavy sea come up. The hull is badly punctured forward. The lighter EMPIRE is standing by ready to start work" (Detroit Free Press Dec. 10, 1910).

The owners, after viewing DUNELM, gave up hope that the ship could be saved, and the wreck was abandoned to the underwriters on December 14. The value of the loss was placed at $100,000 (Detroit Free Press Dec. 15, 1910). The next day the underwriters announced they were taking salvage bids on a no-cure, no-pay basis (Toledo Blade Dec. 15, 1910). (In this account the captain of DUNELM is listed as Featherston.)

The Canadian Towing and Wrecking Company took the contract and Capt. Morrison was put in charge of the operations. The work was carried out in the face of heavy waves that continually pounded the wreck. It was feared that the waves would push DUNELM off the reef's edge to sink in the 500-foot depths. (This report accurately gives the location of the wreck as Canoe Rock rather than Blake Point.) The weather grew colder and the salvage vessels became covered with ice, making the difficult salvage job that much harder. Some days nothing could be done, and at times the salvage efforts seemed hopeless (Detroit Free Press Dec. 21, 1910).

On December 21, Port Arthur received the wireless message that DUNELM had been freed and was safe at anchor in Duncan Harbor. The ship would be towed to Fort William and would be the first vessel to use the new dry-dock facilities that had just recently been completed. In the Dec. 21 account, DUNELM's cargo was listed as general merchandise (Detroit Free Press Dec. 21, 1910; Detroit Free Press Dec. 29, 1910).

Sarah Moore Morrison, wife of Capt. Morrison's son Neil, wrote the following poem commemorating the stranding and salvage of DUNELM (originally published in a book of poetry by Sarah Morrison titled Scenes and Hours [from notes in the Michigan Technological University Archives by Neil F. Morrison and published in the Fort William Daily Times Journal and Nordic Diver, Winter 1975.]

At the head of navigation
Of our Great Lakes waterway,
Stand Port Arthur and Fort William
Looking out to Thunder Bay.

In the busy sailing season
Vessels come, unload, and fill,
But they tie up for the winter
When the ice-bound Lakes are still.

Yet one Christmas at Port Arthur
People gathered at the quay:
Why should they be there on Christmas--
What was there for them to see?

Bitter cold it was that morning
When the DUNELM stood at dock.
Salvaged after two weeks' effort,
Stranded on a ledge of rock.

Stranded where the Great Lakes' MONARCH
Met her doom some years before
On Isle Royale in Lake Superior,
Broke in two, sank aft and fore.

On her last trip of the season
And her last forever more.
But the DUNELM held together,
She was floated, towed to shore.

And the people hailed her gladly,
And they hailed the rescue crew,
Glad to have them home for Christmas,
After all they had been through.

In the cold and stormy weather
They had stayed when hope was slight,
They had worked with skill and patience,
They had laboured day and night.

Sheathed with ice the rescued freighter
Had a dignity new born;
She looked stately at her moorings
On that clear, cold Christmas morn.

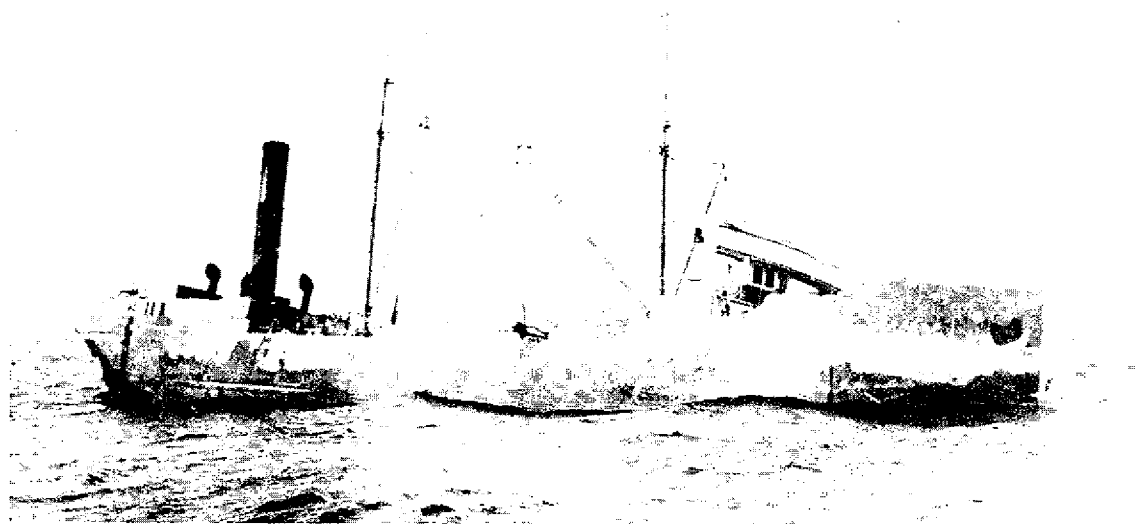


Fig. 4.29. Package freighter DUNELM aground at Canoe Rocks, Isle Royale December 1910. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

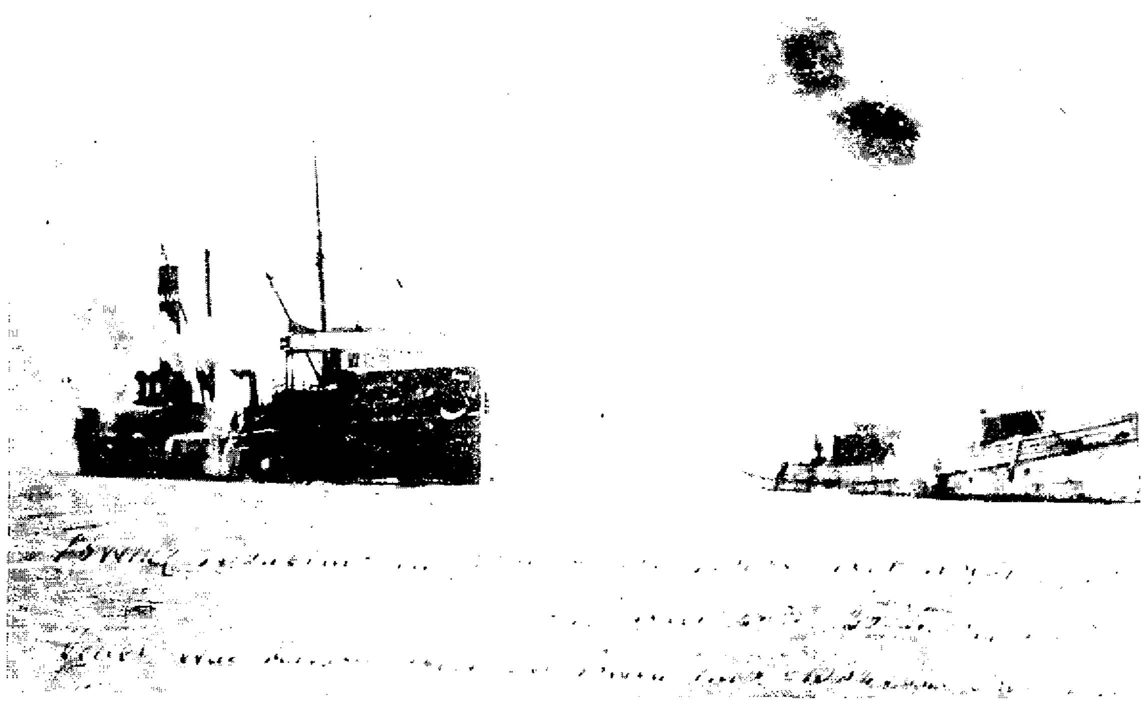


Fig. 4 30. DUNELM under tow after release from the stranding at Canoe Rocks. U.S. Army Corps of Engineers Canal Park Marine Museum Collection.

CHAPTER V. SHIPWRECKS OF ISLE ROYALE: THE ARCHEOLOGICAL RECORD

Introduction

This chapter consists of a series of analytical descriptions of each of the principal shipwreck sites at Isle Royale. For each site a depiction is developed through graphics and narratives of the remains on the Lake bottom. Empirical observations are interspersed in the narrative with references to those aspects of the historical record that most influenced our approach to data recovery in the field. The best way to understand any preconceptions held by this research team in its interpretation of the archeological record is to read, in its entirety, the historical record section of this report, which identifies all of the archival elements thought pertinent to the archeological analysis and site interpretation.

The historical record has been isolated in this document to emphasize an overall philosophical approach to Historical Archeology. Archives and oral accounts were used to establish that major wreck events had occurred and to indicate contemporary notions about what happened and why. A chain of evidence was then developed to support a constantly evolving explanation for how each ship was transformed into an archeological site due to the wreck event and subsequent post-depositional processes, whether natural or cultural in nature.

In each case, the archeological record is seen as the hard evidence that confirmed, controverted, or augmented the historical record. In many instances, on-site observation also suggested new areas of inquiry. Establishing a range of expectations from the written and oral traditions enabled identification of more fruitful lines of inquiry much quicker than would have been possible in a totally inductive framework. Generic and specific research questions are explicitly stated in the research design section of this report (Chapter I). The analyses presented address most of those questions and in all cases were guided by them.

The amount of time devoted in the field to each site was variable dependent on several factors. The intact vessels, for the most part, received less attention than the ones that were broken and scattered. In a dispersed wreckage field the archeological record requires more explaining; i.e. there is more discussion necessary to establish the identity of each piece of vessel fabric. The more intact the wreck, the less time needed to ascribe function or significance to specific pieces of structure or machinery.

Additionally, in the decision-making process about time allocations in the field, more weight was given to those sites representing vessels without plans and to the older wooden vessels, which, coincidentally, ended up being the same ships. Also, wood usually breaks in discrete units and individual components retain much of their original form, much like pieces of a jigsaw puzzle. In contrast, steel plates in a high-energy site buckle, fold, and adopt shapes that are generally irrelevant to the process of archeological reconstruction. Consequently, more latitude was given to the illustrators in portraying fine details of dispersed metal wreckage than dispersed wooden pieces. One may expect, therefore, that the details in the portrayal of the twisted structural remains of GLENLYON, for example, may not match the level of accuracy inherent in drawings of CHISHOLM, CUMBERLAND and MONARCH. In the case of ALGOMA, a decision was made to document only a representative sample of the wreckage fields, because it would have been extremely expensive and time-consuming to produce a high-resolution map of this widely scattered site, much of which lies in deep water.

As with all archeological endeavors, the provenience of the material remains and the judgment of the researchers determine where "sites" begin and end. For this report, artifactual material that was spatially continuous or contiguous was seen as composing one site, regardless of the nature of the cultural material itself. Consequently, the wrecks of CUMBERLAND and CHISHOLM are treated as one site because their remains overlap spatially on the Lake bottom. These two ships are, of course, treated separately in the historical record chapter (IV). EMPEROR and DUNELM are also treated as one site for the same reason; it is only the analysis of the remains that ascribes separate identities to the wreckage of EMPEROR as opposed to the nearby anchors and other residues attributable to the DUNELM stranding event. The latter event did not end in complete loss of the vessel, but did result in a limited amount of material residues.

The one exception to the rule in the way sites were defined for this presentation is in the treatment of a piece of ship structure located off Cumberland Point several miles from the main concentrations of CUMBERLAND wreckage. there is compelling evidence that this piece of structure is indeed a portion of CUMBERLAND, which was deposited there after the wreck event, and because it was convenient from an organizational point of view, it was included as part of the CUMBERLAND/CHISHOLM site description. In all, this section will include 9 site descriptions encompassing 11 separate shipwreck events.

Observations

Although the specific problems identified for each site in the research design are addressed in the context of the individual site discussions in this chapter, there are some observations that can be made related to issues identified in the general problem statement.

First, the material remains of vessels at Isle Royale give the impression of industrial intensity even more than is indicated in the historical record. There is little in the way of recreational vessels or vessels designed solely for passenger excursions represented in either the major shipwreck population or the number of small craft wrecks, which are primarily fish tugs. This is not necessarily compatible with expectations because there was significant resort-oriented activity at Isle Royale as evidenced from examination of land based sites (Chapter VI) and the historical record.

Regarding the role Isle Royale played in Lake Superior navigational history: it is clear that it was more than just that of a natural obstacle to shipping. At least one of the major shipwrecks (AMERICA) was intimately tied to the island, and many of the smaller wrecks were tied to fishing or support activities of the island population. Resource extraction was a major motive for prehistoric and historical human activity in the area followed temporally by recreation and leisure values that eventually predominated, resulting in the island becoming a national park.

The number of modern wrecks associated with the bulk trades is remarkable. It is rare to work in an area in which there is such a disproportionate amount of post-1900 shipwrecks. Even considering the shorter history of maritime activity compared to the Atlantic seaboard, for example, the fact that there are no known shipwreck sites representing sailing vessels would not be predictable from the historical record alone. This disparity is additionally noteworthy when one considers that steam vessels had much greater flexibility in coping with navigational problems associated with shipping environments with limited sea room; i.e. they could maneuver without dependency on wind conditions. If one were only to use the visual remains at Isle Royale and never open a book or visit an archival collection, the impression would be one of steam mayhem. It would suggest to the viewer that something about the nature of steam applications on Lake Superior (perhaps differential capital investment from that associated with sail) was resulting in increased risk-taking ventures than under sail. The preponderance of steam vessels could also be the result of the formation of shipping lanes after the decline of sailing vessels. It is not at all clear that this situation is replicated on the eastern and western U.S. seaboards. In Florida, California, Cape Cod, and numerous other areas investigated by this research team, it would be extremely unusual to have no sailing vessels represented in a shipwreck population of 10 major vessels. Even if the answer is that "they haven't been found yet" at Isle Royale, it is still noteworthy that the first 10 located are all steam, and it is unlikely a comparable population of sailing vessels has thus far escaped detection.

Some other general observations derived from examination of the material record has to do with post-depositional processes. The lack of superstructural remains from the vessels is notable, as is the fact that in all the ten complete major losses at Isle Royale, including the "intact" sites, the pilot house remains in place only on CONGDON. This would not have been predicted before examining the sites. Although it is understandable that lighter structural remains would be less well-represented in the archeological record than the heavy hull components, it is surprising that in a fine preservation medium such as cold, fresh water, almost nothing related to superstructure remains. The lesson this leaves the viewer with is that superstructure, which is the least well documented part of a vessel in construction plans, is also going to be the least well-represented under water. It is also the part of the ship that is the most dynamic in an architectural sense, because it changed the most over time. These modifications are, of course, the signatures of adaptive behavior to meet exigencies of social change and vessel use. The ability to compare the modifications against the original intent, for function and form evident in the hull construction, is what is lost when one loses superstructural remains.

Another general observation that can be made is wooden vessels of the construction dates as represented at Isle Royale (1871–1890) tend to break apart in a very predictable fashion. They disarticulate along the turn of the bilge into fairly large discrete units. The point of greatest variability in the wreck process on the hull of the vessel is the bow, which is not well represented in any of the three wooden ships wrecked at Isle Royale.

There is much to suggest from the individual site analyses in this chapter that ice damage is a significant factor in the site-formation process, preceded only by the short period immediately following the wreck event in which the ship is often in a high-energy zone, and by those processes which can be related to human activity -- "C transforms" in the sense of Schiffer (1976:12-19).

There are two points at Isle Royale where there is a clustering effect for shipwrecks. One is Canoe Rocks and the other is Rock of Ages. It is not surprising that ships tended to pile up in these areas because they represent points that either course changes were taking place, or that a vessel was at most risk just prior to making a course change to avoid Isle Royale. The composition of the concentration at Canoe Rocks, however, has implications for understanding the economic dynamics of the period of vessel losses.

All the shipwrecks in the vicinity of Canoe Rocks were downbound from Port Arthur or Fort William. The locations, time of loss, cargo and type of vessel closely fit the model of Lake Superior shipwreck distribution developed by Hulse (1981).

The spatial distribution model of Hulse links site location to transportation, rather than settlement. The model reflects the cultural history generally and the transportation industry specifically. The shipping industry was structured by trade routes, industrial development and the physical environment. Hulse demonstrated that shipping is a non-random, culturally patterened phenomenon, and consequently shipwrecks will similarly be patterned and non-random in their distribution (Hulse 1981:2).

The typical downbound navigation route from Port Arthur and Fort William contains four course changes after leaving Thunder Bay. The first two are made to avoid Isle Royale. The first course change is made at the mouth of Thunder Bay as Pie Island and Thunder Cape are passed. This course alteration aims the vessel directly for Passage Island, the shortest route around the north end of Isle Royale. Navigational errors in setting and maintaining this course contributed directly to the Canoe Rocks and vicinity wrecks. The second alteration occurs immediately after clearing Passage Island and corrects for the shortest course to Whitefish Point The construction of the lighthouse on Passage Island in 1882 greatly diminished the potential for wreck occurrence at the second course change; consequently, there are no known wrecks after that date in the area.

The known sites on Canoe Rocks reflect the heavy bulk traffic of the late nineteenth to mid-Twentieth Century. The shipwrecks of Canoe Rocks: EMPEROR, CONGDON, DUNELM as well as MONARCH (wrecked on The Palisades just in-shore of Canoe Rocks) were all carrying Canadian cargoes, and all but CONGDON were Canadian vessels. The location of these wrecks reflect the growth of Canadian freight trades, primarily iron ore and grain.

Canadian grain production moved westward in a similar pattern as that of the United States (see Chapter III). Port Arthur and Fort William, Ontario became the major Canadian ports on Lake Superior soon after the completion of the Canadian Pacific Railway, which connected Port Arthur with Winnipeg in 1883. Prior to this date, most Canadian grain was shipped out of Duluth.

Continued settlement of the Canadian Northwest and the growth of grain production was ensured by the construction of additional rail lines. Port Arthur and Fort William were the principal grain shipping ports of Canada until about 1920. These ports diminished in importance as a result of the development of the Pacific coast route becoming a viable alternative to the Lakes route after the completion of the Panama Canal in 1914. Port Arthur and Fort William, however, remained important grain exporting ports well into the mid-Twentieth Century (Nute 1944:140, 316). MONARCH (1890-1906) carried grain, flour, and package freight on its last voyage.

CONGDON (1907-1918) was loaded with wheat when it was wrecked. DUNELM, stranded in 1910, carried a load of wheat flour.

Iron ore shipped from the Canadian Superior port cities never reached the magnitude shipped from the American ports. Ore bodies comparable in size to those on the south shore of the Lake were not discovered on the north shore. The source of iron ore shipped out of Port Arthur and Fort William was the Steep Rock mine west of Port Arthur in the Atikokan district. The mine was discovered just before 1940; mining operations began in 1942 after the Steep Rock Lake was drained. A new ore dock was built at Port Arthur for the trade (Nute 1944:155-6). EMPEROR, sunk in 1947, was carrying 10,000 tons of Steep Rock Mine ore.

The other principal export of the Canadian Lakehead was lumber. There are no wrecks currently known on the north side of Isle Royale with a load of lumber. Basing a prediction on the pattern of ship loss that develops from those in the vicinity of Canoe Rocks, it is likely that one exists, yet to be discovered.

ALGOMA and KAMLOOPS, vessels wrecked well away from either end of the island, were the result of severe storm activity, and possibly equipment failure in the case of KAMLOOPS. GLENLYON was wrecked while seeking shelter from a storm. Outside of the attributes of cargo and general location, the final location of these ships could not have been predicted from the distribution model.

On the south end there also is a concentration of shipwrecks. Three vessels are wrecked in close proximity over a period of 44 years. CUMBERLAND and COX wrecked on Rock of Ages while downbound from Canadian ports to Duluth/Superior. Because of participation in the passenger/package trade on the North Shore, their final location could have been anticipated. CHISHOLM, in contrast, was a bulk freighter that had left Duluth downbound with a cargo of grain for Buffalo. The ship was caught in a storm and released its tow, which was a schooner carrying a cargo of lumber. CHISHOLM was lost as a result of navigation error while searching for its consort around the south end of Isle Royale. Its location could not have been anticipated by the generally accurate shipwreck distribution model of Hulse. Some shipwrecks occur as a result of activity not anticipated in a general distribution model.

CUMBERLAND/CHISHOLM: SITE DESCRIPTION AND ANALYSIS

Site Location

The wrecks CUMBERLAND, CHISHOLM, and COX are on a shallow reef southwest of Rock of Ages lighthouse on the south end of Isle Royale. The vessels are within a square, 3,000-feet on a side, with its geographic center at 47°51'28"N and 89°19'32"W. The center is 3.9 statute miles from the starboard-hand nun buoy at Cumberland Point on a true bearing of 275 degrees. It is 336 degrees true from the starboard-hand nun buoy southwest of Rock of Ages lighthouse and 222 degrees from the lighthouse a distance of 4,000 feet (useful for chart plot). On site location is best from North Rock: the site is 258 degrees true, 2.4 statue miles from the rock.

Site Description

The wreckage of CUMBERLAND and HENRY CHISHOLM are intermingled near the lighthouse at Rock of Ages reef. They represent two wreck events separated by 21 years, but because their remains overlap on the Lake bottom, they will be treated as one site in the archeological record. The historical background of these vessels leading up to the wreck events is presented in detail in Chapter IV.

In addition to providing a remarkable museum-like exhibit on late-Nineteenth Century wooden vessel construction, the CUMBERLAND/CHISHOLM remains, when closely examined, reveal much about both wreck events and the subsequent post-depositional processes. First impressions of this site by divers have been characterized by phrases such as "mass confusion" and "huge jumble of timbers." What at first appears to be a hopeless jigsaw puzzle makes good sense, however, when attributes peculiar to each vessel are discerned, and the whole is reduced to manageable size on paper. Given the constraints of underwater visibility and the large size of the site, divers can never see more than a small fraction of the wreckage at one time. This makes accurate mapping critical to obtaining an understanding of the site.

It is apparent from a brief perusal of the site map in Figure 5.1 that the two vessels comprising the site are broken into several large, discrete units. Most of these structural elements are spread through a single underwater ravine that ranges in depth from 20 to 80 feet. The exceptions are the rudder of CHISHOLM located part way down the reef, the portion of hull on which the CHISHOLM engine rests (V) in 140 feet of water, and a disarticulated piece of hull (IV) that lies next to it at 150 feet of depth. These latter pieces are at the bottom of a drop-off that fringes the rock reef that in turn surrounds the main wreckage field in shallow water. To gain a perspective on the site in its general environmental context, Figures 5.2 and 5.3 have been provided.

Attributing these various hull sections to one vessel or the other becomes easier when several selective factors are recognized.

The most remarkable contrast between the remains of the two vessels is size. The following table is a general comparison of the two vessels as built:

Table 5.1 CUMBERLAND/CHISHOLM Comparison

	Dates	Gross Tons	Length	Beam	Depth
CHISHOLM	1880-98	1775.3	256.5	39.3	20.3
CUMBERLAND	1871-77	629	204	26	10.7

Although both vessels had two decks, CUMBERLAND was a side-wheeler, and CHISHOLM was a propeller-driven bulk freighter (see Fig. 5.4). The length to depth ratios are: CUMBERLAND 1:19; CHISHOLM 1:12.6. The length to beam ratio for CUMBERLAND is 1:7.8, indicating a long, narrow hull configuration when compared to the beamier CHISHOLM, with a ratio of 1:6.5. The higher ratio of CUMBERLAND reflects the desire for speed in the passenger trade. CUMBERLAND probably would have drawn about 6 feet of water and CHISHOLM 12 to 14 feet.

The comparison of the documented dimensions of the two vessels indicates that the scantlings of CHISHOLM would be significantly larger than those of CUMBERLAND. This observation was supported by the examination of the wreck remains on the site. The remains of the two vessels could be separated on the basis of the single attribute of size alone. The remains of CHISHOLM are massive compared to CUMBERLAND (Fig. 5.5).

CUMBERLAND remains are characterized by split frames that were employed in the construction process (Figs. 5.6, 5.9, 11). The futtocks are separated by a spacer block and are quite distinctive. CHISHOLM, in contrast, had the more common solid, triple-futtock framing from the keel to the turn of the bilge (Fig. 5.22), double futtocks from there to the weather deck and a single-frame timber that continued up to become a stanchion of the bulwark. At all points in the hull, this style of construction can be easily distinguished from the split frames and associated architectural attributes of CUMBERLAND's wreckage.

Another useful diagnostic element is the diagonal strapping that was used to provide longitudinal hull support in CHISHOLM. At any point where the broken hull sections expose the interface between the molded face of the frames and outboard planking on the side of the hull, this metal strapping is evident. The strapping intersects itself at 90 degrees and forms a sort of rigid steel basket weave over the hull side augmenting the longitudinal strength of HENRY CHISHOLM. No comparable feature exists on the CUMBERLAND hull pieces. In its stead, the builders of the latter vessel used an unusual arch support that is built into its ceiling plank layout to deal with the common problems of sagging and hogging in large wooden ships (Figs. 5.9, 5.11). Truss rods provided the transverse support needed to cope with the special problem of wheel guard sag in side-wheelers and evidently formed part of the longitudinal support system as well.

In some cases, the task of separating out hull pieces was greatly facilitated because enough of a particular section was intact that two rows of vertical or "hanging" knees were evident, indicating the piece was part of CHISHOLM (Figs 5.12, 5.13). The knees on CUMBERLAND were sawn and elongated (dagger knees), whereas the larger knees of CHISHOLM are natural (i.e. made from "compass" timber) and noticeably broad.

That some third, undocumented wreck also occurred at this site is a possibility that must be addressed in this discussion, but one that can be quickly dismissed. The same thematic traits in construction that permit distinguishing these ships from each other also indicate that they are the only two vessels represented in the wreckage field. This becomes a certainty beyond reasonable doubt when we fit the pieces together on paper and find that we are left with no duplication of parts in the final picture, nor any elements not readily attributed to either vessel.

CUMBERLAND's remains are evident in the northern part of the ravine where they trail off into deeper water. CHISHOLM dominates the southern portion of the ravine and slightly overlaps CUMBERLAND (Fig. 5.1). None of the wreckage in the deep water where CHISHOLM's engine is located can be attributed to CUMBERLAND.

When all the hull sections making up the site are sorted and reconstituted into their original form as two ships, several other observations can be made. The most intriguing is the fact that much of CUMBERLAND is not represented on the site. What had seemed an endless field of shipwreck remains does not in fact represent the two vessels in their entirety. Also, as is typical of all the wrecks of Isle Royale, little of the superstructure of either vessel is present on the site.

A comparison of the reconstituted CHISHOLM to the original ship shows that approximately 50 feet of the port side of the hull is missing, mostly from the bow area. All of the rest of the vessel is represented with the glaring exception of part of the bow and all of the superstructure. Similarly, no significant portion of CUMBERLAND's superstructure is evident on the site, but, unlike CHISHOLM, a very significant portion of its hull is also absent.

Once the initial separation of the remains on the basis of size was completed, researchers turned their attention to a comparison of individual components. The components were approached in categories, such as propulsion elements, auxiliary machinery, hull architecture, cargo handling machinery, superstructure and cargo. The latter categories of cargo and superstructure were of no assistance, because no superstructure attributable to either vessel could be located and no evidence of cargo was observed.

Propulsion elements

Propulsion elements, particularly engines and boilers, could be easily separated. The vessels had distinctive propulsion machinery: CHISHOLM was a screw steamer, powered by a compound engine and Scotch boilers (Fig. 5.17), whereas CUMBERLAND was a side-wheeler powered by a walking beam engine and firebox boiler (Figs. 5.4, 5.16). Although the specific type of boiler was not historically documented for CUMBERLAND, it could not have been a Scotch type. Scotch boilers appeared on the Lakes after the loss of CUMBERLAND. It is unlikely that propulsion elements of the two vessels could be confused.

The compound engine of CHISHOLM was located intact in 150 feet of water sitting upright on its mounts within the detached stern portion of the wreck (Figs. 5.18, 5.20). An examination of the structure related to the stern portion revealed the unmistakable characteristic hull architecture of CHISHOLM. A comparison of the shallower remains with those found with the engine of CHISHOLM allowed quick separation of the two wrecks based on scantling size and construction technique. This would have allowed the separation of the two wrecks even in the absence of historical documentation of their dimensions.

The steam plant of CHISHOLM presents a unique opportunity to study an example of Great Lakes technology in a formative stage. The engine is still connected to the shaft and screw, much like it might be arranged in a museum display. It is a double-expansion, inverted, vertical, direct-acting steam engine with cylinders of 30 and 56 inches in diameter and a 48-inch stroke. The two cylinders pushed the CHISHOLM at almost 9 knots.

The engine, number 128, was built in Cleveland by Globe Iron Works the same year as the hull. Upon examination, one is struck by the ornate quality of the steam jacket around the cylinders, which contains wrought iron borders and diamond designs in the center of each cover. The engine cylinders are mounted on top of iron supports cast in the shape of columns. The supports between the columns are in the shape of circles.

This is the earliest steam engine extant of the Isle Royale shipwrecks, and its ornate embellishments reflect a time when the designers of steam engines were concerned with both function and aesthetics. (A discussion of the cultural context of machinery decoration in the Eighteenth and Nineteenth Centuries relevant to the interpretation of the the steam engines of Isle Royale can be found in Kasson 1976.) None of the other engines of the ships of Isle Royale shows the same regard for aesthetics on the part of the designers. In other wrecks, e.g. AMERICA, the embellishments have been executed by the men who used the machines, rather than the designers.

CHISHOLM's propeller has four blades; the two lower ones are broken (Fig. 5.19). It is uncertain if the blades were broken as a result of the initial wreck event or the trip down the slope after the stern section separated. It is most likely that the two lower blades were broken as the stern settled. The first historical accounts of the wreck indicated the bow was aground with the stern over deep water. The break up of the wreck occurred as the stranded vessel was buffeted by two storms in quick succession (Detroit Free Press Oct. 26, 27, 1898, see Chapter IV).

The propeller shafts and shaft log are in their normal position. The tail shaft is flanged to a thrust shaft. The thrust shaft has a single collar that articulates with the thrust bearing mounted on a pillow (or plummer) block, which is tied into the centerline keelson. The single-collar thrust bearing was sufficient for the relatively low rpm of CHISHOLM's engine (Fig. 5.20). Multiple-collar bearings came into use later to dissipate the increased thrust and friction of the more powerful triple-expansion engines and larger hulls. A typical example of the multiple-collar thrust bearing may be seen on the shaft of GLENLYON (Fig. 5.43).

The rudder of CHISHOLM (Fig. 5.15) is in 70 feet of water immediately upslope from the engine. The visible steering chain is attached through a block to one of the two tiller arms on the rudder stock.

The rudder is typical of those fitted to contemporary wooden propeller-driven vessels. Figure 5.21 shows the position and attachment of the rudder on a similarly constructed bulk freighter of the period. The rudder is not hinged on a gudgeon and pintle arrangement common in earlier vessels, but rather, the rudder stock is suspended from a rudder carrier that is inboard of the horn timber. The lower end of the rudder stock rests and pivots on the rudder shoe. The rudder shoe is a flat, iron casting attached to the underside of the keel extending about four frames forward of the stern post, and aft beyond the screw to support the base of the rudder.

CHISHOLM had two iron rods extending from the horn timber as additional support for the rudder and shaft. One rod was attached to the lower side of the horn timber positioned aft of the screw and forward of the rudder. This rod, which supported the aft end of the rudder shoe, is not depicted in the example of Figure 5.21.

A second iron rod extending from the horn timber terminates at the aft end of the shaft log forward of the screw. This rod appears to be adjustable and apparently used to relieve the tension of the bearing on the shaft.

Examination of the sternpost directly beneath the horn timber revealed Roman numeral depth marks. Numerals XII and XIII were on the upper edge of the sternpost. The numeral XIV was split between the sternpost and horn timber (Fig. 5.23).

Portions of side-wheels were located on the other end of the site from the CHISHOLM engine (Fig. 5.1). Obviously related to CUMBERLAND, they indicated that wreckage scatter from this vessel lie generally to the north. A boiler and condenser were located between the paddle wheel fragments and the concentration of hull remains. The boiler and engine cylinder, which still remains in the hull of CUMBERLAND, are separated by a distance of 270 feet. In the immediate area of the boiler there was also a piece of particularly heavy structure, which could be a portion of reinforced deck below the boiler.

Propulsion elements of CUMBERLAND are spread along a distance of over 400 feet. There are paddle wheels in 80 feet of water at a distance of 300 feet from the engine cylinder. A paddle wheel flange and three radii (or paddle wheel arms) are located on the hull side of CHISHOLM 135 feet in the opposite direction from the CUMBERLAND engine cylinder (Section IV, Fig. 5.1).

The paddle wheel segments (Fig. 5.7) are connected to a cast-iron flange that forms the hub. The paddle wheels had an outer and inner circle or rim of wood (square) connecting and strengthening the paddle wheel arms or radii. The paddle arms were separated by 4-inch square blocks 2 feet 10 inch long behind the outer rim. The rim strengthened the outer circumference of the wheel at the edge of the floats.

The inner rim, 2 feet 6 inches below the outer rim where the buckets (or floats) were attached, was made of wood with a circle both on the inside and outside of the arms. There was no evidence of iron reinforcement on the circles of the paddle wheels of CUMBERLAND as would be typical of western river practice -- a reflection of the lack of floating obstructions on the Lakes that frequently damaged the western river paddle wheels.

The paddle floats were attached to the arms by three iron through-bolts. The dimensions of the extant floats or buckets are 1 feet 8 inches x 1 inch, and 7 feet long. A section of paddle wheel was located at a depth of 82 feet with buckets still attached (Fig. 5.1).

Western river steamboat buckets were most often attached by an iron "U" rod or stirrup that bent around the arm and bolted through the bucket planks. This variation may be the result of the different environmental conditions of the Lakes and western rivers. The western river steamboat frequently damaged paddle wheel buckets on floating debris and quick replacement was necessary. The U-bolt assembly practice allows quicker replacement, although it might not be as strong as the Lakes through-bolt attachment. The Lake paddle wheels were stronger in the buckets and weaker in the arms than the western river vessels. The western river practice strengthened the arms (the most difficult element to replace) and considered the bucket expendable.

The paddle wheels of CUMBERLAND were estimated to be 26 feet in diameter. The arms are 12 feet long from the hub to the outer rim. A contemporary newspaper report gives the diameter of CUMBERLAND's paddle wheels as 30 feet (Detroit Free Press Oct. 4, 1871). The field observation estimate was based on the length of the arms attached to a partial flange. Given the 12-foot paddle wheel arm length, the complete flange would have had to be 6 feet in diameter to conform to the historical dimensions, which is unlikely. The contemporary diameter may have included the paddle wheel boxes in the 30-foot measurement.

The boiler on the site (Fig. 5.8) is from CUMBERLAND; of this there can be little doubt based on both archeological and historical evidence. The boiler is in proximity to the paddle wheels and quite removed from the engine of CHISHOLM. An explanation would have to be developed to account for the movement of the mostly rectangular boiler far from where it would have been located if it had been part of CHISHOLM. The possibility that another vessel could have deposited the firebox type boiler can be dismissed: there were no structural remains located that did not conform to either of the two vessels.

Historical evidence also supports CUMBERLAND as the origin of the firebox boiler, although the records of what type boiler CUMBERLAND carried and whether they were salvaged have not been located. A rectangular, multi-tubular firebox boiler would be expected on CUMBERLAND. Firebox boilers were used extensively after 1850 on walking beam side-wheelers. Beam engines normally operated with less than 50 pounds of pressure, the pressure normally produced by a fire box boiler. Compound engines required 100 pounds of pressure or more, considerably in excess of the normal capabilities of a firebox boiler of the type located on site. Historical documentation indicates that CHISHOLM carried Scotch boilers at the time of loss and they were salvaged in 1901 (See Chapter IV).

The elements of propulsion other than the boilers located in the shallow area of the site can be attributed to CUMBERLAND. The pressure vessel in the vicinity of the boiler appears to be a surface condenser, the type recorded for CUMBERLAND, and of a size too small for the engine of CHISHOLM. Surface condensation came into general use in 1860 and resulted in a reduction in fuel consumption when coupled with higher steam pressures. A first-class vessel, like CUMBERLAND, built in the early 1870s would generally have carried a surface condenser to reduce operating costs in the highly competitive passenger-package trade.

An iron cylinder 36 inches in diameter and about 4 feet long was also located near the largest concentration of CUMBERLAND hull remains. This is much too small to be the main cylinder (CUMBERLAND's engine was 44 inches in diameter with an 11-ft. stroke); it is probably the air pump.

Underneath the inverted main hull section of CUMBERLAND (CU Bottom, Fig. 5.1), the bottom of the main cylinder was located. The bottom of this feature can be viewed through a break in the hull planks. Nearby, mounted on the bottom of the hull is a rectangular feature that contains a lobed shaft (resembling a modern gas engine cam shaft) of uncertain function. This may have been a part of the mechanism for operating engine and pump valves.

The last elements related to ship propulsion located on the site were the tops of the A-frames (Fig. 5.10). The A-frames were wooden timbers, heavily fastened with iron, constructed in an A shape to support the overhead shaft or trunnion of the walking beam (Fig. 5.4). The two A-frame tops were broken off just below the apex of the frame. Both fragments contain the walking beam shaft bearing.

The missing machinery of CUMBERLAND presents a bit of a problem. No other fragments of the main cylinder, steam chest, walking beam, crank shaft, lifting and connecting rods, piping, boiler breeching or stack have been located. It is likely that most of the portable artifacts have been removed by divers, but the larger machinery that is missing is puzzling. Perhaps some of it could have been removed by the salvors when they were working on CHISHOLM, but the question remains as to why they only removed some pieces and not others. If they were interested in the recovery of scrap, then it is not clear why the firebox boiler was left. They certainly had the means to recover it — they salvaged the Scotch boilers of CHISHOLM. It is hard to imagine that they simply overlooked it, or did not locate the CUMBERLAND boiler.

The salvors of CHISHOLM were apparently not interested in scrap, but only reusable elements with high resale value. The firebox boiler was not only out of date, but was also damaged beyond reasonable repair. The top of the boiler was ruptured. This was not likely the result of a boiler explosion - the shell is depressed inward. Because the salvors did not remove the boiler, it is unlikely they removed any of the other machinery. Perhaps there is large machinery yet to be discovered near the site.

Auxiliary Machinery

Another piece of machinery was located on the CUMBERLAND/CHISHOLM site but cannot, as yet, be definitely attributed to either vessel. Figure 5.14 shows a reciprocating steam water pump of a type commonly used for boiler-feed water. The steam piston is on the right of the pump and the piston of the water pump housed on the left. The spherical attachment above the pump piston is an air chamber. The air chamber serves to allow an even flow of water. Without the air chamber, or accumulator dome, the water would tend to pulsate because of the back and forth motion of the pump piston, which stops at the end of each stroke. When the piston moves forward water enters the dome and compresses the trapped air, which later forces the water out of the chamber when the piston comes to rest at the end of the stroke. This allows a steady discharge of water.

The pump is similar in design to those of a number of manufacturers. It is quite similar to the "Knowles Single Pump" and the "Blake Single Piston Pump" in common use in the latter part of the Nineteenth Century.

It is likely that the pump in Figure 5.14 is from CHISHOLM. Although unattached, it lies on a section of the port side of CHISHOLM's hull. It is also likely that the the pump is near its proper location on the vessel, in the machinery spaces, and close to the boilers. In the immediate area of the pump other evidence of machinery is found. Above the steam cylinder of the pump and to the left above the divers head in Figure 5.14, a strongly reinforced through-hull fitting can be seen. The location of this fitting is above the main deck, and it is probably an overboard discharge. Some metal sheeting was found in the area (immediately below pump, north end of Section II, Fig. 5.1), which may have been used to line the boiler room.

A separated windlass with some decking attached was located on the bottom of CHISHOLM's hull (Section II, Fig. 5.1). Based on the dimensions, it is most likely to have belonged to CHISHOLM. In the immediate vicinity of the windlass is an anchor, which is wedged between the bottom of the hull and the starboard side. The wooden stock was all that could be reached to measure. The stock is 13 feet 8 inches long, indicating an anchor of a size more appropriate for CHISHOLM than CUMBERLAND.

Along the limberway of CHISHOLM's hull bottom 2 1/2 and 3-inch diameter iron pipe was located. This was bilge pump piping. A rod with two cup-like attachments was found on the port side of CHISOHLM. This is assumed to be the interior mechanism for a double-acting, hand-operated bilge or fire pump.

The last feature possibly associated with auxiliary machinery is also located on the assumed port side of CHISHOLM (Section I, Fig. 5.1). A 10-foot long, iron-capped cylindrical timber of unknown use was discovered. The base of the timber, which was 12 inches in diameter, was broken.

Hull Architecture

As discussed, the hull architecture of the two vessels is easily separated. The differences in scantling size and construction techniques is marked. The centerline frame dimensions of CUMBERLAND are 12x14 inches including a 2-inch space between the futtocks, while those of CHISHOLM are 18x18 inches. On this basis alone, the remains of the two vessels can be distinguished; however, there are specific attributes of both vessels that bear close examination.

There are certain aspects of architecture that would be expected of a 200-foot class, side-wheel passenger vessel. Indications of guards, gangways, round stern, sharp bow and hull support should be notable in the remains.

A right-angle iron bracket was located on a section of the side of CUMBERLAND's hull (CU Side, near fantail, Fig. 5.1). The bracket, which is on the outboard side of the hull, was used to support a section of the paddle wheel guards that ran longitudinally along the outside of the hull at the height of the lower edge of the paddle wheel box along the level of the main deck.

Guards (or sponsons) may have originally appeared on Fulton's eastern river steamboats. Fulton introduced them to prevent damage to the otherwise exposed paddle wheels. Eastern river guards were widest at the paddle wheel and tapered fore and aft. Later, in western river practice, guards were extended the full length of the hull to add cargo space to the main deck. In addition, the guards gave support to the outboard paddle wheel shaft bearing.

Great Lakes steamboats normally followed the eastern style of guards with the widest overhang at the paddle wheel and tapered ends. The maximum width of the guards was determined by the size of the paddle wheels and paddle boxes (housings). Guards were extended to provide additional usable deck space and ease of cargo handling. Gangways normally opened on the guard level to facilitate cargo loading. Package freight could be wheeled from the dock across the guards into the cargo spaces on the main deck.

Judging from the size of the right-angle guard support brace, this portion of the hull was far forward or aft of the paddle wheel, in the area of minimum guard width. It is most likely that the hull portion with the brace attached is from the stern, rather than the bow. This speculation is based on the proximity of stern structure (sternpost and fantail) and the lack of bow structure anywhere within the main site concentration.

Along the upper edge of the side of the CUMBERLAND hull, there are rectangular cutouts for the main deck beams. The main deck beams extended beyond the hull side and supported the guards. The right-angle braces or struts, which appear to occur in pairs on CUMBERLAND, were located between the deck beam and hull side in the area of the largest overhang. One side of the brace was attached to the hull, the other attached to the beam with the iron brace between them forming the hypotenuse of the right angle. Examination of a portion of the bow of CUMBERLAND, which was located in Washington Harbor, revealed that the main deck beams were extended over the sides in the forward part of the hull.

The rounded structure visible in Figure 5.1 (Fantail) is from the stern of CUMBERLAND. This portion, with exposed cant beams, sternpost, centerline keelson and deadwood attached, can be seen on the map to the north of CHISHOLM's hull bottom. The deck beams radiated from the sternpost to support the overhanging fantail. This portion of the stern would have been on the main deck level, even with, and a continuation of the guards. This hull fragment was the overhang above the rudder.

Most of the CUMBERLAND hull structure located on site comes from below the level of the main deck. All structure seems to come from the stern of the vessel. The sharply curved frames visible in Figure 5.6 are from the stern area between the keel and main deck in the aft third of the hull.

An interesting feature of the frames visible in Figures 5.6 and 5.11 is that the futtocks are separated by a 2x14-inch spacer block. The futtocks are made of 12x6-inch timbers. The frames are on 24-inch centers. A possible explanation for this feature is that the technique reduced dry rot in the frames. This is unusual for ocean and Western River vessels as well. The hull was built by Melchanthon Simpson of Port Robinson, Canada. Historical research may produce some additional evidence for this construction style and the rationale for it. If historical research is unproductive, examination of other wrecked vessels produced by the builder will be the only source of comparative data. This construction is apparently not unique with CUMBERLAND, but it is rare on the Great Lakes, known only from brief mention in historical references.

CUMBERLAND carried cabins above the main deck, as was the practice on the Great Lakes after the appearance of GREAT WESTERN in 1839. Figure 5.4 is a drawing of the general arrangement plan of CUMBERLAND. A steamer of the dimensions of CUMBERLAND would have had about sixty cabins, plus parlors and a large ladies' cabin aft. The crew's quarters would most likely have been below decks.

There were no structural features located on site that could be attributed to deck structures. Few elements of deck structures have been located from any of the wooden vessels. Deck structure was of lighter construction and easily demolished and separated from the hull during, or soon after, the wreck event.

The construction of CHISHOLM was of much heavier scantling than CUMBERLAND (Fig. 5.5). The floor frames are composed of three 6-inch wide members. Each 18x18 inch frame is spaced on 24-inch centers. There are two 6-inch futtocks on the sides of the hull and one 6-inch futtock above the spar deck, which formed the bulwark stanchion.

The hull of CHISHOLM has a large centerline keelson composed of six elements. The center keelson is 15 inches wide and 28 inches deep, the sister keelsons on both sides are 12 in. wide and also 28 inches deep. The centerline keelson contains two elements each 14 inches deep. The elements are fastened with 3/4-inch diameter iron drifts. The centerline keelson scarfs are not hooked, but are straight diagonals.

Next to the centerline keelson assembly is a transverse limberboard 2 1/2 inches thick and 12 inches deep. The limberway is a triangular cut on the bottom of the member.

On each side of the hull there are 6 side or floor keelsons and a bilge keelson. The side keelsons are 12x16-inch timbers on 28-inch centers.. The bilge keelson is similarly constructed with two 5x11-inch ceiling planks and a single 5x9-inch plank edge-fastened at the turn of the bilge. The ceiling above the bilge is composed of 6x14-inch planks.

The hold floor is composed of 2x8-inch and 2x10-inch planks laid transversely. This upper layer overlies a 3/4-inch thick layer of planks of smaller widths.

The height of the hold was 12 feet 6 inches and the height above the main deck was 7 feet 6 inches, which together equals the register depth of 20 feet 3 inches

The spar deck shelf, bulwark and rail detail is depicted in Figure 5.5. Close examination of the interior of the rail cap revealed it to have been painted pale green with a routed groove at the base, which was painted red. At regular intervals between the spar deck knees there were 5 1/2-inch diameter cargo rings of 3/4-inch stock attached to the ceiling planks.

Hull support

A detailed study of the hull support systems integrated into the wooden vessels of Isle Royale can reveal much of what was understood by mid- and late-Nineteenth Century Lakes shipwrights about the dynamics of the stresses the hulls would be subjected to by the Great Lakes. Much can be learned about the technology of these vessels, as well as the interaction of ideas from other shipbuilding areas. The Lakes shipwrights borrowed methods and techniques from other areas as they developed and experimented with variations on their own to meet specific requirements imposed by the environment of the Great Lakes.

Fortunately, we have examples of three very different vessels to compare hull structure and support systems: MONARCH, a propeller driven passenger/package freighter; CHISHOLM, once the largest bulk freighter on the Lakes, and the side-wheeler CUMBERLAND. All three had different hull support systems.

The hull of CUMBERLAND was long and relatively narrow with a shallow depth. The registered length was 204 feet. The beam was 26 feet and the depth 10.7. Length-to-beam ratio is 1:7.8, and the beam to depth is 1:2.4. Length-to-depth ratio is 1:19. The hull was built to attain higher speeds with moderate power desirable for the passenger/package trade. Knowledgeable opinion of the period was that the longer the boat, the faster, and beam being equal, the same power would push a longer boat faster (Wheeling Bridge Case 1851: 385, 648 in Hunter 1949:85-89). The theoretical hull speed of CUMBERLAND is estimated at 19 knots.

The length to beam ratios of the western rivers peaked about 1850 at 1:7.9 and dropped to 1:6.0 in the 1870s, representing a shift in emphasis from speed to cargo capacity (Hunter 1949:86). CUMBERLAND represents the continued emphasis on speed in the passenger/package trade on the Lakes. Slower and cheaper propellers had the competitive advantage in cargo capacity, and were generally designed with much more beam, and lower length to beam ratio. The design of bulk freighters on the Lakes emphasized carrying capacity and cheap operation; speed was a secondary concern.

The machinery of CUMBERLAND was located just aft of amidships. The heavy keelsons (engine keelsons) in the engine area amidship supported the machinery weight and stresses of the A-frames. In addition to the weight of the engine and boilers, the weight of the outboard paddle wheels exerted stresses on the hull. The concentration of weight in the center of the hull had the effect of correcting some of the hull curvature due to hogging.

The hull would still have the tendency to hog as a result of the reduced buoyancy from the decreased volume in the relatively sharp stem and stern areas of the hull, as well as the light scantlings necessary for the shallow draft design. The stresses from the long, narrow and shallow draft design of Lakes side-wheelers, and the weight of machinery made hull reinforcement necessary. In most of the middle-size vessels of CUMBERLAND's class, structurally-integrated arched trusses running fore-and-aft were the common method of longitudinally strengthening the hull. These trusses were tied into the deadwood at the bow and stern, and rose above the gunwales, and often above the paddle boxes amidships. The hull-truss system of the paddle wheeler functioned much like the trusswork of a bridge forming a sturdy and well-supported longitudinal structure.

CUMBERLAND, however, did not have the typical arched-truss support system. None is visible in the historic photograph (Figs. 4.1, 4.2). An obvious question arose regarding the support structures of CUMBERLAND's hull. Several possibilities were considered. CUMBERLAND could have longitudinal bulkheads like some of the western river steamboats, or some other hull-level support mechanisms. Rod and turnbuckle arrangements were possible, again, much like the "hog chains" common to western river vessels.

Examination of the vessel remains produced features that were a part of the hull strengthening system of CUMBERLAND. No evidence of longitudinal bulkheading was observed, although additional keelson structures were added amidships in the machinery area to handle the increased weight and stress (Fig. 5.5).

Elements of a longitudinal support system that were built into the ceiling planking were noted (Fig. 5.9). These curved planks were tied into the stern deadwood and appeared to arch upward on the inside of the hull. Historical research has not shed any light on this construction technique. Measurements of the hull side indicate that the "ceiling arch" extended to, but not above, the main deck. Unfortunately, more documentation is needed on this feature before a definitive description of the construction technique is made.

A similar feature was predicted for the bow. This speculation was later verified when a portion of CUMBERLAND's bow was located. In July of 1984, after the writing of the first draft of this section of the Isle Royale report, divers from the Submerged Cultural Resources Unit in association with Park Ranger Jay Wells located and videotaped the bow section of CUMBERLAND in about 6' of water in Grace Harbor. A tip from Stanley Sivertson, Captain of WENONAH that "an old dock structure or perhaps a piece of wreckage had been sighted frequently by locals in the area" provided the clue to this major part of CUMBERLAND structure. This wreckage is over 7 miles from the main site.

Later, Patrick Labadie and LaMonte Florentz relocated this site and diagrammed the construction details. This revised documentation is reproduced in Figure 5.11.

The bow wreckage is in two major pieces. The larger contains the stempost. There can be little doubt that this is the port bow of CUMBERLAND because it has the unusual split-futtock frame construction and shares many attributes with the identified structure on Rock of Ages. The location of these bow fragments contributes additional information to the construction details of the inner ceiling arch support noted on the stern elements on the main site.

The bow section incorporated features that allowed a better understanding of the construction details of the support system. The frames at the bow were 5-inch sided by 12-inch molded at the keelson, tapering to 6-inch molded at the deck level with a space of 2 1/2 inches between the futtocks. The spacers between the futtocks are of oak, 2 1/2-inch sided and 14 inches long.

There was diagonal ceiling planking present forward and above the beginning of the arch. The arch began 20 feet aft of the stem post and was 4x36 inches, edge bolted with 3-inch square coaks present. The clamps were 4x32 inches, composed of three planks. It was observed that the ceiling arch met the clamps 57 feet from the stem. Deck beams, as determined from the cutouts at the main deck level, were 5 1/2 inches square and placed on 24-inch centers between the frames. The presence of the deck beam cutouts indicates the deck beams extended beyond the side of the hull the entire length of CUMBERLAND.

The stem was 12x26 inches and the stemson 12x20 inches. There were three iron straps across the stem, which were of 1/2-inch stock, 4 inches wide. An 8x10-inch breast hook was present. The hawse piece was 16x48 inches.

Additional features associated with the inshore bow area include 1 1/2-inch rod and iron sheeting. The iron rods lend support to the conjecture that CUMBERLAND contained a longitudinal hog-truss system in addition to the transverse trussing in the midship section. The iron sheeting was an external hull cladding for ice protection.

Captain Sivertson also recalled fishing over what he believes to be the rudder of CUMBERLAND outside of Cumberland Point. "Trolling" SCRU team members behind a boat for several hours, on two occasions did not produce any finds in this regard, but Park staff and sport diver volunteers have been encouraged to continue the search along the wreckage trail.

A second feature located on the main site connected with hull strengthening was a 7 1/2 inches square, 20-foot long kingpost with a square iron cap to which an iron rod with a turn buckle was attached. The king post was a support member for a section of hull connected to the post by the iron rods, which were called "hog chains" in many areas.

Both 1 and 1 1/2-inch iron rods were located in association with CUMBERLAND on the site. Fittings that appear to be for the attachment of hog chains were located on the engine keelsons. Hog chains were typically used on western river steamboats to add hull support longitudinally and, on side wheelers, transversely. It is not clear whether this feature, located in proximity of the amidship engine mounts, was a portion of a transverse chain used to support the guards and the shaft blocks of the paddle wheels, or was part of a longitudinal hog-chain system. Generally, iron rods were used in association with the A-frames, but the presence of the king post is evidence of a more complex arrangement on CUMBERLAND. Iron rods were also noted on the A-frame tops found on site (Fig. 5.10). The two sizes of iron rod may indicate that both transverse and longitudinal hog chains were employed. It is unknown how common the use. of hog chains was beyond their common association with A-frames was on the Lakes.

The hull support system of CHISHOLM has already been mentioned. Beside the keelson and ceiling arrangement, CHISHOLM used a network of iron strapping for additional longitudinal hull support. The sided or outside face of the frames were rabbeted at a 45-degree angle to the keelson to receive the criss-cross of 5-inch wide and 1/2-inch thick diagonal iron straps. The iron straps were riveted together where they cross in the spaces between frames. The common practice was to secure the top of the diagonal strapping with rivets to a horizontal belt course below the bulwarks. This feature, composed of 3/4-inch thick, 10-inch wide iron strapping was observed on CHISOHLM. This sheer belt can be seen at the ends of the hull sections (I and III) on Figure 5.1.

Apparently, some ocean vessels used diagonal strapping over the entire hull, including the bottom, but the practice in the Lakes was to extend it under the turn of the bilge only enough to fasten securely. Observations on site indicate CHISHOLM followed the Lakes practice.

Typically, iron strapping was also secured to each frame with a drift. This feature was not observed on the wreck, although a common practice, and required by various registers and certifying agencies. The 1876 International Board of Lake Underwriters requirements for diagonal strapping stated: "all straps are to be fastened with bolts, one to each timber of the frame; one to the ceiling or planking in each room between the frames; and one to each crossing .... The fastening of iron to iron to be hot-riveted; and all other bolts riveted or nutted on the wood."

Contemporary accounts of CHISHOLM described the diagonal strapping:

> ... double diagonal heavy iron straps run down the sides and under the turn of the bilge, and fasten to the long frames under the bottom and

bolt through the bands when they cross and outside of the frames under the planking (Chicago Inter Ocean Sept. 24, 1880).

Site Formation Processes

The remains of CHISHOLM are principally in four large sections. There are 177 feet of the bottom on the shallower portions of the site. Below, there is a second section of bottom 47 feet in length. A total of 227 feet of CHISHOLM'S original hull length of 256 feet remains on site. The portion missing is the bow, which is only represented by the windlass and anchor and some associated frames west of the bow of COX (Fig. 5.59).

Examinations of the structural elements of the vessel remains indicate the original location of the principal structural elements in the hull, and reflect that the sequence of formation process, such as salvage attempts, storms and ice heaving, worked in concert to produce the remains seen on site.

Although the hulk apparently reached a deep resting place before the high-energy action at the surface could break it into smaller pieces, it is disarticulated and positioned in a fashion that would have been difficult to predict. Consider the fact that Section V (Fig. 5.1), which comprises the engine and extreme stern flooring of CHISHOLM, is facing southwest in 150 feet of water, while section IV, which was part of the original starboard side and bottom where it articulated with the fantail, is facing the opposite direction. The piece of wreckage lying under the engine floor timbers is part of the fantail itself. The matching stern section of the hull for the port side is still a part of a larger section of the side (I) that is located above in the shallow water ravine. Apparently, the port side broke through the stern gangway. This conclusion can be reached by process of elimination: II is the hull bottom and section III is associated with the starboard side, because it is the only piece short enough to fit the puzzle yet not exceed the length of the CHISHOLM if added to IV, which is part of the stern.

The assumption that IV is the starboard stern can be further justified by examination of the northern end of the piece. The arrangement of shelves, knees, etc. indicate that it was coming to a narrow juncture with the deadwood in the stern. With all the pieces restored, the end product would be as illustrated in the midship cross section Figure 5.5.

Historical documentation informs us that the vessel ran aground in 12 feet of water, with the stern floating over 40 feet of water (Detroit Free Press Oct. 23, 1898). The bow was damaged severely enough by the grounding to dislodge hull planks. When the ship was abandoned it was listing "4 feet" (Ft. William Daily Journal Oct. 21, 1898). The wreck was broken up by two storms, which struck in quick succession, the first only 4 days after the wreck, and the second three days later (Detroit Free Press Oct. 26, 1898).

The positioning of the hull pieces allows the development of a probable sequence of events. The stern section was broken off as a result of the still-buoyant stern section of the hull being worked by the storm waves. The hull was probably grounded from the bow to below the boilers. Historical records do not state to which side the vessel was listing, but indications are that it was to port, because hull damage caused from the boilers appears to have been on that side, and the deep portions of the wreck show more extensive damage to the port side in the stern section. What probably took place was the boilers tumbled out of the port side as the stern section broke off. The most damaged section of the port stern was in the area just aft of the gangway. The starboard gangway is still visible in section IV. The boilers would have slid down the slope, while the hull, relieved of the weight of the machinery and stern structure, became more buoyant and continued to move to the port (north), pushed by the waves and wind.

As the stern section slid down the face of the reef, the rudder shoe struck with enough force to dislodge the rudder and push the horn timber upward, breaking the fantail. The lighter stern and fantail pieces reached the bottom of reef before the stern section of the hull bottom, which still contains the engine. This stern section (V) is resting on structure that is from the port side of the stern. The large piece of wreckage just off the port side of the bottom hull (IV) is a major portion of the starboard part of the stern and fantail. The end containing the knees and gangway (northern end) was forward on the starboard side.

The hull was presumably more heavily damaged on the starboard bow, probably a result of being the first point of contact with the reef. The starboard side, now free both bow and stern, separated along the bilge as the hull pivoted on the remains of the bow. The starboard side was probably originally deposited in shallower water and later pushed northward and down the slope into the gully by ice movement.

The storms, principally from the northwest (Detroit Free Press Oct. 26, 1898), continued to buffet the still-connected port and bottom. As the vessel moved, the bow was breaking up and apparently dropped the anchor and deck section carrying the windlass northward to the upslope location above their current position. The port side must have separated after the hull bottom turned almost 180 degrees with the bow facing south and the stern portion of the bottom to the north.

The depositional sequence of the 177-foot long bottom section, the port side, the anchor and windlass in the shallow portions of the site might have taken place over a longer period of time. The bottom was the first element to arrive in its present location, with the anchor coming to rest at its present location at the port bilge. The windlass evidently was the next element to be located in its present position on top of the bottom. The port side was the last piece of CHISHOLM to find its way down the incline to the bottom of the gully. After the port side was in position, a piece of paddle wheel of CUMBERLAND came to rest on it. All the shifting of the elements was probably the result of ice movement.

Diagnostic features can be used to establish the articulation of the hull pieces. The principal diagnostic feature of the large bottom portion (II) is the doubled floor keelsons on the north end of the section, which are likely associated with strengthening of the machinery spaces.

The features on the section of hull side that is in proximity to the bottom (I) that indicate the stern is to the north, are more definitive. The water pump and through-hull fittings on the north end of the piece reflect the boiler spaces. There is an iron beam in the vicinity. Historical documentation indicates CHISHOLM had iron beams below the boilers for support. In addition, documentation indicates the boiler spaces were sheathed with iron. Iron sheeting, riveted together, was located in close proximity to the beam. This sheeting is of a style of construction appropriate for sheathing for fire protection:

> The iron beams under the boilers, and the iron house over and around the boiler, with the iron coal bunkers, are sure protection against fire ... (Chicago Inter Ocean Sept. 24, 1880).

(No indication of the iron coal bunkers were located).

There are indications that the bow was the southern end of this portion of port hull. The mooring fairleads on the southern end of the piece appear to be bow associated. Directly behind the fairleads is a chain plate assembly. Seventy-five feet to the north along the gunwale (under the paddle wheel segment) is a second set of chain plates. The location and distance are what would be expected for the fore and main mast of CHISHOLM. The reason the mizzen chain plates are missing is that they were placed higher on the cabin structure in the stern, and no cabin structure remains on site.

The second side section in the shallow area of the site (III) has no clearly diagnostic attributes, except it lacks both bow and stern features. The main indication that this is the starboard side is found on the hull side in deeper water. The hull and fantail section (IV) associated with the stern bottom section has considerably more of the starboard side connected to it. The beams and gangway are clearly starboard side. The assumed starboard side (III) in shallow water is 200 feet in length, including the diagonal-strap sheer belt, while the port hull side (I) is 230 feet in length. The port side would simply be too long for the vessel's dimensions if added to the starboard fantail section.

The last of the diagnostic elements to be considered is also in the deeper section. The stern bottom section is resting on remnants of the port side. Virtually all of the stern hull structure is represented.

Question arose as to those portions of the vessel missing. All the fore and aft cabin structures are absent. In addition, the towing bitts, which would have been stepped into the horn timber, deadwood and the main deck, are not represented. There is also about 25 feet of bow that was displaced from the central site concentration. Other elements missing are the main and spar deck beams. None were recognized anywhere on site. They must have all been pulled out when the sides of the hull separated from the bottom. The main deck may not have originally been planked, but would have had the beams in place, whether planked or not.

The remaining fragments of CUMBERLAND exhibit more extensive alterations by formation processes than CHISHOLM. The relatively intact structural elements of CHISHOLM can be attributed to heavier construction and the diagonal strapping that tended to hold the sides together. CHISHOLM's bow, lacking the iron strapping, appears to have come apart as separate elements.

Less than 100 feet of CUMBERLAND bottom was located on site. Apparently the hull separated between the engine and boilers, as did CHISHOLM. The boiler and bow structure maintained enough buoyancy to be moved a hundred feet to the north before the boilers and other machinery dropped out. The bow section was able to float the 7.5 miles into Grace Harbor. The offshore hull elements show evidence of movement by ice. Some of the hull sections show ice scour damage. Ice movement must be considered a major formation process in the shallower sections of CUMBERLAND.

CUMBERLAND, with a draft about half that of CHISHOLM, originally broke up in the shallower sections of the reef. Storm and ice movement are undoubtedly responsible for the vessel fragments being moved off the edge of the reef into the gully in which they now lie. Both the vessels moved basically northward during and after the wreck event. This may be the best indicator for the direction to concentrate future survey efforts.

The remains of the vessels are a particularly rich source of information on wooden steamers of this period. As has been demonstrated, there are many details of construction techniques and steam technology that may only be answered by examination of the material record. Even when one is fortunate enough to have *construction drafts and blue prints of a particular* vessel, or as in the case of CHISHOLM, plans of a similar vessel, many details were omitted. They were considered too obvious and common to have been included in plans and have already slipped from our current understanding of our technical heritage.

The side-wheeler contained numerous common, and some very rare features. The *split-frame construction is apparently rare. The details of the hull support system* will be of interest to historians and students of marine technology, as well as serving as a comparison. CHISHOLM has already contributed to the details of known technology through its nearly complete engine and drive train. In addition, the use of iron beams for boiler support and other technical details of construction are not represented on the blueprints of the similar vessel of Figures 5.20 and 21.

A last glance at the wreckage of the CUMBERLAND/CHISHOLM site leaves us with a tantalizing thought for future research: where is the rest of CUMBERLAND? The reconstruction of CUMBERLAND parts available in the known site boundaries indicates that some very interesting materials related to this wreck have neither been found on the site nor been accounted for in the historical record of salvage. Is it possible that more large machinery and intact pieces of CUMBERLAND bow wreckage are waiting for discovery some place between the boiler and the bow in the deep waters leading up to Rock of Ages light?

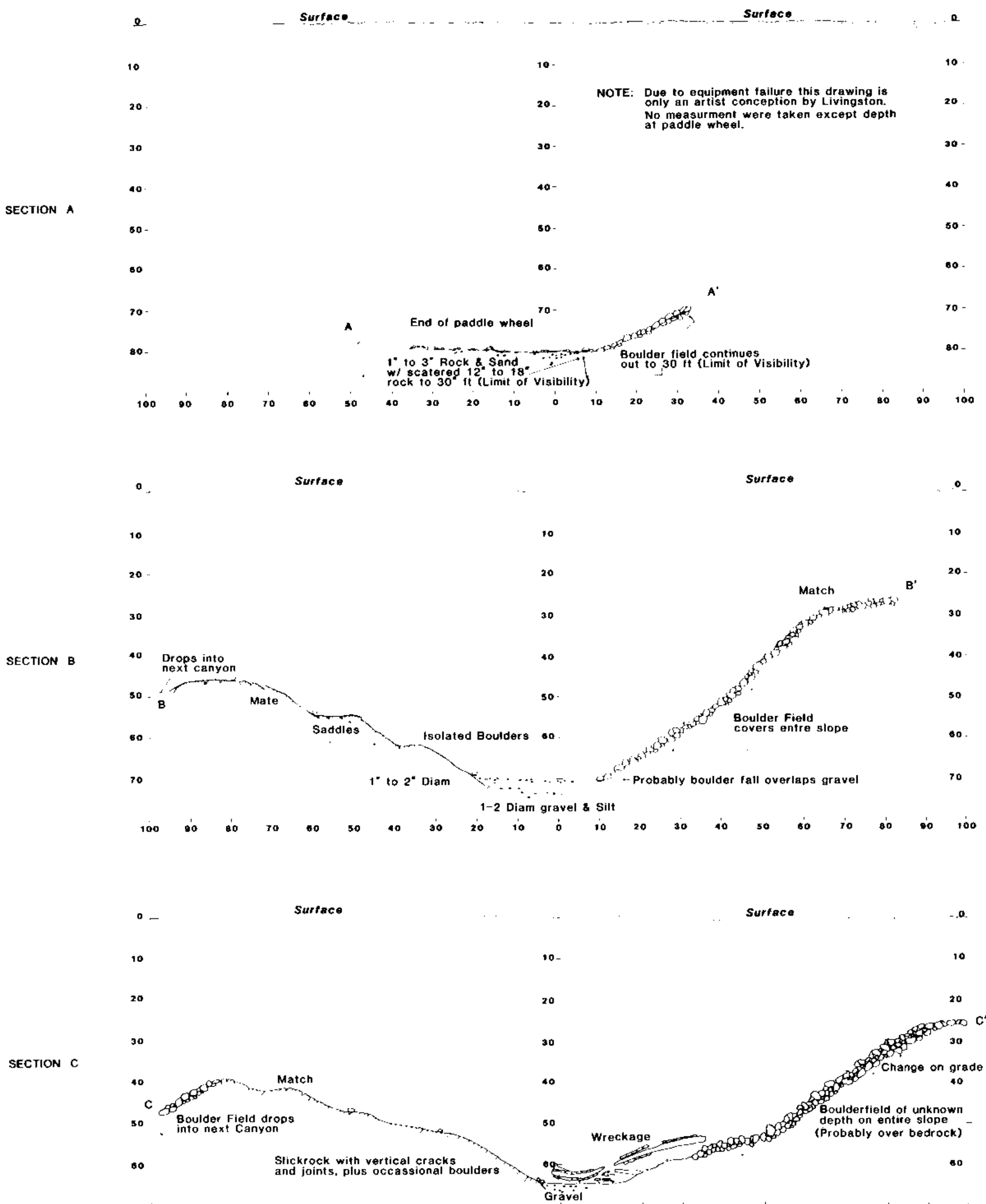


Fig. 5.2. Environmental cross section of the CUMBERLAND/CHISHOLM site. Drawing by Ernesto Martinez.

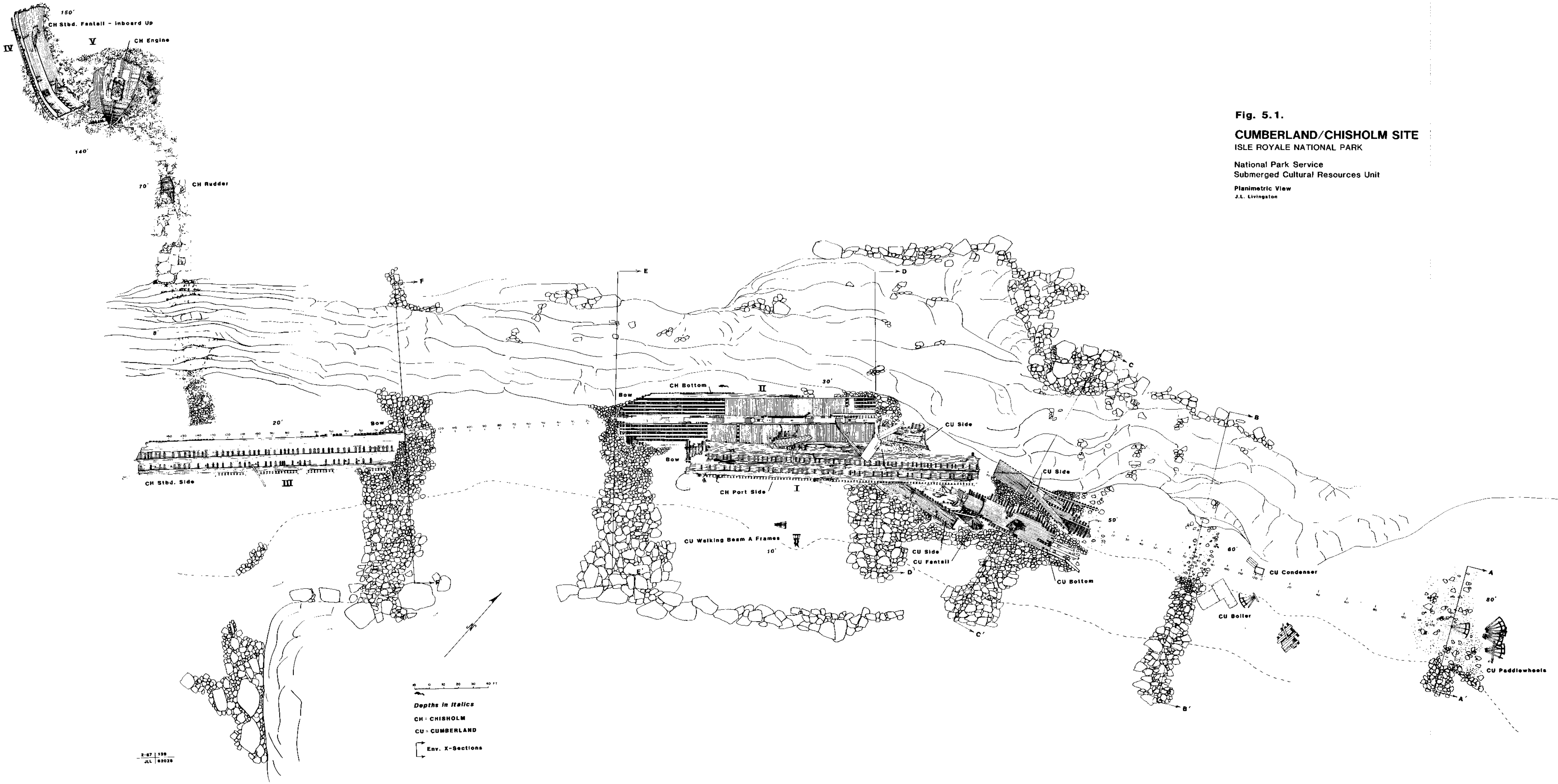


Fig. 5.1.

CUMBERLAND/CHISHOLM SITE
ISLE ROYALE NATIONAL PARK

National Park Service
Submerged Cultural Resources Unit

Planimetric View
J.L. Livingston

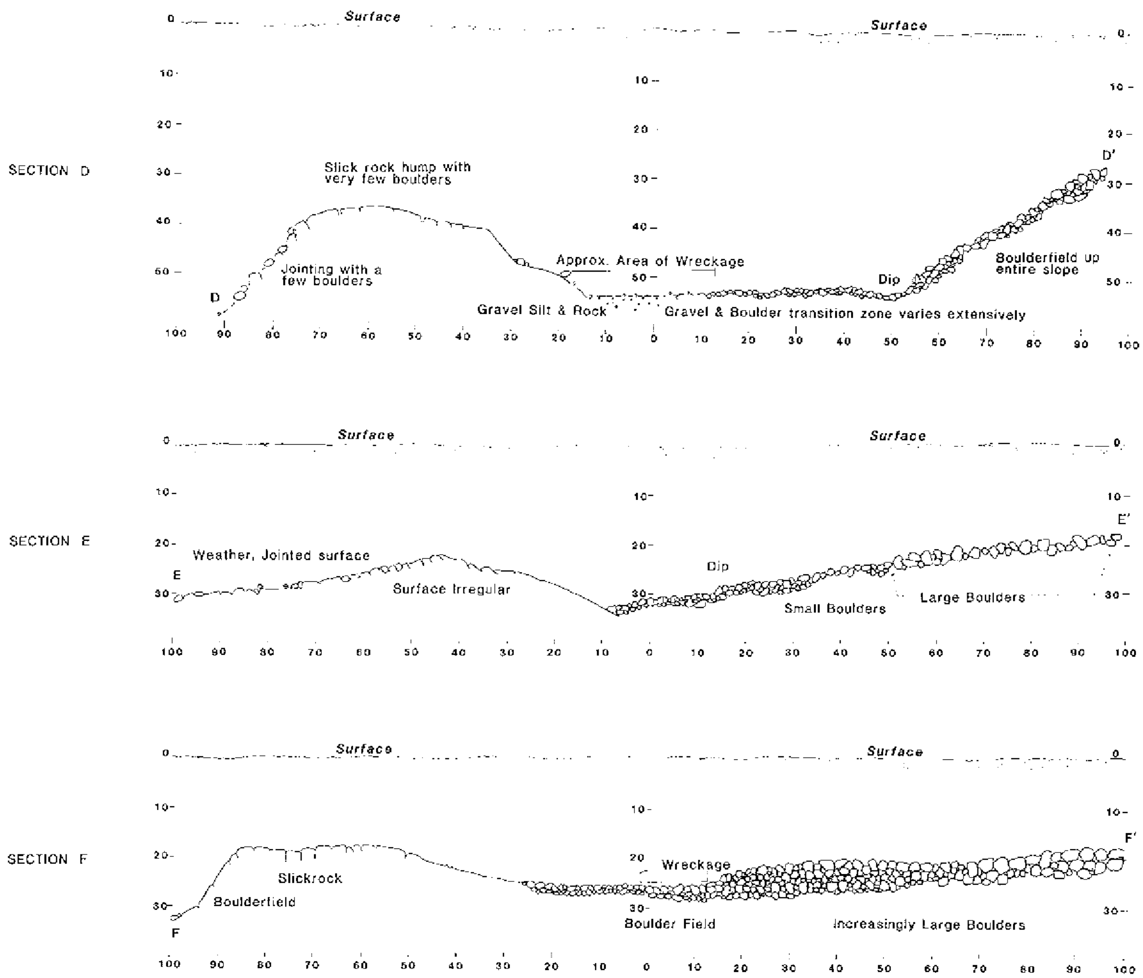


Fig. 5.3. Environmental cross section of CUMBERLAND/CHISHOLM site. Drawing by Ernesto Martinez.

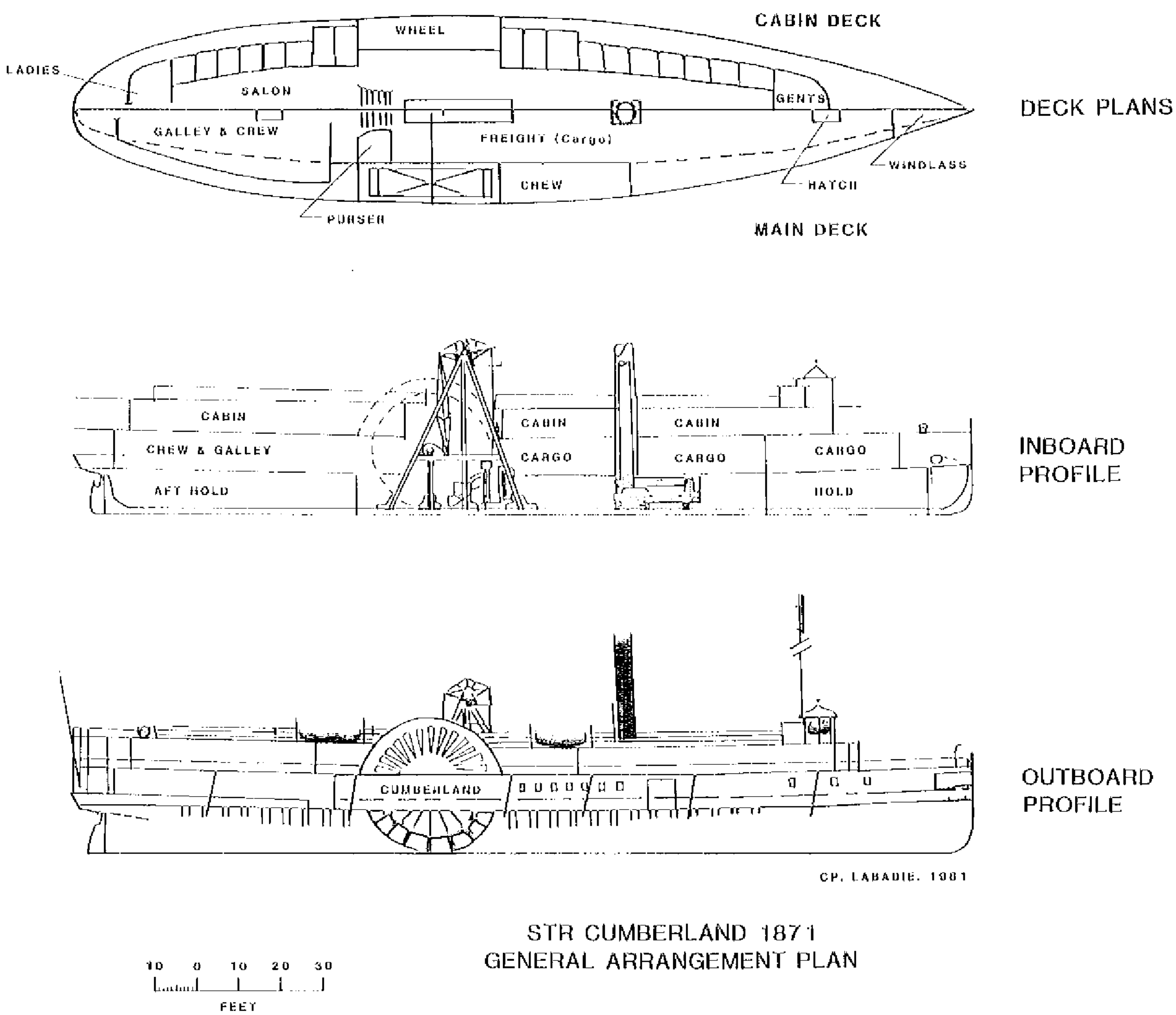


Fig. 5.4. Conjectural general arrangement plans of CUMBERLAND. Drawings by C. Patrick Labadie.

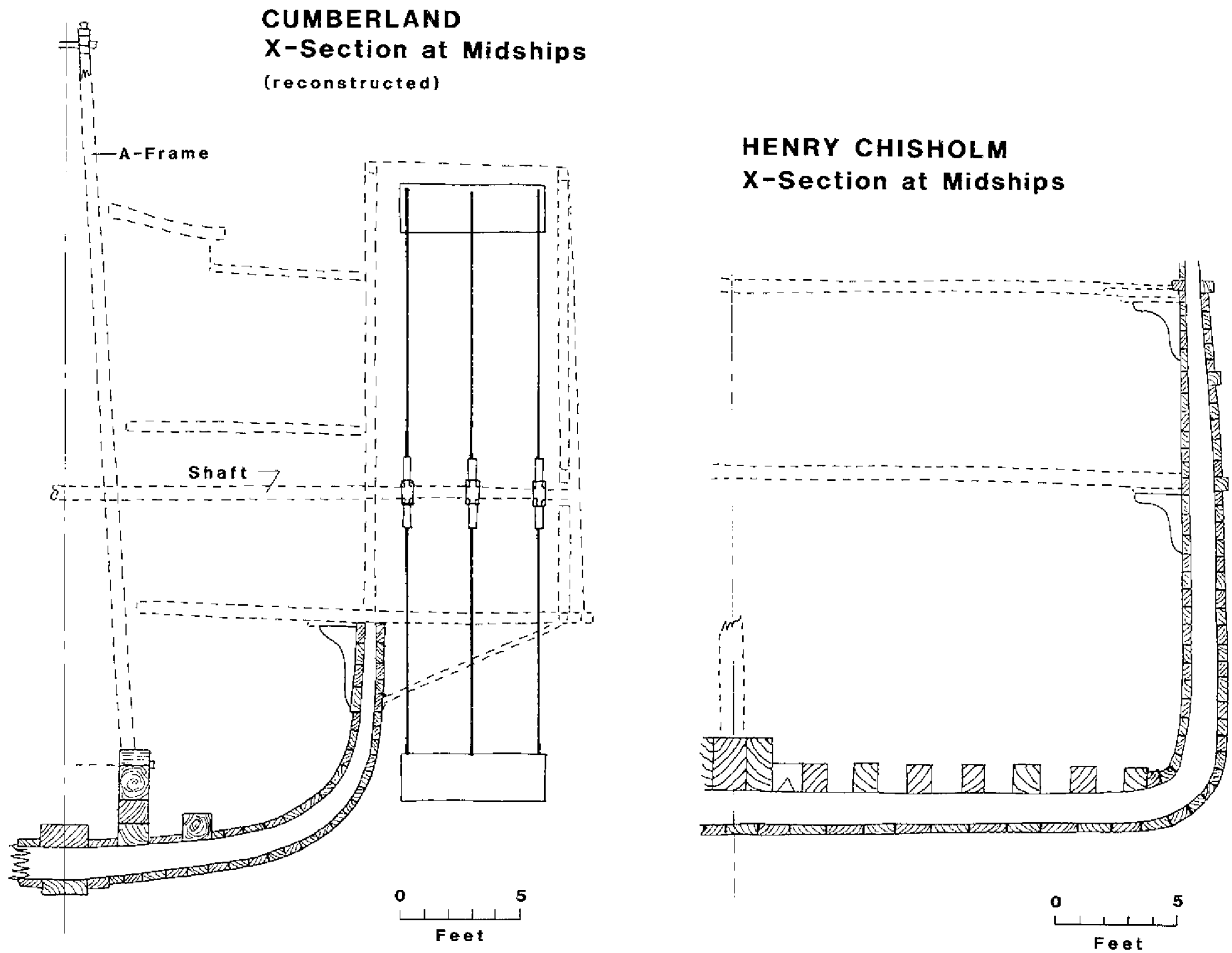


Fig. 5.5. Comparative midship cross sections. Drawings by C.Patrick Labadie.

Fig. 5.6. Structural elements related to stern of CUMBERLAND. Note split-frame construction with separated futtocks on the central segment. These pieces are outboard side up. NPS photo by Larry Murphy.

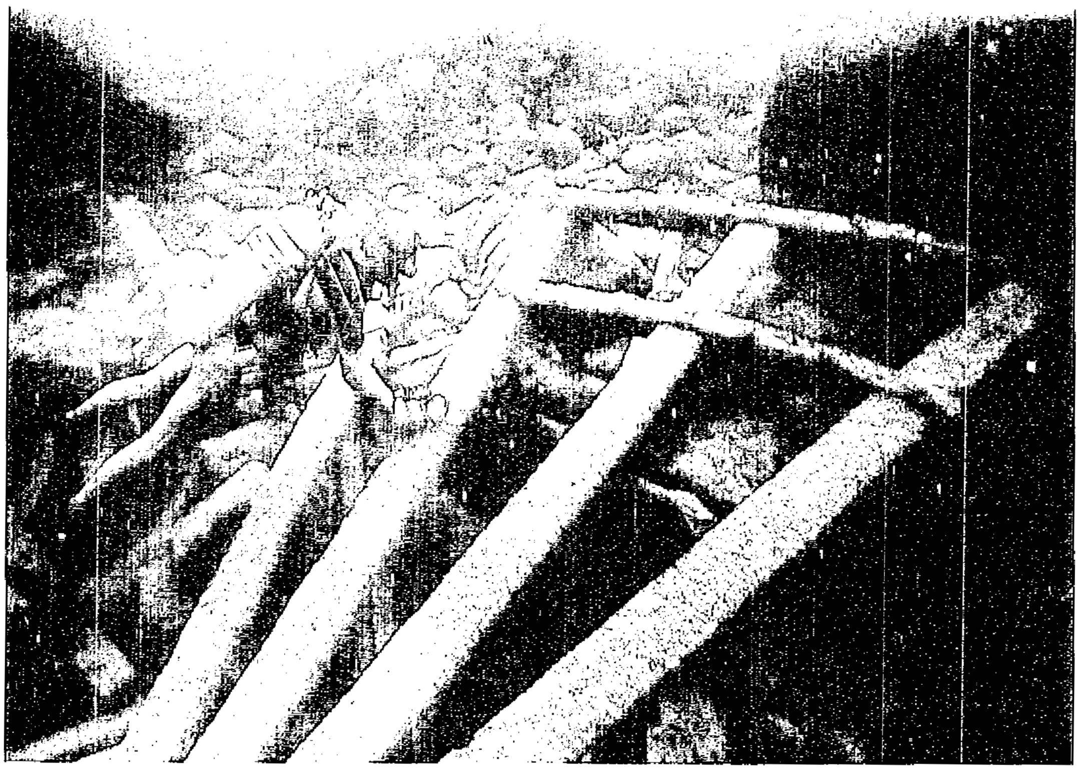


Fig. 5.7. Segment of paddle wheel from CUMBERLAND. Note firebox boiler in upper right. NPS photo by Dan Lenihan.

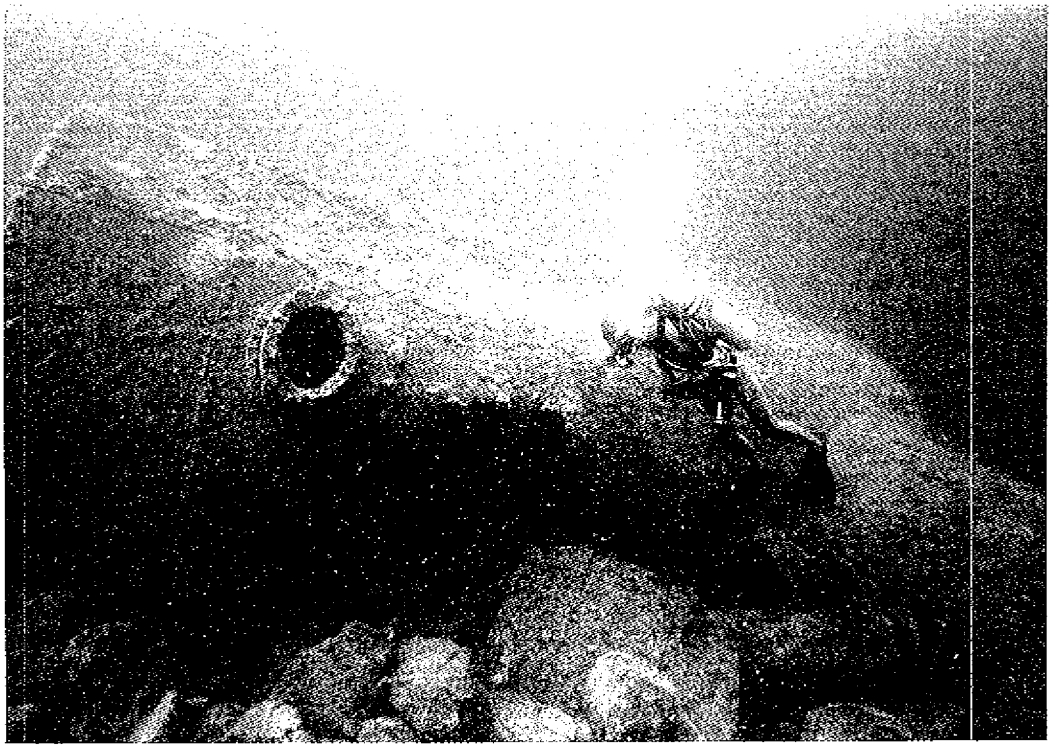


Fig. 5.8. Firebox boiler of CUMBERLAND. NPS photo by Dan Lenihan.

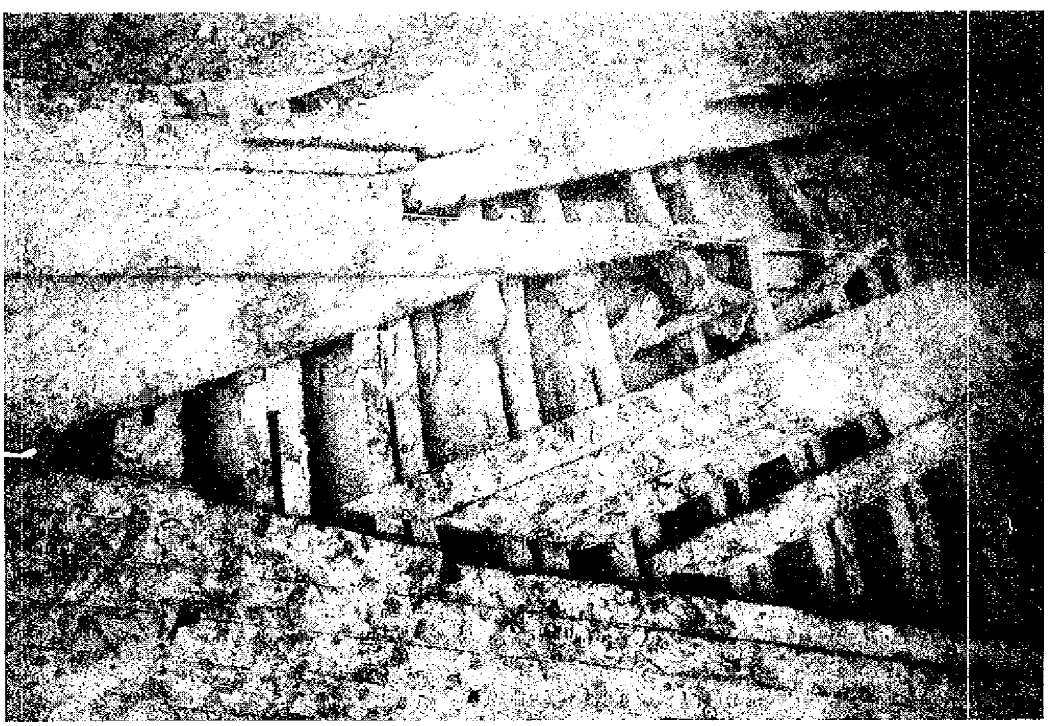


Fig. 5.9. Hull structure of CUMBERLAND. Note that a structural arch for longitudinal support was built into the ceiling planking. NPS photo by Larry Murphy.

Fig. 5.10. Top of A-frame that supported the bearings of the walking beam of CUMBERLAND. NPS photo by John Brooks.

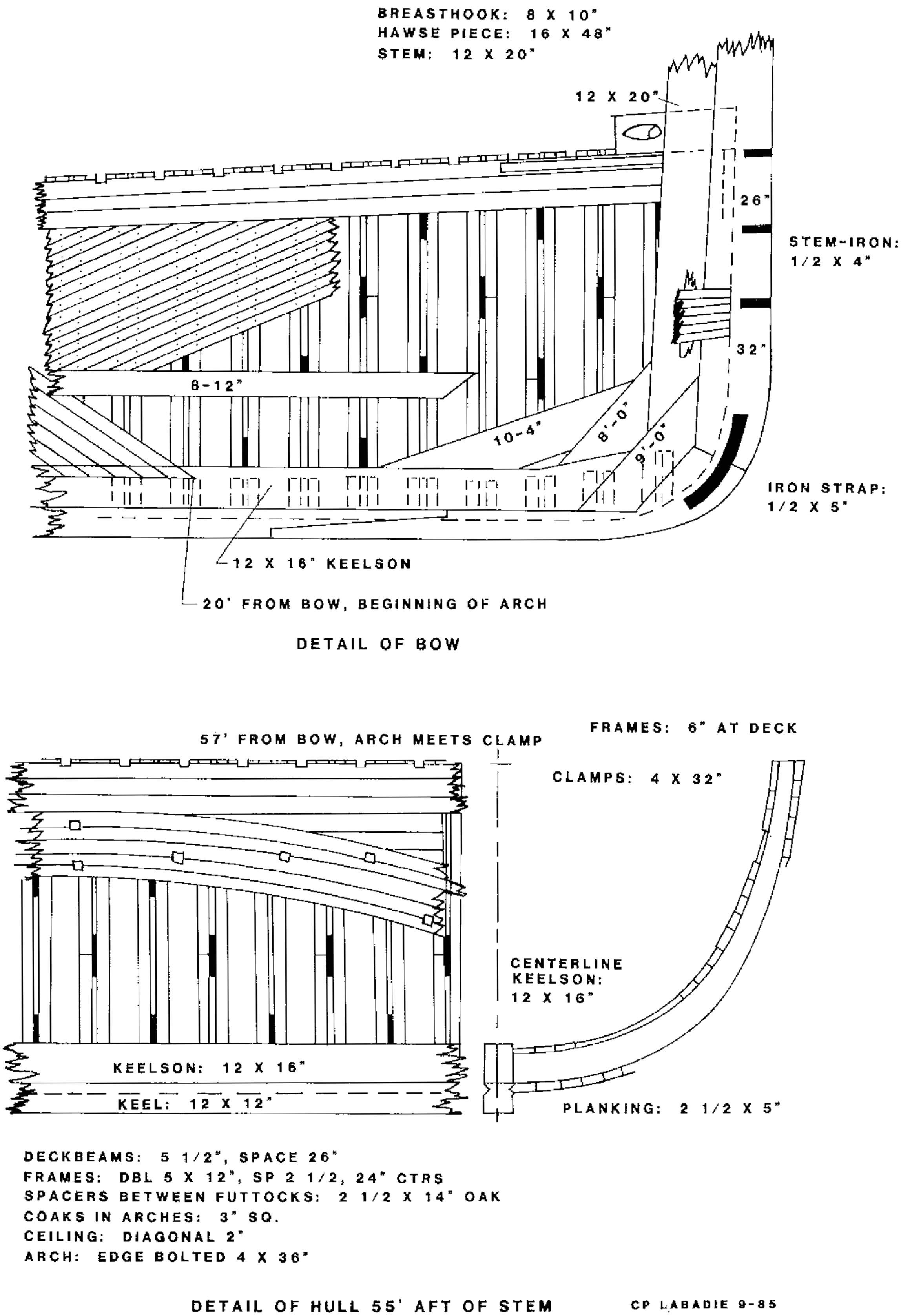


Fig. 5.11. Port bow structure of CUMBERAND found at the entrance to Grace Harbor. Drawing by C. Patrick Labadie.

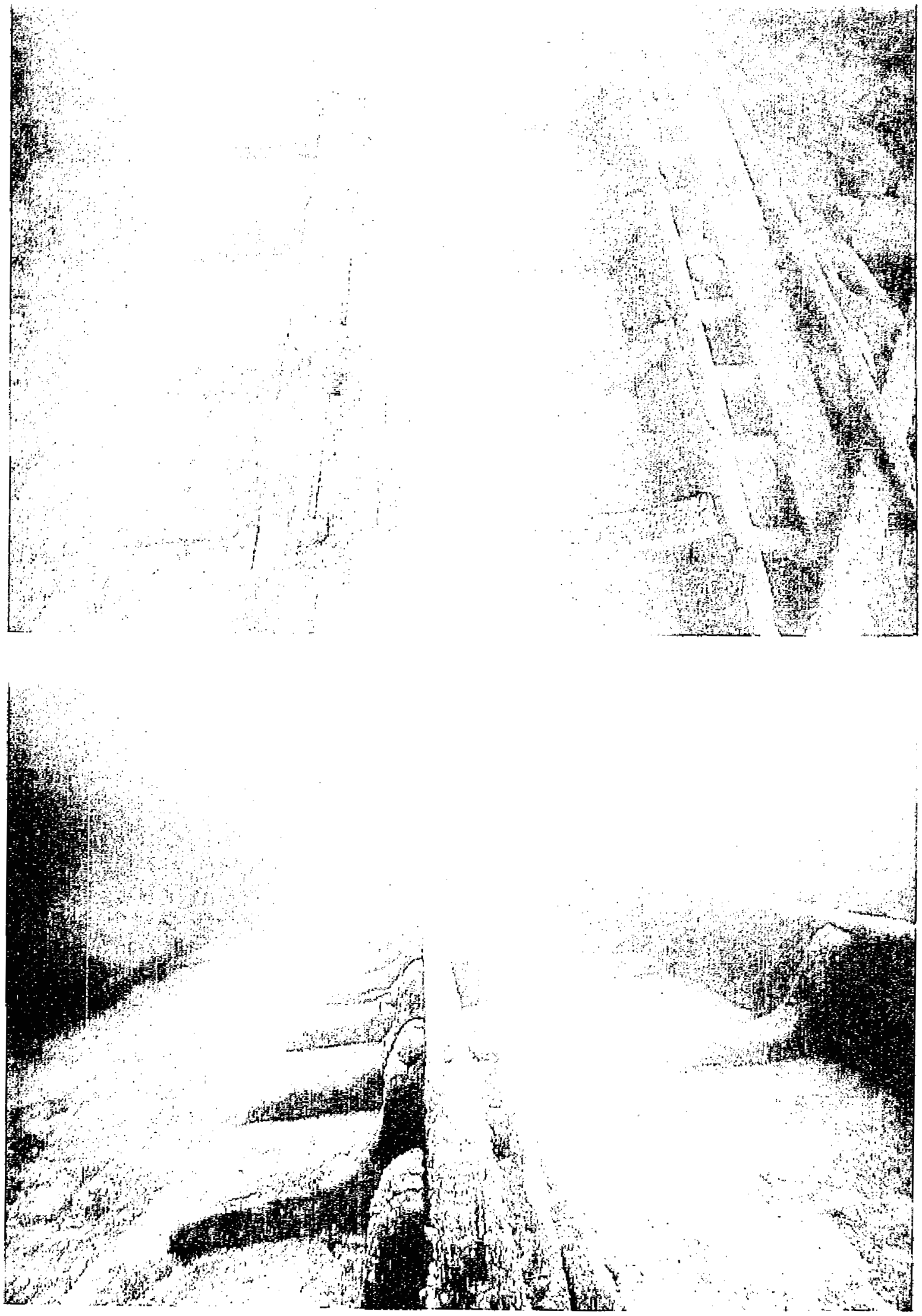


Fig 5.12–5.13. Two views of main and spar deck beam knees and shelves of CHISHOLM. Note their large size compared with the structure of CUMBERLAND. NPS photos by Larry Murphy.

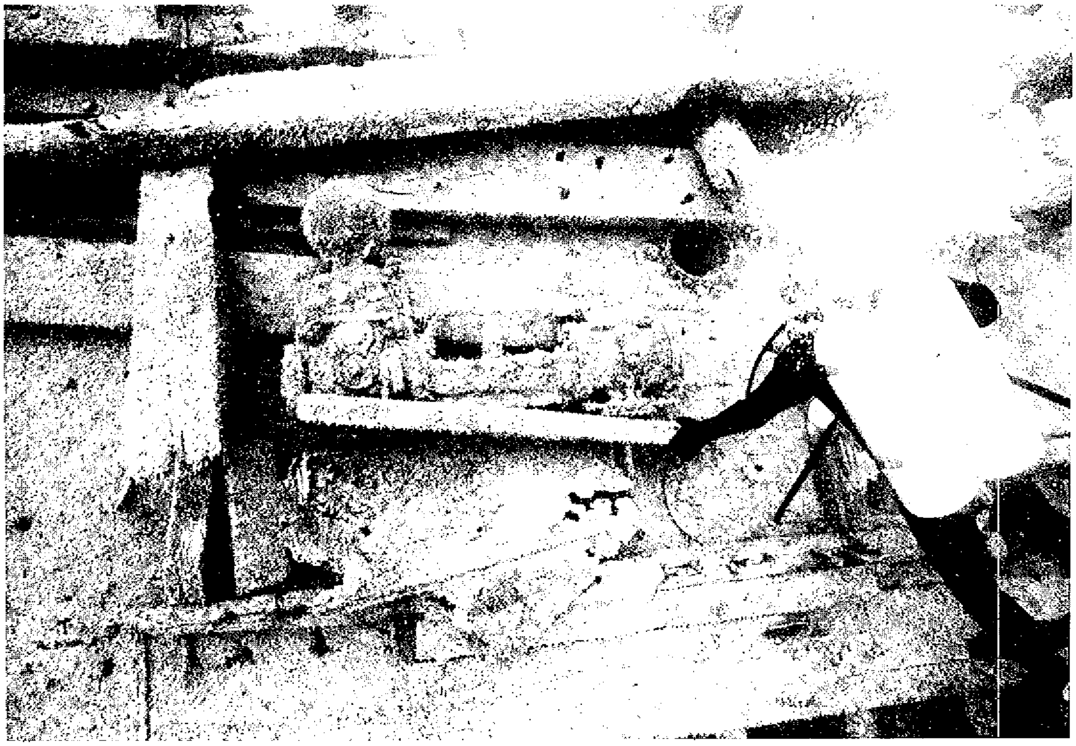


Fig. 5.14. Double-acting, steam water pump on CUMBERLAND/CHISHOLM site. Pumps similar to this were often used as boiler feed pumps. This one is in proximity of the machinery spaces of CHISHOLM and is likely from that vessel. NPS photo by Larry Murphy.

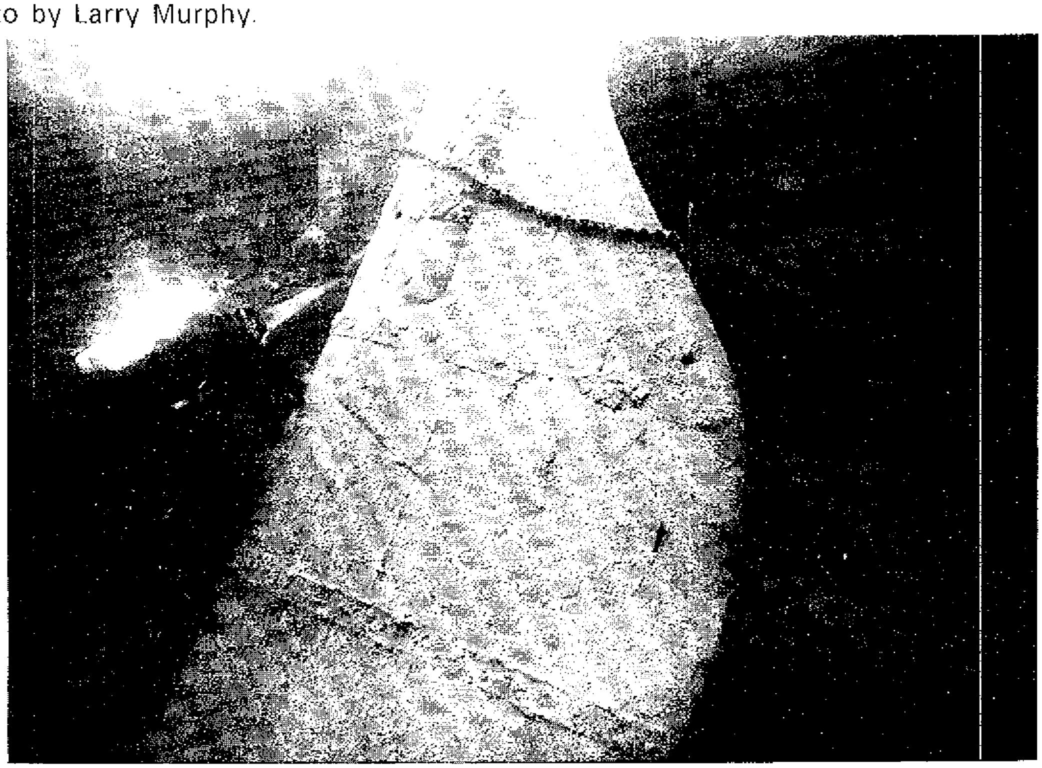


Fig. 5.15. Rudder of HENRY CHISHOLM at Rock of Ages Reef. NPS photo by Dan Lenihan.

Fig. 5.16 Firebox boiler similar to that on site from CUMBERLAND, which did not have a steam drum as depicted in this illustration. U.S. Army Corps of Engineers Canal Park Marine Museum Collection

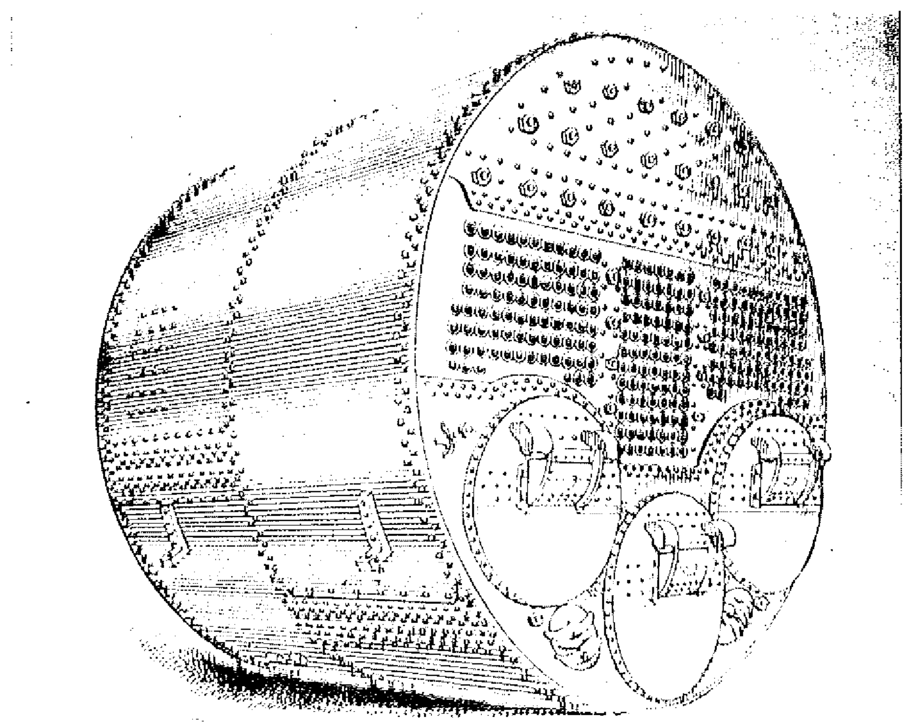


Fig. 5.17. Single ended "Scotch" boiler similar to those carried on the other Isle Royale vessels. U.S. Army Corps of Engineers Canal Park Marine Museum Collection

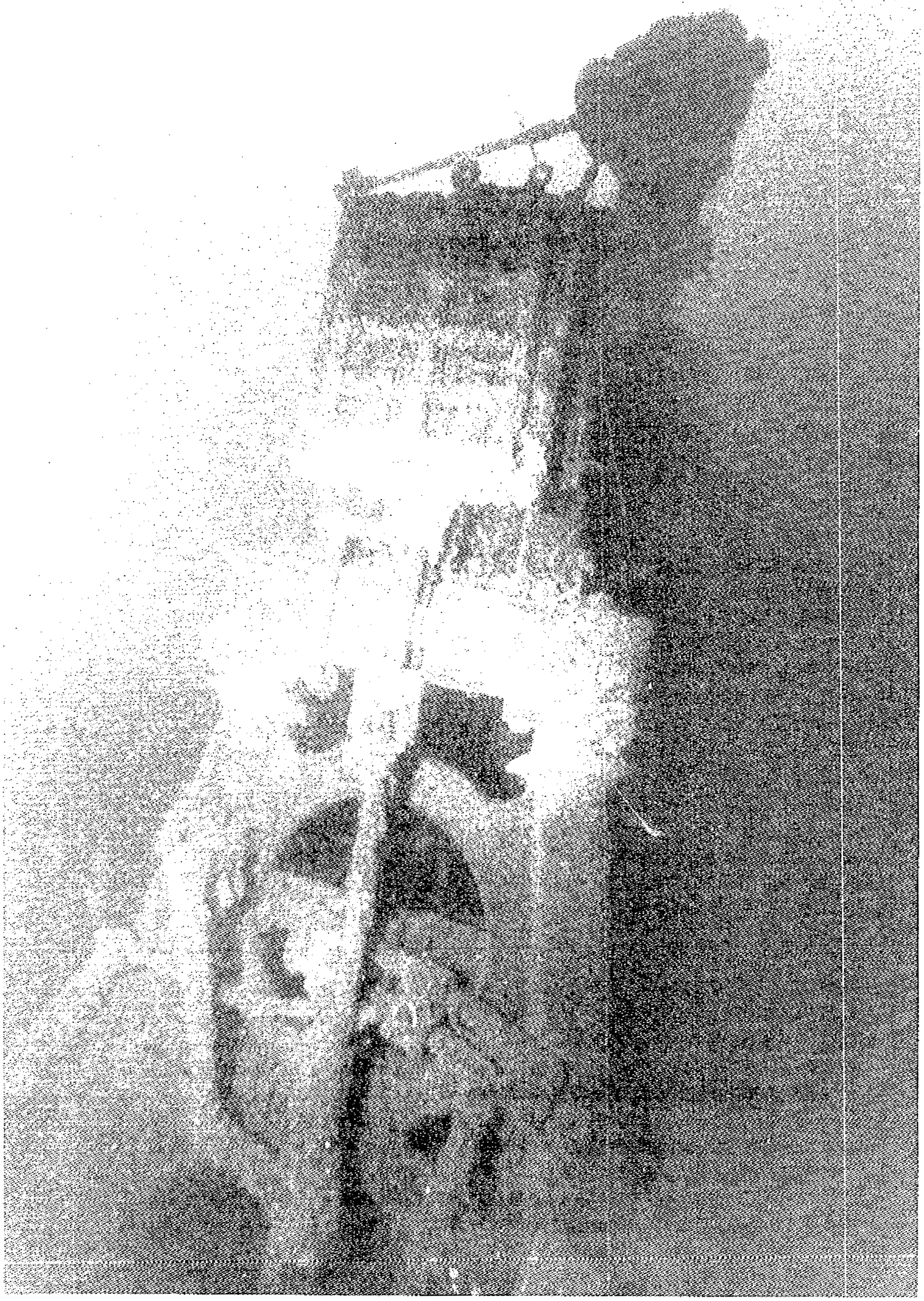


Fig. 5.18. CHISHOLM engine at depth of 140'. NPS photo by John Brooks.

Fig. 5.19. Archeologist Larry Murphy examining propeller of HENRY CHISHOLM. NPS photo by John Brooks.

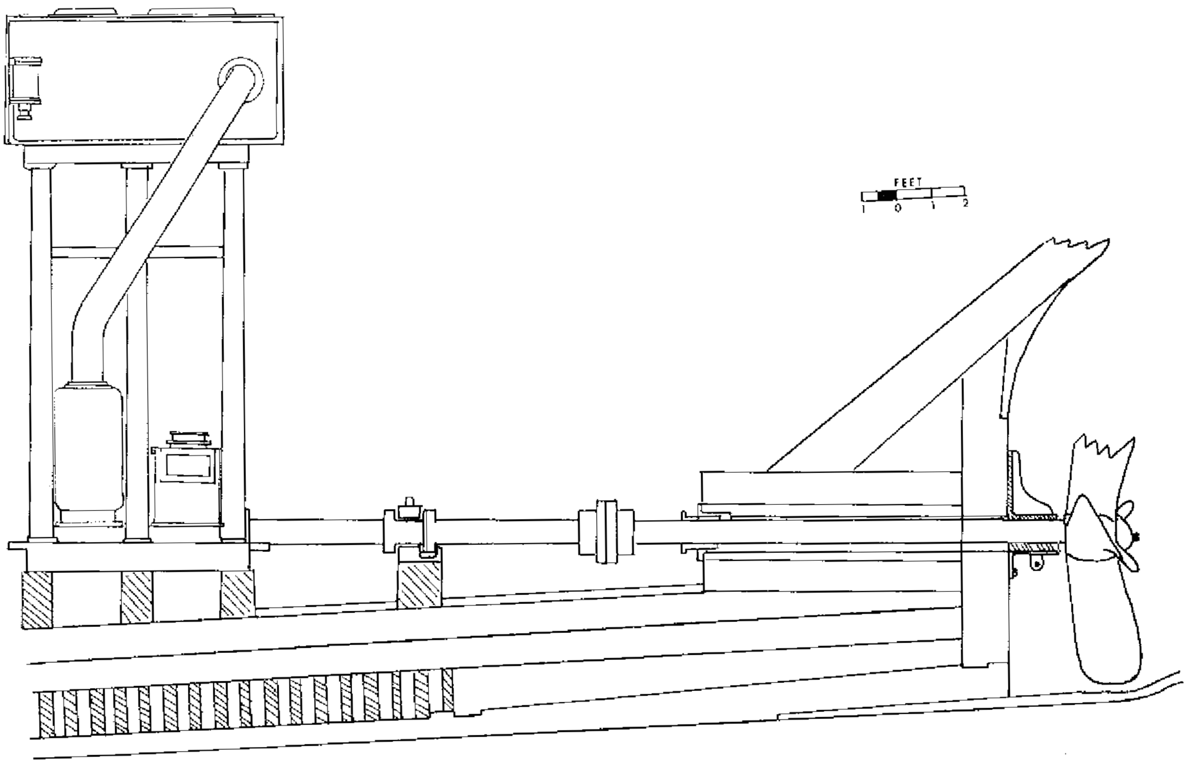


Fig. 5.20. Tracing from 1881 plans of MASSACHUSETTS, a vessel very similar to CHISHOLM. The drawing corresponds to the remains of CHISHOLM in 140 feet of water.

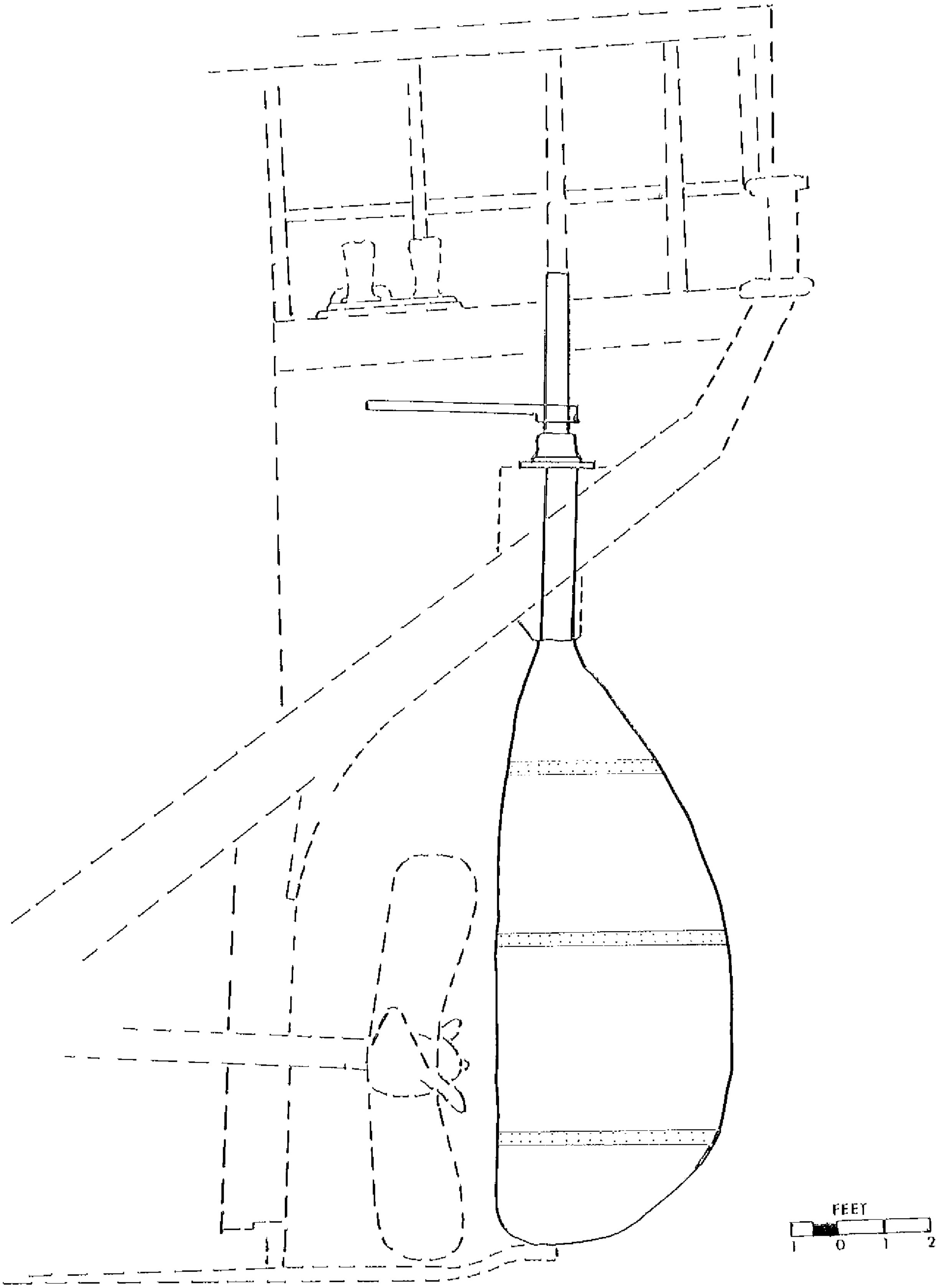


Fig. 5.21. Arrangement of rudder from MASSACHUSETTS plans. The rudder and support is similar to that of CHISHOLM.

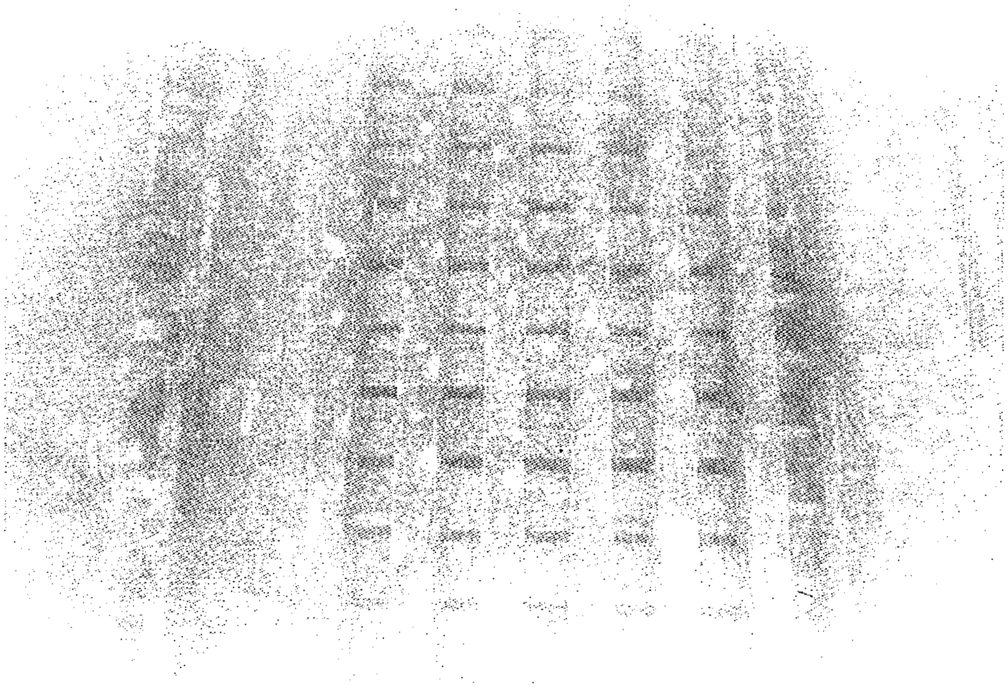


Fig. 5.22. Hull bottom remains of HENRY CHISHOLM. Centerline keelson is on the right and bilge keelson and broken paired vertical frames on the left. NPS photo by Larry Murphy.

Fig. 5.23. Roman numeral draft markings located on the horn timber of CHISHOLM at a depth of 130'. NPS photo by Larry Murphy.

ALGOMA: SITE DESCRIPTION AND ANALYSIS

Location

ALGOMA is directly offshore of Mott Island on the northeast end of Isle Royale. The center point of the known wreckage is computed at 48°06'41"N and 88°31'55"W. This point is approximately 2 1/3 statute miles from the starboard-hand bell buoy at Middle Islands Passage on a true bearing of 53 degrees, 4 1/8 statute miles on a true bearing of 31 degrees from the white daymark at Saginaw Point, and approximately 7/8 of a mile on a true bearing of 61 degrees from the radio mast on Mott Island. The point can be reached by rounding the starboard-hand bell buoy at Middle Island Passage, traveling a distance of 2 1/3 miles, and lining up on the Mott Island radio mast with a true bearing of 240 degrees.

The steel steamer ALGOMA was wrecked at Greenstone Rock, Mott Island, on the north end of Isle Royale in November 1885. It blundered onto offshore rocks at the south end of the 1-1/2-mile island and was subsequently driven onto the rugged and exposed shoreline by heavy seas and easterly winds of gale force. Because the shoreline is studded with irregular ledges and rocks, the ship's steel hull broke up immediately, and even the stern portion, which remained relatively intact, rested on an uneven bed of pinnacles and ridges. The ship's upper works were entirely shattered by the breaking seas, and driven into three narrow coves. There is no shelter at the site from easterly or southerly winds, which enjoy a clear sweep of the open Lake for a fetch of anywhere from 50 to as much as 200 miles.

In the shallower water near the shoreline, three depressions or gullies lead into deeper water from the three coves and the wreckage of ALGOMA rests principally in those gullies, separated by shallower rocks and ridges reaching out from shore. The fractured wreckage was likely pushed into the gullies from the ridge tops by ice action. The remains of the ship are, as a result, largely found in three main fields. The remaining wreckage lies dispersed in deeper water immediately offshore, ranging from 50 to about 150 feet of depth. The inshore portions are from 6 or 8 to 50 feet deep.

An unusual quality about the ALGOMA wreck is that it is broken up in a different manner than most steel ships. The hull is not so much torn apart as it is disassembled. The component parts of the vessel are intact for the most part, but few are attached to anything else. As a result of this, most of the wreckage of the ship consists of collections of parts that are structural elements, lying in random groupings as the topographical features of the Lake bottom and natural forces arrange them. Only in a few places are there assemblies large enough to refer to as a section of the vessel. The peculiar quality of the ALGOMA wreck is thought to have resulted from the failure of the fastenings, the steel rivets by which its frames and plates were held together. It is interesting to note, however, that ALGOMA's sisters, ALBERTA and ATHABASCA, had long successful careers lasting more than 60 years after ALGOMA's loss; as far as is known, these vessels never had problems resulting from rivet-failure, and they were broken up for scrap in the late 1940s. ALGOMA was barely two years old at the time of its disasterous loss.

Historical records indicate that repeated salvage work was done on the ALGOMA wreck. The ship's machinery, including engines, boilers and auxiliaries, was removed in 1886. Duluth newspapers mention the removal of large quantities of scrap steel in 1903 (see Chapter IV). Both of these salvage jobs undoubtedly involved the use of divers and explosives, but archeologists could not distinguish the effects of dynamiting from those of a century of waves and ice. The tangible evidence of salvage work lies not so much in the remains of the ship, but rather in what is missing. There are no machinery parts at the site at all. The boilers, engines, windlass, and all of the auxiliaries are gone. There is no evidence of anchors, chains, propeller, or shafting and it must be assumed that all of those elements were removed. There are few steel rails left from the cargo; the large quantity known to have been carried aboard was probably removed by the same salvors. The major machinery is known to have been used in the construction and outfitting of the steamer MANITOBA in 1889, but it is not clear whether or not that included all of the ground tackle (anchors and chain, windlass, etc.) and auxiliaries.

The configuration of the bottom near shore is quite dramatic. There are distinct ridges and gullies, rocky pinnacles, ledges, and holes until a depth of about 50 feet is reached and then the bottom becomes flatter, with a gentle steady slope downward. In general, the 50-foot depth lies about 200 feet from shore; the bottom slopes to 100 feet deep 300 feet from the beach.

The three fields of wreckage nearest the shore have a wide variety of ship parts. There are angles, bars, beams, flat floors, and hold-pillars from the framing; steel plates of various thicknesses from the shell; masts, gaffs and tackle from the rigging; and specialized fittings such as davits, fairleads, gangway-doors, and cargo-handling gear. Inasmuch as the ship was carrying mixed freight at the time of its loss, it is speculated that the debris also includes portions of the cargo, but that premise proved difficult to substantiate. There are also remnants of personal effects from passengers and crew as well as articles of the ship's outfit, such as cabin-fittings, china, kitchenware, and engine-room tools liberally distributed about the heavier items and lying in all of the depressions and cracks in the rocks. Most of these lighter artifacts are broken by the movement of rocks and ice, or worn by the abrasion of sand and gravel, especially in the "high-energy zone" of the shoreline, where the constant action of a century's waves has left it mark.

There are no known shipyard plans of ALGOMA or its 1883 sisters, but shipbuilding texts of the period offer clues about the details of ALGOMA's design. Most of the elements of construction and the dimensions of component parts were dictated by Lloyds' Rules of Ship Construction -- strict standards adopted by the steel shipbuilding industry almost world-wide during the 1870s and 1880s, resulting from research by United Kingdom shipbuilders, owners, classification societies, and marine underwriters. The Rules specified appropriate sizes of beams, plates, frames, etc., according to the length or tonnage of a vessel. Parts of ALGOMA measured at the wreck site all fit the recommendations of Lloyds' Rules, and the ship's design seems, as a result, to have been very "standard." The construction shows many distinctly British features and, although the vessel's sister ships are no longer in existence, similar features may be observed in the steel steamer KEEWATIN, which was also built in Scotland for the Canadian Pacific Railway Company, at a later date (1907). The KEEWATIN is preserved as a museum at Saugatuck, Michigan and offers a very useful comparison for a number of the Isle Royale wrecks.

Besides the rivet-failure that is evident in all parts of the ALGOMA wreck, another interesting characteristic is the relative simplicity of its framing. All of the framing members are built up of a few standard parts. It is clear that the steel shipyards of the 1880s had a very limited field of standard steel shapes to work with, and from a narrow assortment of sheets, angles and bars they had to produce all of the complicated shapes and forms necessary to frame a ship. The frames, as a result, were all built up of sheets cut to the appropriate shapes, with inner and outer edges reinforced by 3x3-inch angles. With those simple components, frames of any variety could be fabricated and riveted together. Longitudinal stringers and transverse deck beams were made of 3x6-inch bulb-angles. Aside from pipes, which were used for stanchions and pillars, almost every piece of framing on board seems to have been fabricated from those three basic pieces of steel stock. Standardized castings were used for fairleads, mooring bitts, davits, fittings, and machinery parts, but virtually none for the fabric of the hull.

The most northerly of the three fields of wreckage contains several distinct features of ALGOMA's stern. Among them are the after mast and sections of the ship's sides, along with much nondescript hull material. This field is nearest to what is called "Algoma Beach," the small cove pictured in historical views of the wreck where the whole stern lay for some time after the accident. This field extends from about 10 to about 60 feet of water.

The second field of wreckage lies about 100 feet west of the first, and includes more hull parts, fender-strapping from the ship's sides, frames, the gaff from the after mast, the ship's steel rudder, gangway doors, and much small debris such as broken crockery; it must be assumed that large quantities of artifacts were removed from this area by divers in previous years. The site has always been regarded as rich in artifacts, and this field demonstrates the fact. It lies between the shoreline in about 30 feet of water.

The third field of wreckage is another 100 feet west of the second. It is also rich in cultural materials and small ship parts, but contains a large section of the after end of the bottom, including an assembly of frames, keelson, and steel-plating from under the engine room. It is one of the most significant portions of wreckage because it communicates much about the framing scheme of the vessel, and it is one of the only assemblies left that shows multiple components still fastened together. The proximity and depth of the frames demonstrates that it came from the machinery spaces, probably right under the engines. In this same area are also more gangway-doors, framing, long sections of shell plating, piping, railroad iron, boat davits, rail stanchions from the hurricane deck, tools, and chinaware. Some rigging was also observed here, with wire rope and jib-hanks from a staysail, presumably the one carried on the after mast.

About 150 feet west of the third field of wreckage, a large section of the ship's spar deck was found lying in about 50 feet of water, sheltered by ridge of rocks. The piece measured about 35 by 50 feet and consisted of numerous deck beams all tied together by the steel stringer-plates on either side, and having a portion of the deck-planking still attached. The section is inverted; the planking lies on the underside of it. This is the only place where wooden parts of the wreck are still preserved, as far as is known, and their preservation is probably due to the fact that the deck-section is inverted, with the heavier steel beams holding the deck-planks in place. The deck section showed curvature at its sides, suggestive of the hull's shape near the bow. If this piece proves to be from the bow, it would be the only portion of the forward half of the ship found in shallow water. All other wreckage in the three nearby fields is presumed to have come from the midships or stern sections of the ship. There are many distinctly stern features found there, and a careful examination revealed no definite bow features at all.

The location of the forward half of ALGOMA has puzzled divers and historians for decades, because it is clear that all of the wreckage found along the shore to date consists of stern features. Field work at the site during the 1985 field season included the use of remote video equipments that enabled archeologists to examine a large area of the bottom to a depth of 450 feet of water in search of the ship's bow. The search turned up no evidence whatsoever of the missing half of the ship, and so the mystery deepened. Some effort was made by sport divers and volunteers to search a large area to the west of the three known fields of wreckage, but nothing of the bow was found there, either, although wind conditions at the time of the 1885 accident suggested that buoyant portions of the wreck would have likely drifted in that direction.

Diving on the wreck during 1986 permitted re-examination of deeper portions of the site, and video tapes were made of several features in 120 feet of water in scattered locations directly offshore of the three shallower fields. Several large sections of hull-plating were observed there that were indistinguishable from pieces found in the shallower locations. One section, however, proved to be a large piece of vertical bulkhead, with distinctive vertical stiffeners on one side and horizontal stiffeners on the other side. Inasmuch as the entire stern of the ship is known to have been either broken up along the shore or salvaged commercially, no section of bulkhead as large as this could have migrated from there to deeper water. That suggests, therefore, that the bulkhead must have come from the bow half of the ship, and that the entire bow must have broken up like the remainder of the wreck, and not drifted down the shore from the site of the stranding at all, which supports some of the observations based on historical documentation in Chapter IV.

The deeper part of the site also contains elements of the ship's superstructure, some of it definitely from the forward portion of the ship. The galley stack, with a distinctive weather cap, appears in historic photographs just abaft the ship's pilothouse -- the stack has been seen lying with the deeper pieces of wreckage. The forward mast is there, too, and at least one of the ship's wooden lifeboats. All of these elements are removed by several hundred feet from the deck section believed to have come from the forward part of the ship, and there is no clear explanation for their having become so far separated. It is possible that the deck section retained some buoyancy with the wooden planking attached, and that it simply floated ashore. There have been no other features found in the deeper water that can be definitely attributed to the bow of the ship, such as anchor windlass, anchors, or chains, pilothouse equipment, or the stem or hawse pipes, all large and durable pieces that should have survived. Some may yet be found, but it is likely that the reusable items were recovered by salvors. Sport divers who visited the site during the 1960s may provide some clues, but it is highly unlikely that the removal of such heavy materials could be attributed to their activity. It is just as unlikely that such easily recognized features could have escaped discovery if they were still at the site.

A more thorough examination of the ALGOMA wreck site will undoubtedly provide more clues about the events that followed the ship's loss in 1885, and explain the present dispersion and condition of the wreckage. A site map and more complete documentation would be useful because the wreck is so randomly dispersed, because so may of the features are not easily recognized by most lay divers, and because the orientation of the component parts is so confusing. It seems likely, in spite of further study, however, that much of ALGOMA's story will remain a mystery.

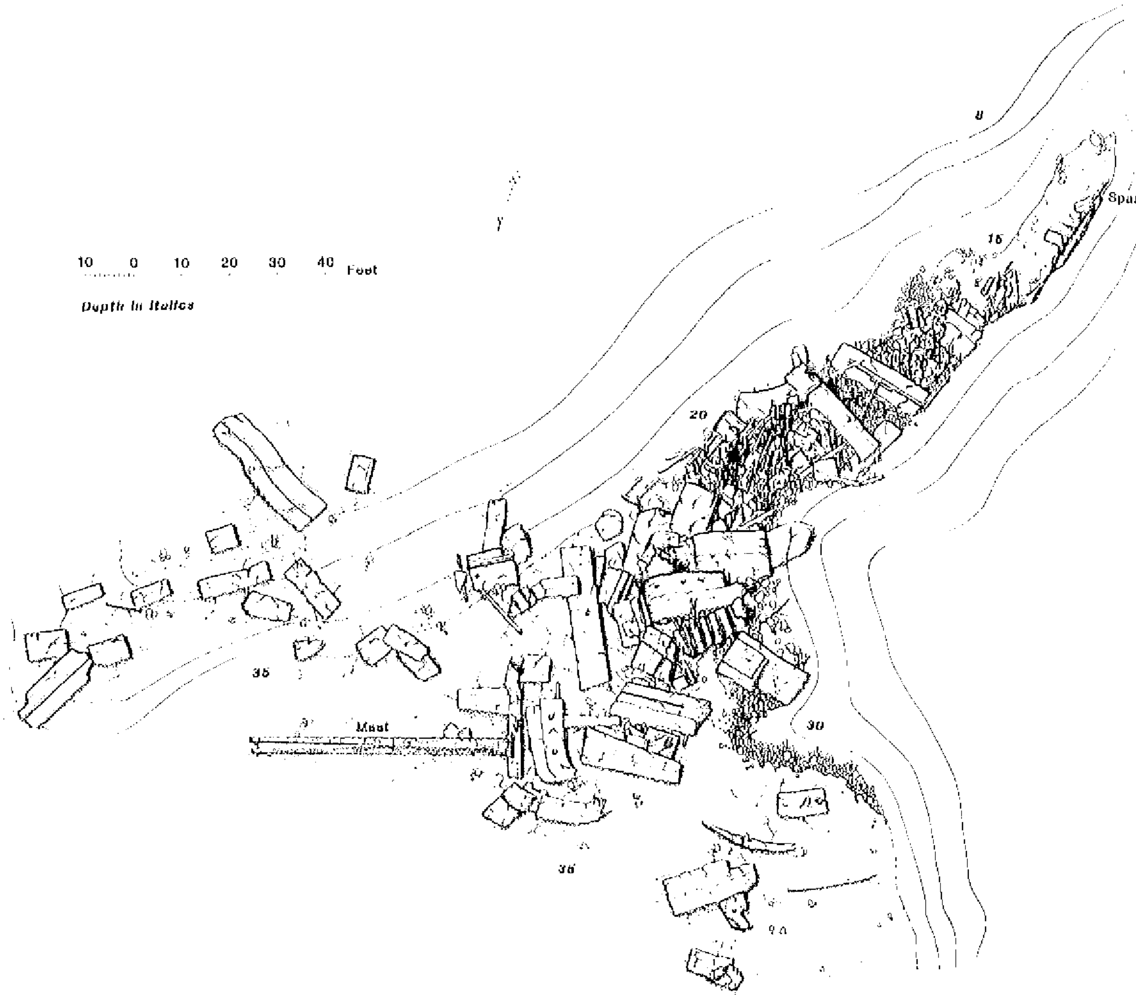


Fig. 5.24. Sample portion of ALGOMA wreckage field. Drawing by Larry Nordby.

MONARCH: SITE DESCRIPTION AND ANALYSIS

Site Location

MONARCH is directly offshore on the west side of the northeast point of Isle Royale. The northeast point on the island is known as Blake Point, and the area immediately onshore from the site is known as The Palisades. MONARCH is 1.2 statute miles from Locke Point on a true bearing of 76 degrees. The site is on a true bearing of 84 degrees from the starboard-hand nun buoy off Locke Point and 251 degrees true from Blake Point Light. The magnetic bearing is 255 degrees (compass) from the site to Locke Point and 90 degrees (compass) from the Locke Point Buoy to the Site. The site can be readily located in the water by rounding the Locke Point starboard-hand nun buoy and setting a course of 90 degrees (compass) to The Palisades and lining up on the characteristic features of the cliff. The site is located at $48^{o}11'20''$N and $88^{o}26'3''$W.

Site Description

If one has viewed many wooden shipwrecks splayed open on the bottom, and especially if one has recently seen the CUMBERLAND/CHISHOLM site, the first reaction on seeing MONARCH might well be: "So where are the knees?" There are various substitutions for hanging knees in marine architecture but, when present, these old friends provide quick and easy indicators for identifying hull sides and their approximate location on the original vessel.

Other diagnostic features of structural elements must be used to identify and position hull sections. The knees familiar on the CUMBERLAND/CHISHOLM site are replaced by beam shelves on MONARCH. Such comparisons and contrasts are informative of the changes and development of marine architecture that occurred during the time period represented by the wooden ships of Isle Royale.

The wreck of MONARCH begins in less than 20 feet of water in front of The Palisades area and extends in a generally westerly direction to a depth of over 70 feet at the stern section of the hull (Fig. 5.27). The structural remains of the vessel within the central wreck concentration consist of at least 15 elements (Fig. 5.25). The principal site scatter covers an area of about 1.5 acres. The arrangement of the components gives the appearance of a vessel that has "opened up" and separated along lines of structural weakness. Components have shifted from their proper alignment, and may reflect the activities of the 1908 salvage operations, as well as natural site formation processes.

Large disarticulated portions of hull lie near the major bottom piece with the multiple keelson structures exposed. The engine mounts and shaft bearings are visible where salvagers have relieved them of the weight of the triple-expansion engine they once supported. The boilers, propeller and most other salvageable steam machinery were also removed by contemporary wrecking crews.

What is not immediately apparent from examining the site first hand is how much of the ship is missing in the known wreckage field. Much as in the case of the CUMBERLAND/CHISHOLM site, one feels an enormous "presence" from the massive wooden timbers, and the site assumes a maze-like quality when the farthest one can see is 20-30 feet. The site is only turned into an understandable entity when subjected to the measuring tapes and protractors of an underwater mapping operation.

When the wreck material is reconstituted on paper into a ship, it becomes evident that the better part of the bow section, some 100 feet of hull and 60 feet of starboard side, are not represented on the site. The parts missing on the site, except the portion of port bow, are roughly equivalent to the portion sticking above the water surface in the historic photographs (Figs. 4.9, 4.10). Spurred on by the knowledge gained of how much ship was missing from the map, Park Service divers in 1982 discovered a previously unknown wreckage trail extending north and northeast of the site. Significant portions of wreckage scattered over a half mile in that direction, and to depths of at least 150 feet, have now been located. No attempt was made to develop a detailed map of this scatter, because the depths and extent of the material distribution would make it too time-consuming to study for the information returns gained. Further exploration dives should be productive and add to the what is known about this site.

Hull Architecture

The hull remains of MONARCH are an interesting and valuable example of the maritime architecture of wooden Great Lakes passenger/package freight vessels, and represent the refinements of a long tradition of wooden shipbuilding in the region. The heavily constructed oak hull produced a strong, rigid vessel that incorporated a combination of iron reinforcing-systems.

The largest single element on the wreck site is the bottom of the hull. It is 155 feet long and extends from the aft deadwood, just forward of the sternpost in 70 feet of water, shoreward to a point about 20 feet deep. An anchor is located just off the farthest extension of the port bilge keelson.

The bottom contains a centerline keelson, four side keelsons (two port and two starboard) and the bilge keelson on each side. The centerline and bilge keelsons are heavily strengthened, and made up of multiple elements.

The double futtock frames are 10x12 inches and set on 24-inch centers. Ceiling planking from the turn of the bilge to the lower edge of the sheer strap below the main deck is 4x8 inches. The center keelson was constructed of 14x14-inch timber, and the sister keelsons, two on each side, are 11x14 inches and 12x11 inches, the smaller outboard. The 2-inch reduction of the outboard sister keelson provided a step for the transverse planks that made a flat floor in the cargo hold on each side of the centerline keelson to the bilge.

The side keelsons are 14x11 inches and 12x11 inches. The bilge keelson contains three elements: a 12x11-inch keelson with an 11-inch wide and a 16-inch wide ceiling plank reinforcing the turn of the bilge.

The center keelson was capped with two planks laid on edge that tied together the base of the 8x8-inch centerline stanchions. The stanchions were secured at the base with through bolts, some of which are still in place. The keelsons were joined by hooked scarfs.

The side keelsons were capped by a plank somewhat narrower than the keelson. This arrangement provided a support for the hold floorboards, some of which are still in place. A bilge limber hatch was located about a third of the distance forward from the stern on the port side. This hatch was the access to the bilge pump intake, which was found intact with the strainer (rosebox) still in place.

The aftermost feature of the stern portion of the bottom is the deadwood, which reinforced the sternpost. The iron fasteners that secured the planking of the stern to the deadwood are in place. The sternpost itself is missing, as are other hull timbers that formed the stern and fantail. A piece of the fantail was located, and is number 9 in Figure 5.25.

The rudder has not been located. The only other construction element connected with the stern was a heavy iron-reinforced timber, which is the rudder shoe (this piece is not depicted on the map, Fig. 5.25, but is shown in Fig. 5.37). The rudder shoe was attached to the sternpost and supported the base of the rudder.

A portion of the starboard side of the hull was found lying outboard side up and is identified as number 2 on the map. Examination of the structure showed it to have collapsed inward with the edge that would have been attached near the bilge line located away from the hull. The hull broke longitudinally on the starboard side close to the bilge line above the bilge keelson and just below the gangways on the upper edge. The sheer strap can be seen on the edge closest to the hull in its current position. A portion of a rub rail is located on the forward edge of this section, which indicates that it is a forward portion of the hull. In the historical photographs of the vessel, this rub rail can be seen extending from the stem part way to the stern, and its presence gives the structural location of this portion of hull. There are iron hull patches on this hull section.

Sections 3 and 5 are similar and probably from the same location on the hull. The notable feature of these pieces is the half-round, canvas-covered railing on the edge farthest from the hull. White paint is still visible on this rail. The rail was originally located on the inboard side at the cabin deck level, and is the top of the gunwale. Both pieces are inboard side up and stripped of both exterior and interior planks.

Section 4 is a piece of hull lying outboard side up. The possibility of it being a section of decking is discounted because the paired timbers are set the same distance apart as the hull frames, clearly indicating it is hull construction.

Section 6 is the starboard stern. The piece is lying inboard side up, and on it can be seen two of the iron hull-support members: the sheer strap and the stern terminus of the truncated iron arch. Together, section 1 and section 6 represent about 195 feet of the starboard side from the turn of the bilge to the main deck level. There is more of the starboard side of the hull than hull bottom present on site.

The piece of decking (Number 7) lying across the stern between the thrust-bearing mount and stern shaft-bearing is part of the cabin (upper) deck, and was from the area above the coal bunkers. The identifying characteristics of this piece are three round holes visible in the port side (north) of the segment. Iron rings with the same diameter as these holes were located on site (Fig. 5.32). The rings were constructed to support two covers. Examination of the artifact concentration in the vicinity produced examples of the two covers that fit inside the rings, indicating they were coal scuttles. The smaller was an iron grate, and the larger was solid, much like a man-hole cover. The top cover would have been flush with the deck when in place. Removed, the coal bunkers could be vented through the inner grate.

Hull section 8 is the port stern, which mates to the starboard hull piece (12) and the deadwood. It is lying inboard side up. The position of this piece and the general configuration of the large hull sections give the appearance that the stern may have been pulled apart. The separation may be the result of a natural break as the hull "relaxed", but it also may reflect salvage activities to ease engine removal. The stern may have been pulled apart by tugs, which explains the displacement of the 100 foot long starboard section of the stern. Section 9 is a portion of the fantail construction.

Section 10 is part of the stern crew quarters that would have been between the main and cabin deck aft. This section is of lighter construction than other segments of the hull, and is pierced by two port hole openings. The port holes have been removed. Port holes were only found on the stern of the vessel after the modifications to the pilot house and lengthening of the Texas deck. Earlier photographs taken prior to the modifications show square windows in the aft crew quarters.

Near Section 10, off the port side of the hull, is the main artifact concentration. A bath tub is indicated on the drawing because this feature is easily recognizable to sport divers, and, in fact, it has become the subject of countless photographs with the predictable "diver-in-tub" artistic composition. The area was photographed and video taped to serve as a base line for monitoring future artifact attrition.

Component Number 11 is a portion of the starboard hull side and is lying on top of the port side of the hull, outboard side up. There are two side cargo hatches, or gangways, located in this section. The two gangways indicate this hull segment is from the forward hull side under the arch.

Component 12 is the port side and clearly shows the arch and sheer strap assembly. The piece is positioned nearly parallel to where it would have been attached, and it is inboard side up. The section broke just below the metal sheer strap, leaving a few feet of hull side above the turn of the bilge on the port side. One section of hull in the forward area (Number 13) is outboard side up. This hull section must have been in place prior to the separation of the port side from the bottom. This section of the hull may be a portion of the bow that was broken away soon after the wreck. There are gouged sections on the hull planks that may be the result of the initial wreck event. It is unlikely that the gouges were caused by post-depositional ice movement because none of the structure around the damaged planks show any similar damage.

The remaining two sections, 14 and 15, are from the bow. The larger is a 40-foot section of the whole port bow assembly. The straight timbers of the fore portion were part of the stem post. The curved timbers to the right articulated with the bow deadwood and centerline keelson. An important feature of Section 14 is the forward junction and tie-in of the arch support and sheer strap.

The triangular piece lying off the forward edge of the bow section is a deck hook. The indicators of the deck hook are the two half-round indentations to the rear of the piece. They were probably cut to fit windlass mounts. A similar section can be observed on the fore deck of AMERICA. This structure is inverted.

Parts of the vessel structure that are not represented in the site remains are the upper cabins, pilot house and decking of the vessel. The only trace of the cabin work located was some metal deck railing found in the forward portion of the bottom. There are no indications of the transverse beams of the two decks; they seem to have been completely stripped out.

Hull Support

The Insurance Underwriters' Vessel List (1890) referred to MONARCH's hull as having "oak construction strongly reinforced with iron." MONARCH was indeed "strongly reinforced with iron", with three principal iron hull components: the main arch ("hog truss" or "truncated" arch on both sides of the hull), the sheer strap (below the main deck level), and the gunwale girder that ran along the promenade or cabin deck level.

The main arch is attached to both the bow and stern deadwood. For the remainder of its span, the arch is attached to the vertical frames that run from the keel to the gunwale. This is a much heavier design than found on most contemporary vessels. Frequently, only every other, or even every fourth frame ran the full height to tie into the arch.

MONARCH's iron or steel arch was composed of 3/4-inch thick stock, 36 inches wide. Prior to the use of iron or steel for the arch, they were constructed entirely of wood. Earlier arches were composed of several layers of heavy oak timbers with mortices for the vertical frames. The metal arch reinforcing of MONARCH is on both sides of the hull frames. Where the arch enters the hull, it is beneath the hull planks. Portions of the arch may be seen above the level of the promenade or cabin deck in Figures 4.7 and 4.8. The arch is constructed of iron and runs along both the inside and outside of the vertical frames. Its shape is slightly flattened and extends just above the deck rail, and thus sometimes referred to as a "truncated" arch.

It may be that the metal reinforcing in the hull of MONARCH was steel, rather than iron. UNITED EMPIRE was reported to have had steel arches (Chicago Tribune March 23, 1883; May 21, 1883; Chicago Times May 27, 1883). It is likely that MONARCH, which was built later, did as well. As of the time of the field work on MONARCH, there was no easy method to determine the composition of metal underwater. Contemporary accounts, like modern ones, often used iron and steel interchangeably, and are not reliable. "Iron" or "ferrous" are used in this report with the realization that the material referred to may be steel. When there is a high certainty that steel is used, it will be so labeled.

There apparently was a box girder arrangement at the level of the cabin deck rail. This girder is made up of two iron plates that run from the stern to the arch, and from the bow to the arch, forming a continuous iron-clad deck rail. This girder provided additional longitudinal strength.

The sheer strap ran the length of the hull inside the frames under the main deck level. This feature is visible on hull sections 6 and 12 in Figure 5.25. This member, unlike the others, is made of a single layer of iron sheeting, riveted together and tied to the inboard side of the vertical frames (Fig. 5.31). The material seems to be the same stock as the main arch: 3/4-inch thick and 36 inches wide. Two widths have been riveted together to give a sheer strap width of about 72 inches.

An inside framing of timbers tied the top and bottom of the sheer strap into the frames, and a vertical frame was laid over the the joints of the iron sheets making up the strap on every fourth frame. This detail can be seen in the site map, and also in Figure 5.31. The details of the forward junction of the arch and sheer strap are located on the port bow section, segment 14.

There is no evidence of the sheer strap on the outside of the hull. It has been suggested that this member was included in the ship construction for protection from ice, but that was not the case. This strap is on the inside of the frames above the normal water line, and the hull was planked with 4-inch thick oak hull planks.

The three support systems provided a particularly strong, rigid hull. This is reflected on the wreck site by the large size and structural integrity of the various hull elements that have survived.

Iron was used in two additional instances within the MONARCH hull. The centerline stanchions were tied together with iron strap for additional longitudinal strength. These stanchions may be seen on the site map (Fig. 5.25), and the straps appear as the long ribbon-like element running along the inner port edge of the hull bottom. The stanchions were torn out, and some are held up above the bottom, still supported by the iron strapping that ran along the upper portion of the port and starboard edge of the timbers. The stanchions are on 4-foot centers, except in the stern section where they are closer together, and may have been used as additional support for the boiler deck. The angles that were made into the strap suggest it ran from the aft deadwood, up under the boiler deck and along the underside of the main deck beams to be tied into the bow. The bow section of the stanchions has not been found and was probably torn off with the bow when the ship broke during the wreck.

Another major use of iron in MONARCH's construction was to line the boiler room. A section of this lining may be seen in Figure 5.36. The practice was fairly common on Great Lakes steamers as a precaution against fire. A similar section of sheeting was located on CHISHOLM (Fig. 5.1).

Propulsion Elements

The stern portion of the hull remains is particularly interesting because the engine and machinery mountings are still in place. The largest feature is the engine mount or bedplate. It is made of cast iron and attached to the large engine bed timbers built into the floor frames (Figs. 5.28, 5.29).

Apparently the engine was removed with little difficulty by the 1908 salvors. It was simply unbolted from its bedplate. The threads on the mounting bolts show little damage and are still clearly visible. One of the most obvious features of the engine mount is the main shaft bearing to the stern of the mount.

Proceeding along the drive train toward the stern, another machinery mount is visible. The mount is a very large, single timber with four holes (Fig. 5.25, 5.30). This is the mount for the thrust bearing. A thrust bearing was necessary to minimize the pressure against the internal crankshaft bearings of the engine and the engine mounts. The thrust bearing transmitted the push of the screw to the hull through this heavily constructed feature. The thrust bearing, a high-cost and reusable item, must have been salvaged with the engine and shaft. A second shaft bearing is located aft of the thrust-bearing mount. Thrust bearings may be easily observed on GLENLYON and CHISHOLM (Figs. 5.43, 5.20). The GLENLYON bearing is a multi-collar type and that of CHISHOLM the earlier single-collar type.

Near the hull, in the area off the engine mount, a 5-foot long, upright iron pipe is located (Fig. 5.34). The pipe is riveted together and connected to a box-like, through-hull fitting. This is the overboard discharge for the circulating pump of the condenser. An intact example may be seen on the port side of the engine room of AMERICA.

Auxiliary Machinery

In the engine room area, a manually operated, double-acting water pump is located (Fig. 5.35). This would have multiple uses aboard a vessel like MONARCH. The pump was used as an auxiliary feed pump for the boilers, a fire pump or an emergency bilge pump. A wooden handle was inserted through the top allowing two people to operate the pump. This pump is very similar to one located on the bow of AMERICA.

This artifact concentration area also contains machinery, including a water pump with a flywheel. An example of the cargo winches found on the site is visible in Figure 5.32. The winches were mounted along the centerline above the main deck. An iron A-frame supported the end opposite the large iron roller. The winches were mounted in pairs above the gangways, and were friction turned by a line shaft with a smaller friction roller that fit between the iron rollers of the two cargo winches. They were used to lower and raise package freight from the main deck to the hold. Several wraps of rope were passed around the slowly turning hardwood roller that functioned as a friction drum. A long portion of the line shaft with the smaller rollers was also located within the hull structure.

The 14-inch diameter wooden friction-drums were 6 feet 8 inches long and turned on a 3.5-inch diameter shaft. A six-spoke wheel 2 feet 8 inches in diameter was still attached to one end of the drum. The spoked wheel, which was turned by a friction drum mounted on a long shaft, was made in two pieces. The inner section appeared to be a casting that included the spokes. The 9-inch outer, flat rim was attached by rivets.

In Figure 5.33 (left center) a portion of a steam radiator may be seen. Great Lakes vessels used boiler steam piped throughout the living and working quarters for heat. Steam radiators, much like ones used in buildings, were the local heat generators. Similar intact examples containing three elements were located on AMERICA. One intact specimen is in the social hall of AMERICA.

Cargo

The assemblage of artifacts in the stern area is interesting and informative. Cargo, machinery, and ship's fittings are found in close proximity. Figure 5.33 shows some of the cargo and fittings. Five boxes, containing either rivets or threaded bolts, are still intact. The bolts and rivets have corroded together to form a solid mass the shape of the packing box. Broken China and brown bottles are strewn over the area. The brown bottles are of the type frequently used for beer, but curiously, some of these are packed completely full of grain and stoppered with cotton (Figs. 5.33, 5.38). There has been some speculation that these were beer bottles of the salvors that were somehow filled with grain. It is more likely the bottles contained grain samples. It has also been suggested that the samples were seed grain. Most likely the bottles contain samples of the cargo grain.

Formation Processes

The remains give some indication of the wrecking process. The vessel was apparently listing to port on the bottom as the breakup occurred. Most of the artifacts and sections are on the port side, which is the deeper side of the hull. The hull sides broke away from the bottom higher above the bilge line on the port side, and the side left in place served to trap many artifacts on the port side of the hull. The extent and nature of the salvor's activities are not known, but the stern area appears to have been separated and moved with the aid of surface vessels.

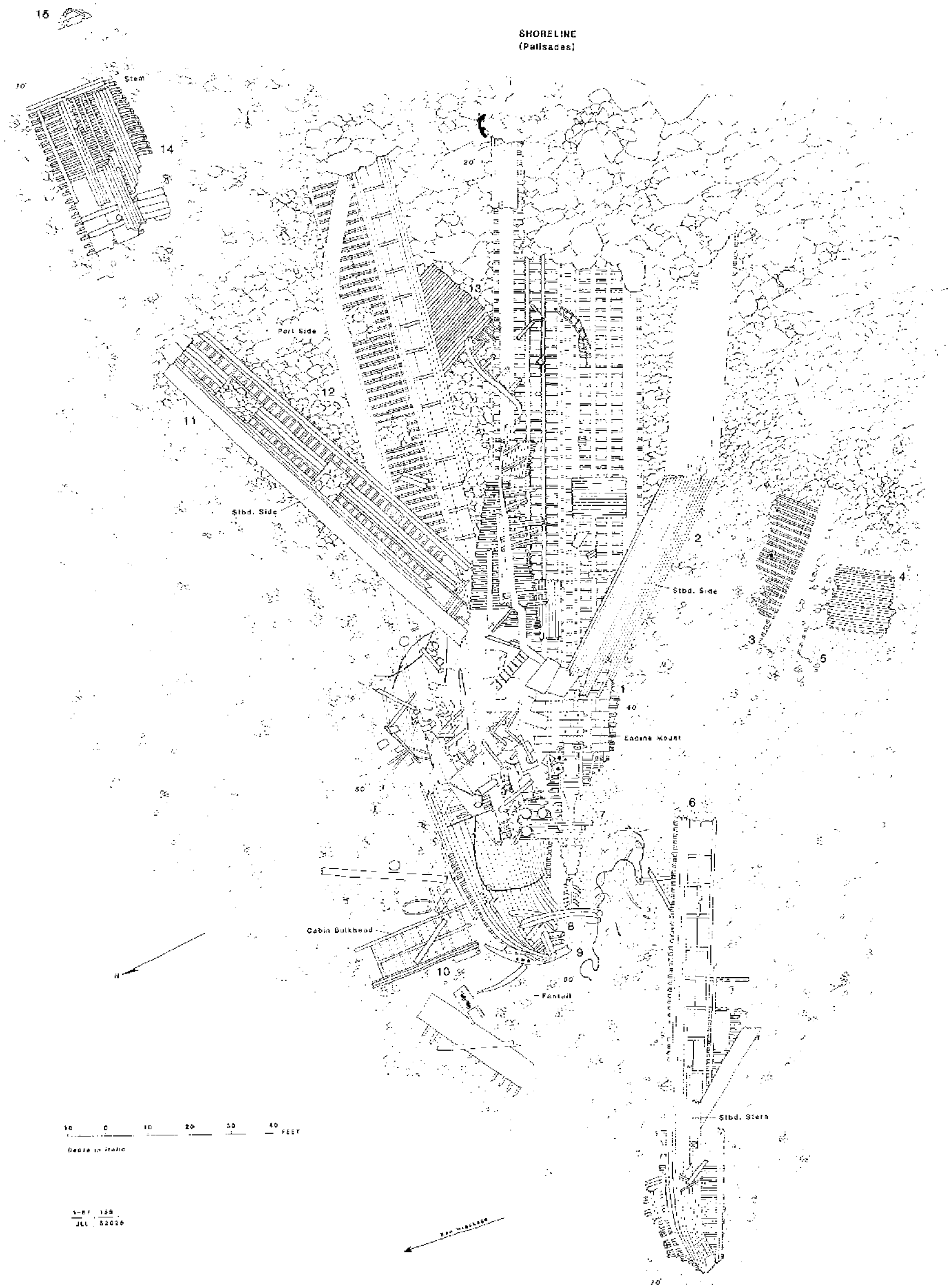


Fig. 5.25. MONARCH site map. Drawing by Jerry Livingston.

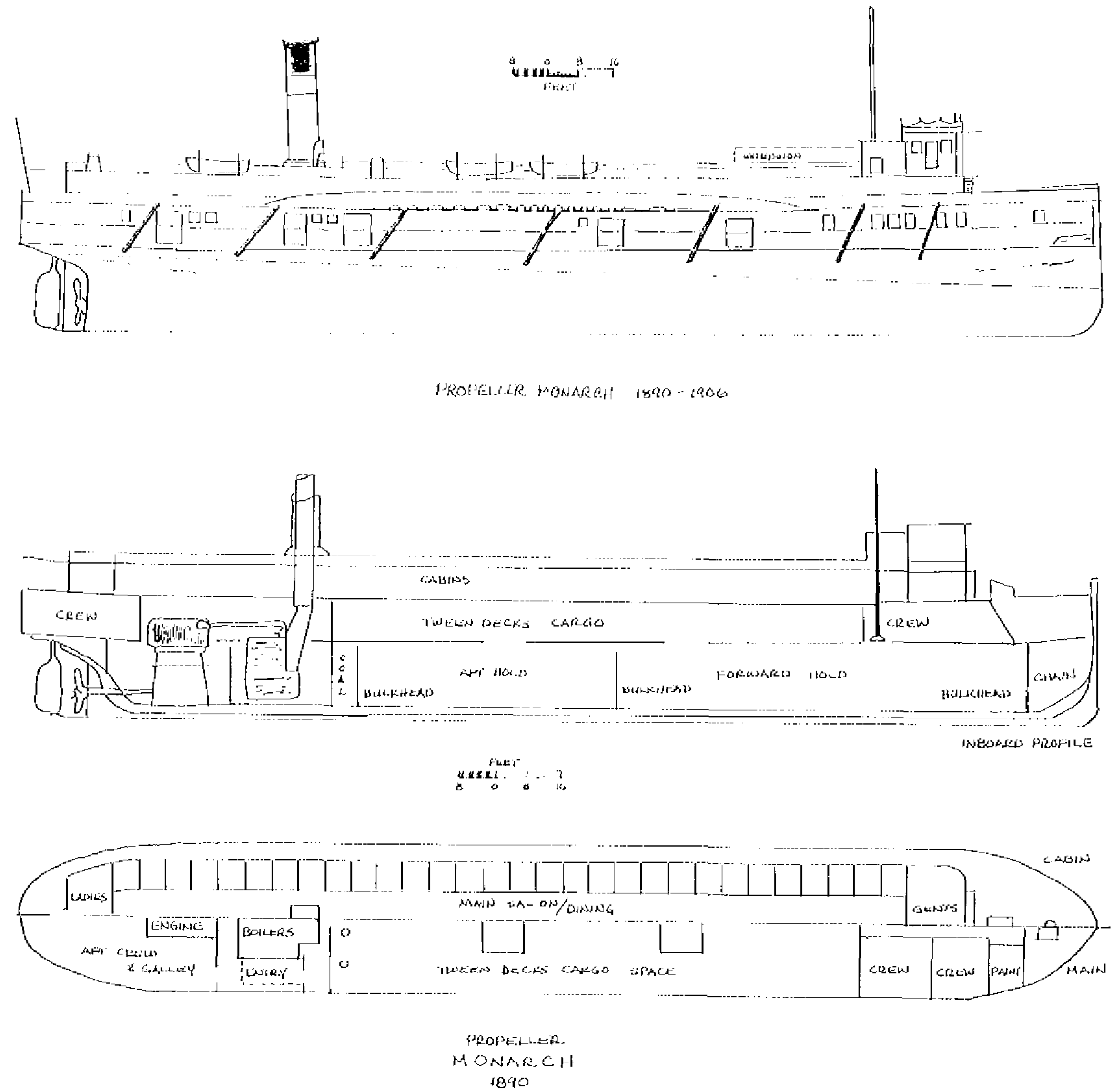


Fig. 5.26. Conjectural general arrangement plans of MONARCH. Drawings by C. Patrick Labadie.

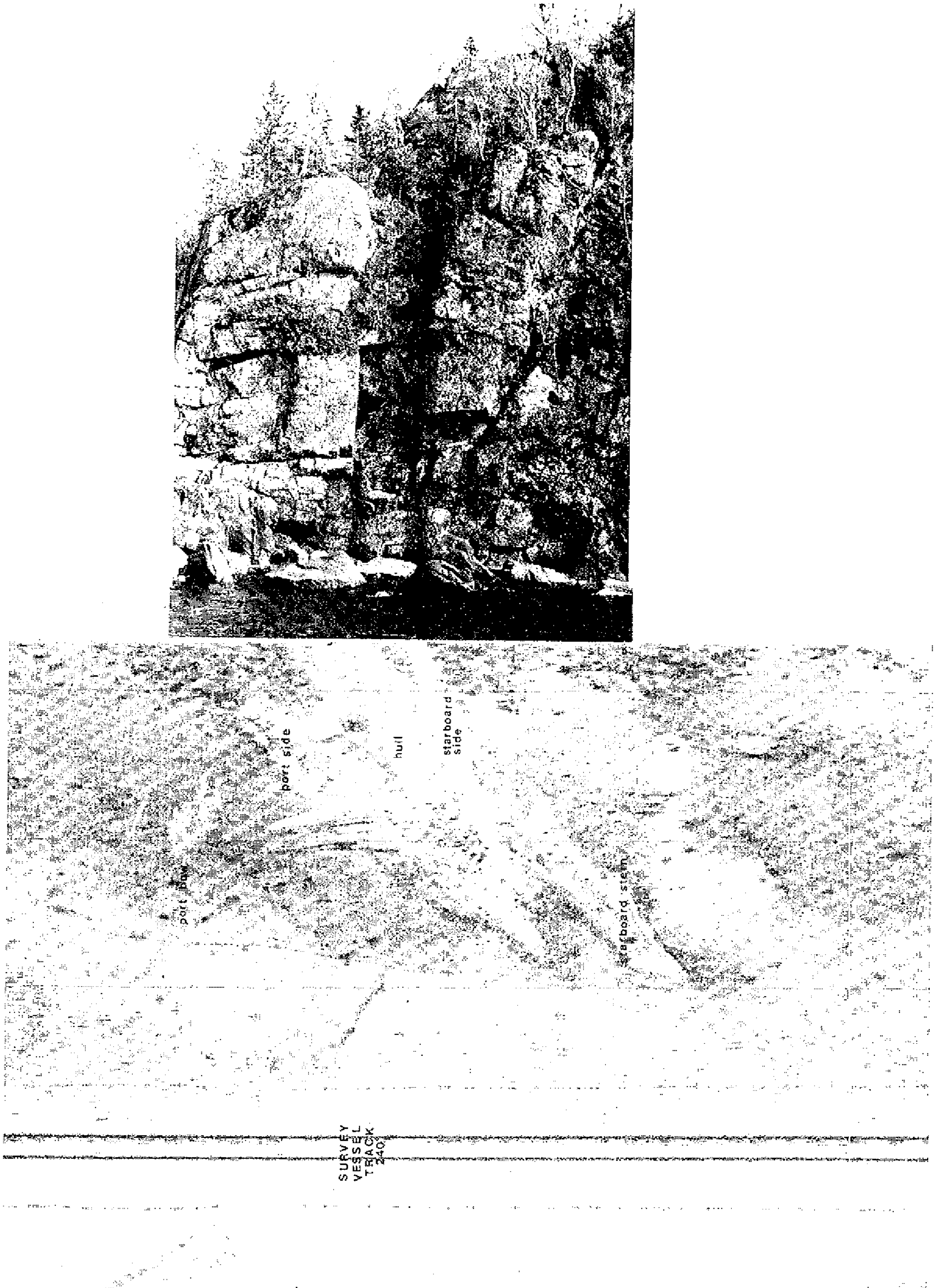
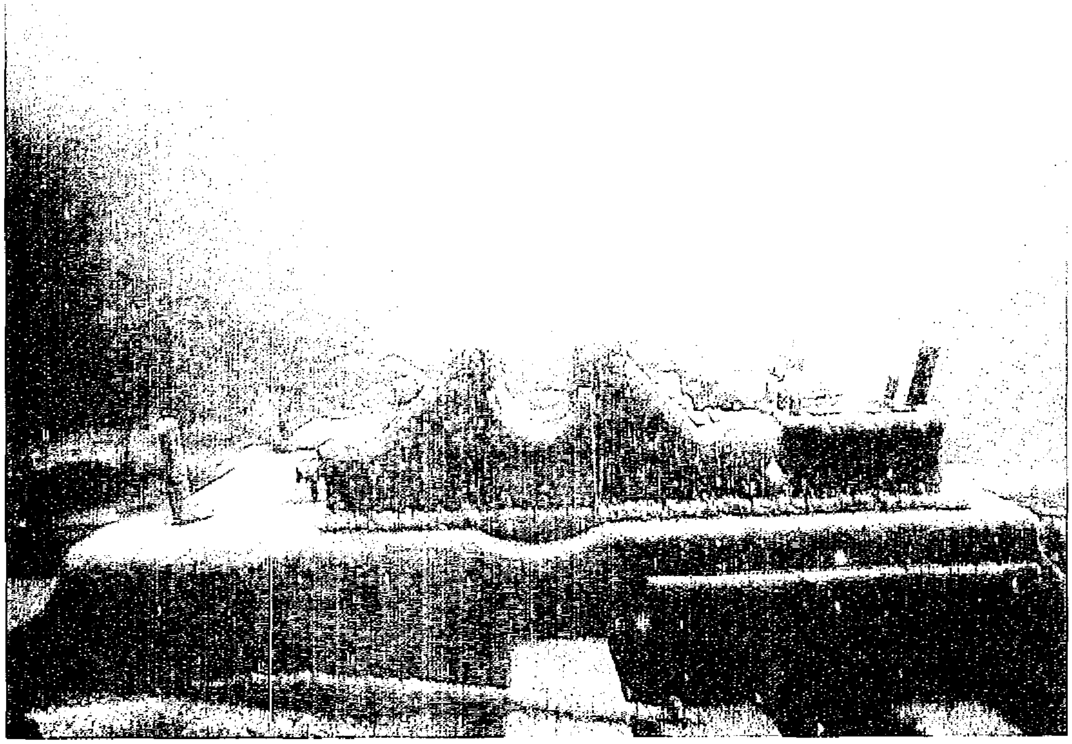


Fig. 5.27. Top photo is of Palisades Cliff in the area where MONARCH struck. The remains of MONARCH visible on the side scan sonar printout are arranged in this graphic to show how they lie on the steeply sloping shoreline below the cliffs. NPS photo by Jerry Livingston.



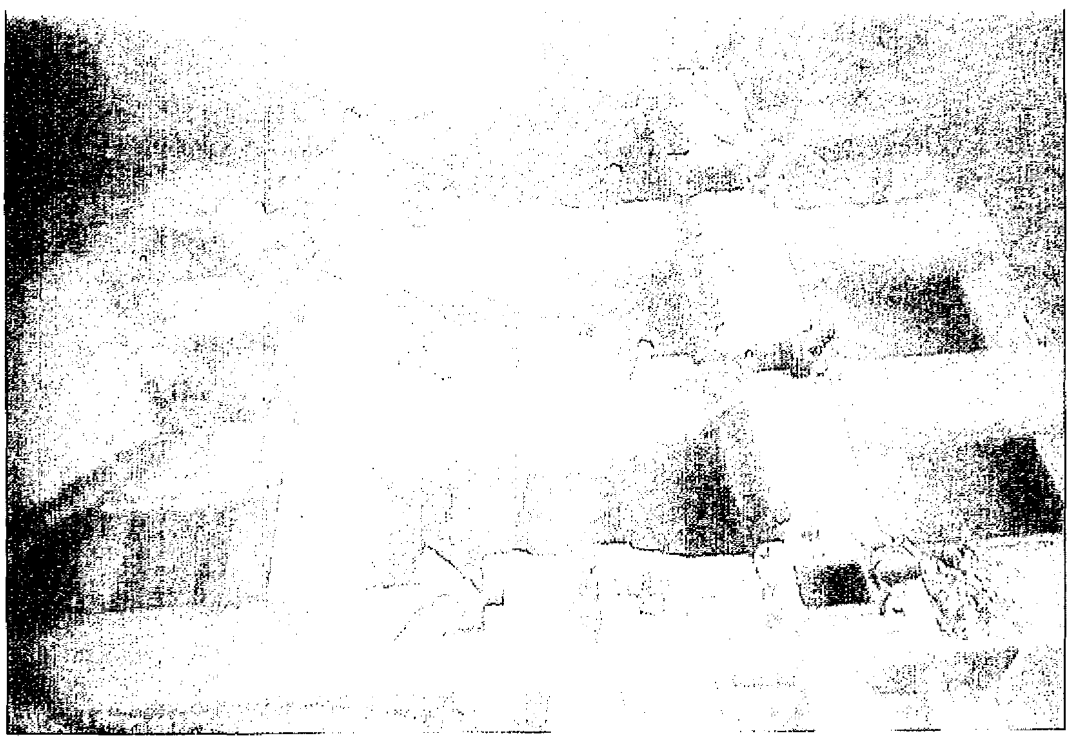


Fig. 5.28–5.29. Two views of the engine mount and main bearing of MONARCH. NPS photos by Larry Murphy.

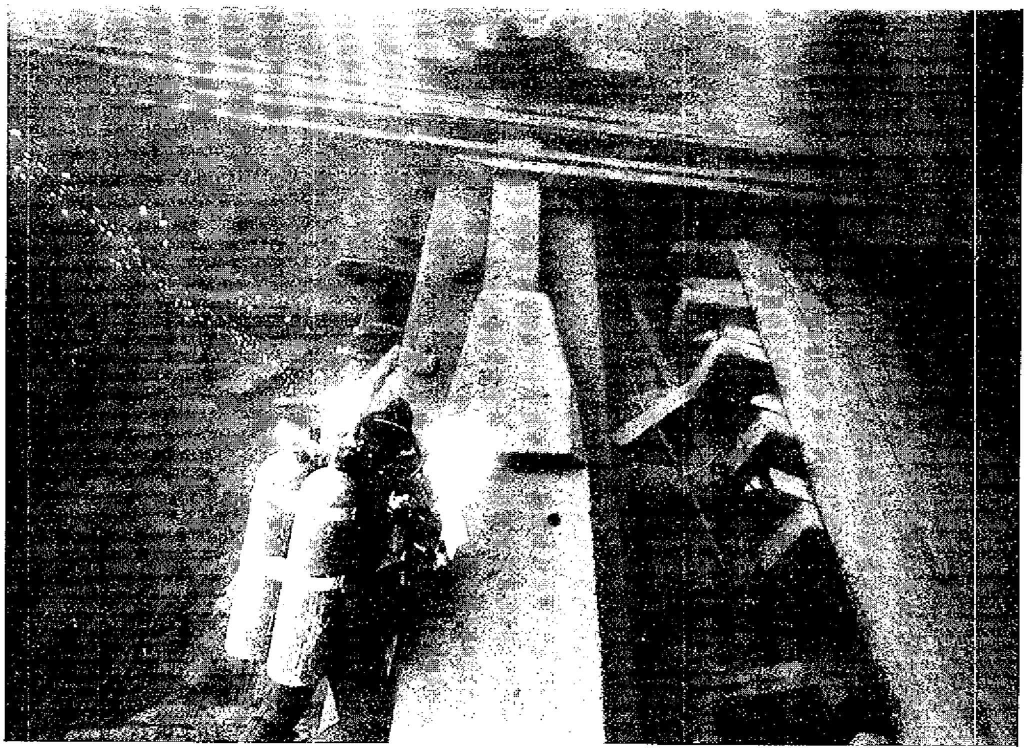


Fig. 5.30. Illustrator Jerry Livingston drawing details of thrust bearing mount, looking toward the stern. NPS photo by Larry Murphy.

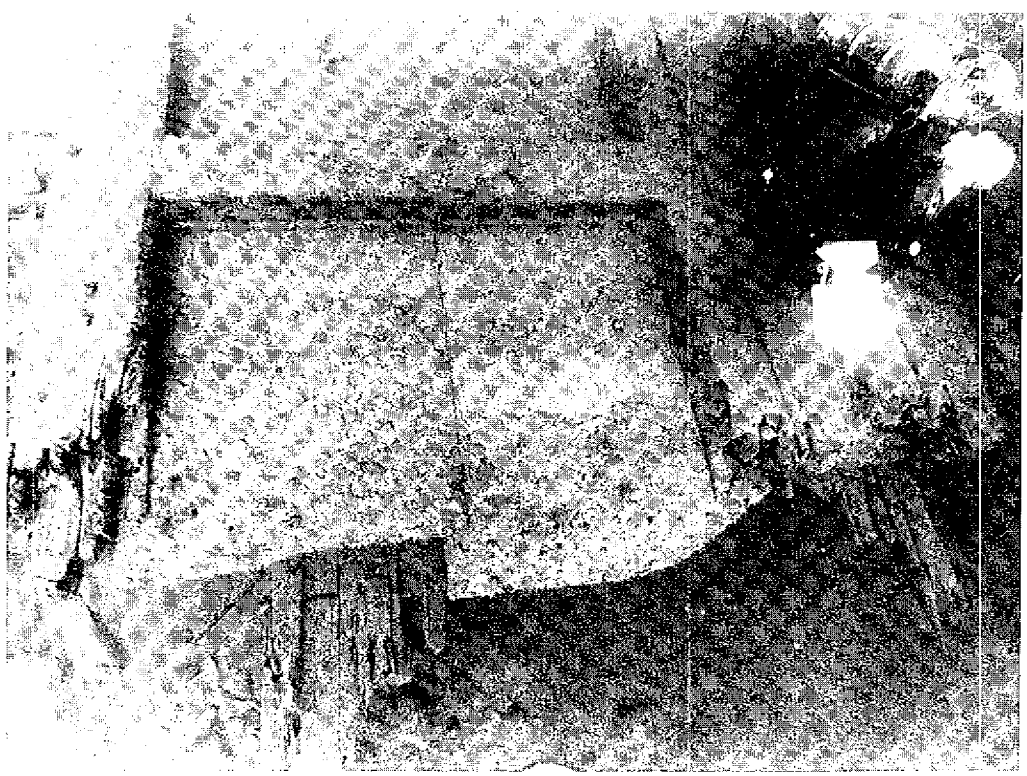


Fig. 5.31. Forward end of starboard stern section of MONARCH. This section is inboard up with the metal sheer strake clearly visible. The photo is looking aft. NPS photo by Larry Murphy.

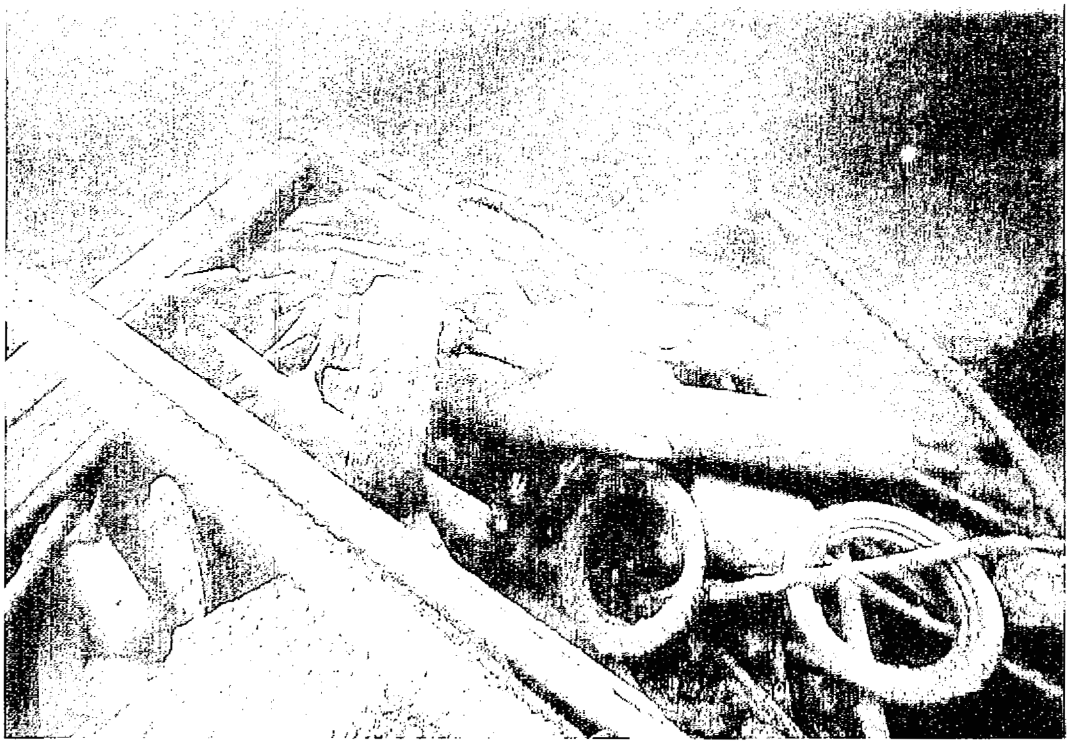


Fig. 5.32. Scattered wreckage of MONARCH off the port side of the hull. In the center are hardwood cargo winches and two iron rings that were coal scuttle hatch coamings. NPS photo by Larry Murphy.

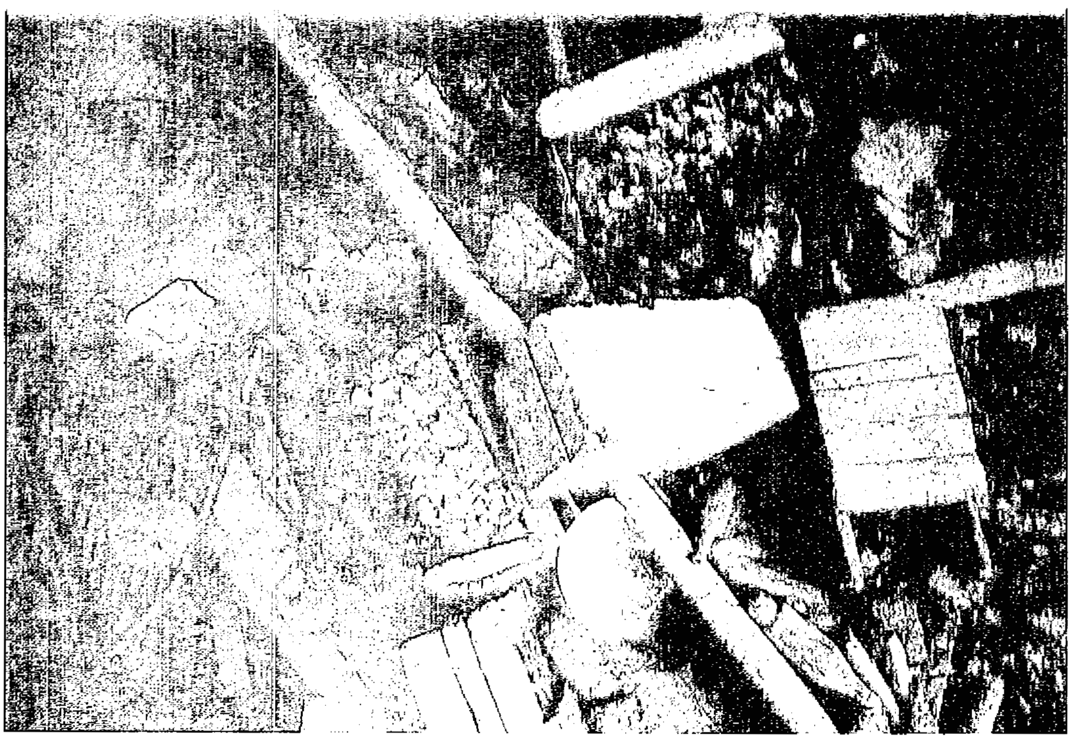


Fig. 5.33. Artifact scatter off the port side of the MONARCH hull. There are four boxes of cargo in the right center. The contents were rivets and bolts. Bottles and chains are also shown in lower right. To the left is a portion of the ship's steam radiator. NPS photo by Larry Murphy.

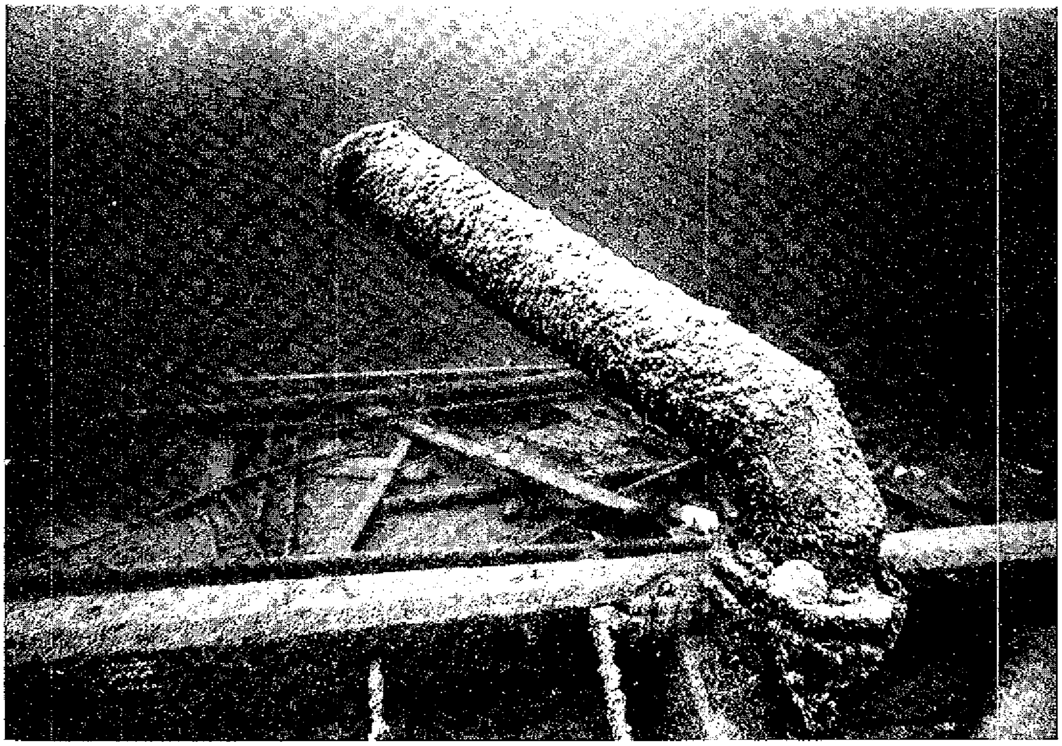


Fig. 5.34. Overboard discharge pipe for the condenser. NPS photo by Larry Murphy.

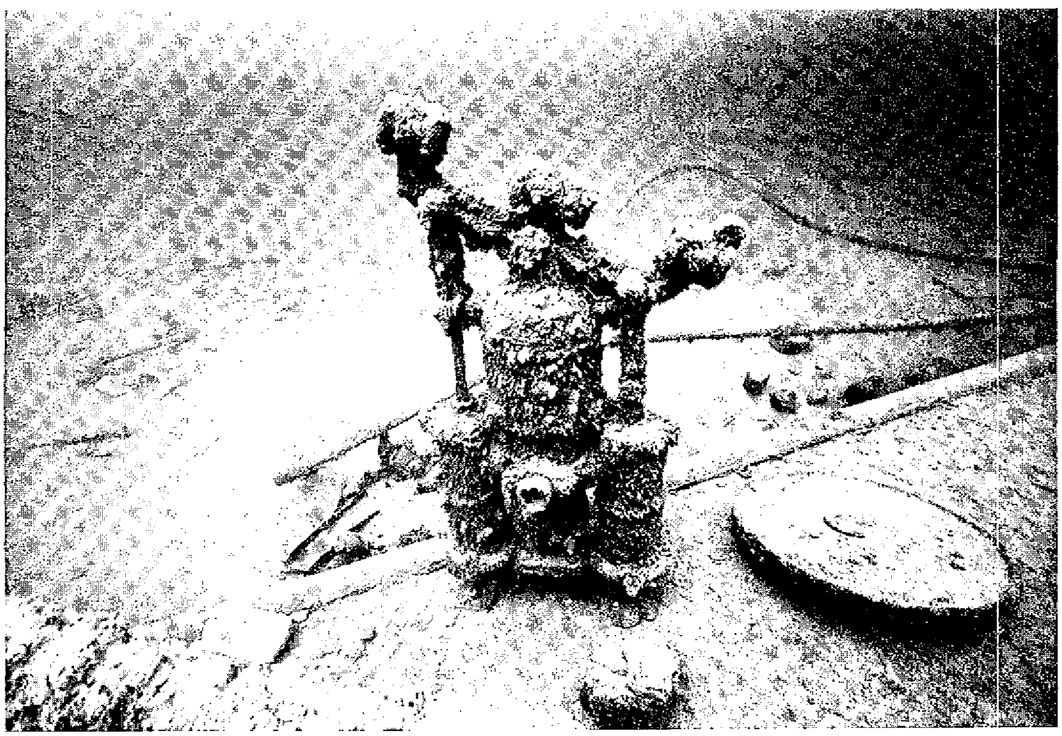


Fig. 5.35. Manually operated water pump. These pumps were used as bilge pumps or fire pumps. A similar pump is located in-place on the bow of AMERICA. NPS photo by Larry Murphy.

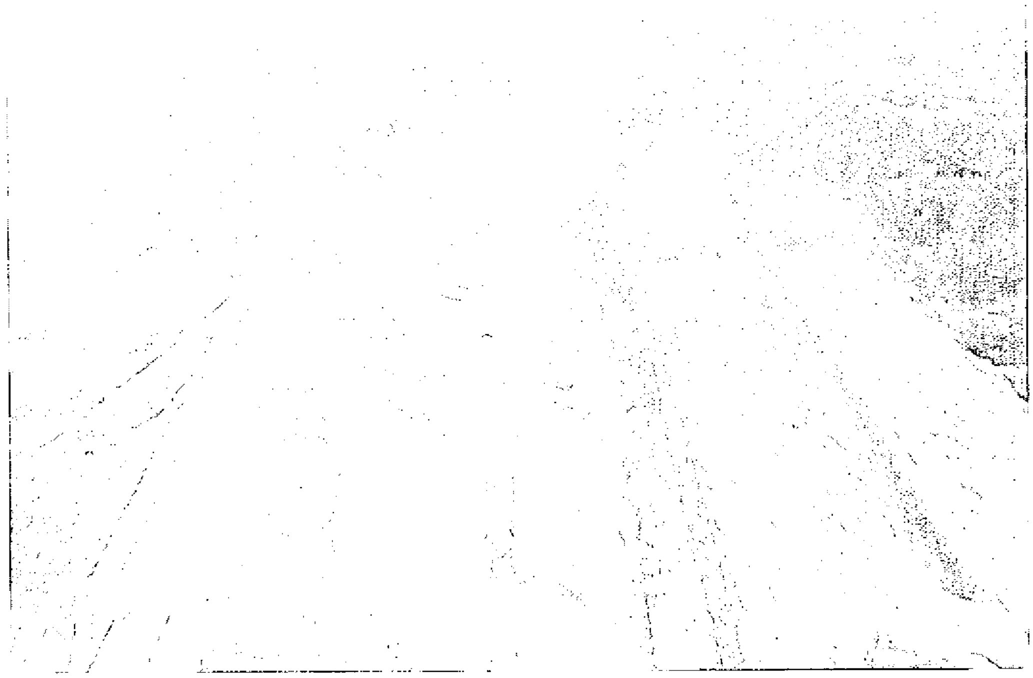


Fig. 5.36. Metal sheeting likely associated with boiler room of MONARCH. NPS photo by Larry Murphy.

Fig. 5.37. Timbers heavily reinforced with metal from near the stern of MONARCH. This portion is the rudder skeg that supported the lower end of the rudder. NPS photo by Larry Murphy.

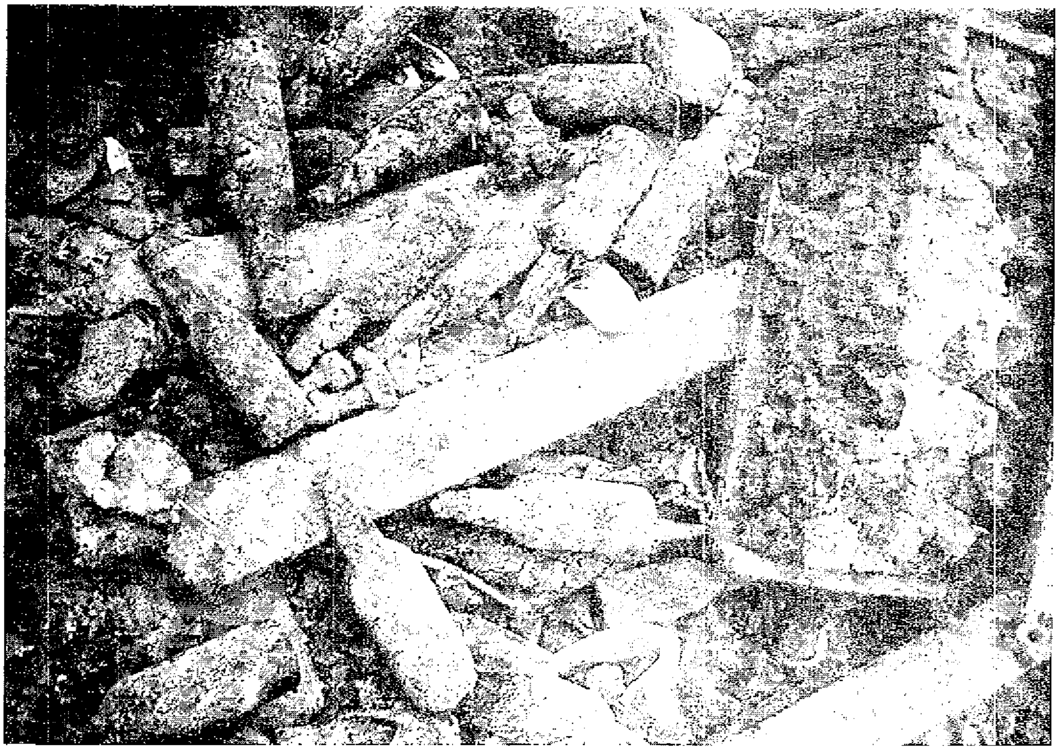


Fig. 5.38. Bottles in the area of cargo concentration on MONARCH. Many of these bottles were filled with grain and stoppered with cotton. NPS photo by Larry Murphy.

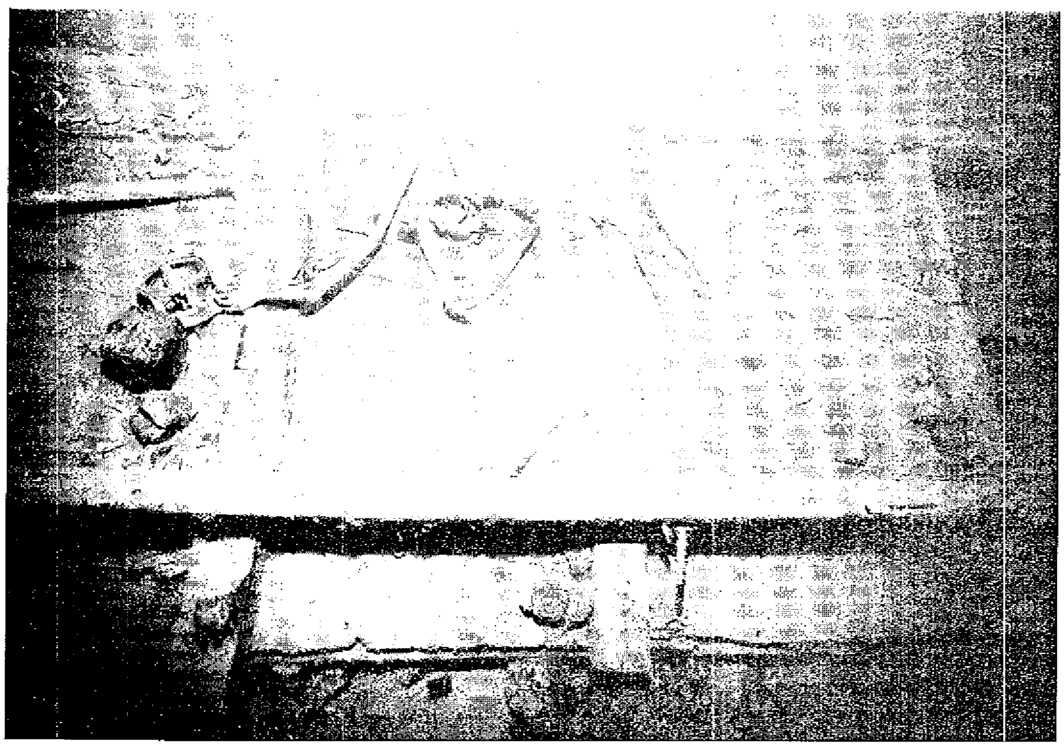


Fig. 5.39. Hull structure and brass fixtures in the rarely visited portion of MONARCH at a depth of 130 feet. NPS photo by Larry Murphy.

GLENLYON: SITE DESCRIPTION AND ANALYSIS

Site Location

GLENLYON is on a shallow reef, known as Glenlyon Shoal, north of Menangerie Island on the south side of Isle Royale near Siskiwit Bay. The charted vessel position is 0.7 statute miles from the Menangerie Island light on a true bearing of 62 degrees. It is on a true bearing of 169 degrees from the western point of Schooner Island and 124 degrees true from the starboard-hand nun buoy (N"2") in the Malone Bay entrance channel. The site can be located by running a course of 169 degrees true from the west end of Schooner Island a distance of 2.2 statute miles. GLENLYON is at 47°57'8"N and 88°44'53"W.

The wreck site is an exposed and treacherous ridge of submerged rocks one-half mile northeast of Menagerie Island Lighthouse on Isle Royale's easterly side. The rocks are the northernmost features of a ridge that runs eight miles in a southwest-to-northeast direction from Houghton Point and includes Menagerie, Long, Castle, Siskiwit and Paul Islands, plus a long string of reefs and shoals. The whole string encloses Siskiwit Bay and protects its waters from all but northeast winds.

Site Description and Analysis

GLENLYON came to rest astride of the shoal, on an apparent heading of about 255 degrees in November 1924. The wreckage lies in two principal fields; the bow lies inside the shoal ridge and the stern on the seaward. Parts of the fragmented hull are spread along a linear distance of more than 900 feet, with smaller pieces somewhat further afield. In general, all of the propulsion machinery lies in shallow water associated with the remains of the stern, on the seaward side of the reef. The majority of the wreckage lies in less than 50 feet of water; much of it can be seen from the surface under the right conditions of lighting and water clarity (Fig. 5.40).

Most elements of the wreck are easily identified despite the disarticulated nature of the remains, because most parts, although greatly transformed in appearance, are not far removed from their structural location in the vessel. Bow features lie at one end of the field and stern features at the other. Historical documentation indicates there were no large-scale commercial salvage operations on the wreck. No significant portions of the vessel were noted as missing from the site. The only contemporary salvage was directed toward removal of the cargo of wheat. No trace of grain could be found during the field work at the site.

The stern of GLENLYON rests seaward, or to the east of the shoal which bears its name, in depths varying from about 20 to over 100 feet. Furthest from the shoal (and in deepest water) are the ship's aftermast and small portions of the hull from the stern, lying about 100 feet east of the larger portions of the stern. In this area is a small steel structure, which may be a stern deck house that was added in 1918 (Canadian Railway and Marine World 1918:126).

Nearer the shoal in shallower water is a field of wreckage covering an area 100 feet wide and 300 feet long, and including what is essentially the whole after end of the ship. At its northern extremity, the field includes heavy but discrete items from the fantail of GLENLYON, such as a spare propeller blade, cast iron mooring bitts, a deck capstan with the drive shaft attached, and the twisted remains of the fantail itself; the rudder, its shaft and the bearing-collar are still held in the tangled steel of the fantail's shell plating.

Moving up the reef face, the next section of wreckage is the most impressive single piece, and it consists of the whole engine-room section of the bottom, with keel and frames to the margin-plate at the turn of the bilge, the main engine and several auxiliaries, the tailshaft and propeller, and a large section of the port side. A smaller portion of the starboard hull side is present to the north of the engine. Prior to the 1985 field work, an intact port hole was observed on the port hull side below the engine. The port hole glass and storm cover were removed by looters in either 1984 or early 1985.

From a diver's perspective, the engine is massive, and it towers above the crankshaft in a jumble of huge castings and forgings. The columns that once supported the huge cylinder-chest have been broken. As a result, the cylinder-chest is lying collapsed onto the crankshaft, and all of the connecting rods are bent out of shape. The cylinder-chest lies over at an angle of about 90 degrees from vertical, leaning to the port side.

The thrust bearing with its four collars is visible directly to the stern of the engine (Figs. 5.42, 5.43). The propeller shaft has been broken, and the tailshaft and propeller are twisted about 30 degrees out of line to the port. This twist may be the result of the engine block and hull bottom assemble sliding down the reef and bending the shaft. The cylinder chest is over some of the port side of the hull, indicating the hull had collapsed before the engine moved to its present location. Two of the four blades of the iron propeller have been sheared off at the hub, and a third blade has been broken in half. It is not clear whether they were broken off when the ship struck the reef or at some time afterward. The missing portions of the propeller blades were not found at the site. It is most likely that the blades were broken during the wreck event.

The engine is a direct-acting, inverted, vertical, triple-expansion steam type, which was developed in the mid-1880s and introduced to the Lakes in the steel steamer CAMBRIA in 1886. This design became the standard for most commercial steam vessels everywhere between 1890 and about 1930. In the remains of GLENLYON, the three cylinder-heads, with diameters of 20, 32 and 54 inches may be clearly distinguished (Figs. 5.42, 5.44, 5,45). A large air-pump was run off the moving connecting rods, and still attached to the starboard side of the engine. The pocketed jacking gear used to turn the engine during repairs is also notable (Fig. 5.42). The large size of the gear indicates it may have also served as a flywheel.

Several other auxiliaries lie in close proximity to the engine in the chaotic scatter of the engine-room debris; among them are the steering engine, which the ship's construction plans show on the main deck just aft of the engine-room bulkhead; various steam pumps for sanitary water, boiler feed, ballast water, bilge suction, and fire fighting; the refrigeration compressor or "ice-machine"; the electrical generator ("light plant"); and numerous tools and parts. Most of the apparatus appears whole, relatively undamaged, and gives the impression it would be easily operable. The engine room remains lie heaped in a 50-foot long pile. The engine and engine room are in a position that affords a remarkable opportunity for a detailed study of early-Twentieth Century steam technology on the Great Lakes.

Alongside the engine-room wreckage is a 70-foot section of the ship's hull that formed the port side of the machinery spaces, from the afterpeak bulkhead to the boiler room. It is pierced with several through-hull fittings for water intakes and ballast discharge, which are all lying exposed; the hull section is inboard up. On the reef directly below the low pressure cylinder head is an overboard discharge valve and pipe, much like the one remaining upright on the site of MONARCH (Fig. 5.34).

Near this section are several other sections of shell plating, bulkheads, and decking from the after end of the ship, and a very heavy length of iron pipe, which seems to have been the main steam line from the boilers to the throttle valve on the engine; the measurements correspond to that element in the vessel's original shipyard drawings. Sections of ballast piping may also be seen in the vicinity; they are similarly large, but of a lighter gauge of pipe.

Further to the west, but still on the seaward side of the ridge, are two more areas of hull wreckage. The first consists of many sections of bottom and side plating and frames, and the second is an 80-foot length of the spar deck from the starboard side, with a pair of mooring bitts still standing near the outboard edge. The decking is presumed to have come from just forward of the boiler-house, where such a pair of bitts are shown on the vessel's plans.

In the shallower water right on the reef ridge lie the ship's two water-tube boilers, one entirely fragmented and the second with its shell torn off, but with the furnaces, smoke chests, tubes and sheets all standing intact. The remains of the latter boiler stand above the reef and reach to within 10 feet of the surface. This boiler is probably the shallowest piece of wreckage on the site, and its weight and bulk is substantial enough that visiting dive charter boats use this feature as a convenient mooring aid.

On the inside (west side) of the ridge that forms Glenlyon Shoal is the forward portion of the ship, from all appearances considerably more than half of the length of the hull. As one swims to what would have been the starboard side of the vessel along a wreckage trail extending into deeper water, deep gouges become apparent in the smooth rock face of the ravine. It is obvious that those scars are not a result of the initial impact, because they are too deep (below the waterline of the original vessel) and are probably a function of ice moving pieces of wreckage around during the winter. At some points, rusted bolts can be found in these cracks. This forward portion of the wreck extends over 600 feet of Lake bottom, but the greatest part of it consists of one mass about 300 feet square. Spread here are sections of bottom, side and deck; beams, hold pillars (stanchions), frames, piping, angles and shell plating. One steel mast lies draped across about 120 feet of debris, twisted grotesquely so that it is no longer easily recognized. There are also heavy steel gangway-doors and the davits that were used to lift them, 'tween-decks cargo winches and the line shafts to which they were connected and deck machinery from the spar deck. The forecastle and forepeak portion of the bow (Fig. 5.41) lies relatively intact for about 30 feet of its length, with the immense steam windlass still firmly rooted in place. The chains are paid out across the windlass and through the hawse-eyes to a pair of stockless anchors. The chain links measure 6 x 9 inches. A steam capstan also lies nearby, as does a mooring winch, both remnants of the forecastle deck above the windlass room. At least three pairs of bitts are also lying within 50 feet of the site, more parts of the forecastle deck.

Some of the plating and trim from around the bow illustrate unusual attention to fine craftsmanship; they have a yacht-like quality about them, in spite of husky businesslike proportions. Some historians observed that the Wheeler shipyard failed because of its particularly costly craftsmanship and its uncompromising standards.

Comparison of GLENLYON with other steel ships at Isle Royale tends to support that claim, although GLENLYON was built 15 years earlier than the other steel freighters there, and its workmanship may be more representative of 1890s standards than it is of any particular shipyard's; when compared with other Isle Royale wrecks, though, it is most reminiscent of ALGOMA's Scottish artistry, and contrasts perceptibly with the utilitarian style of EMPEROR, KAMLOOPS, and CONGDON.

Near the wreckage of the forecastle there is a single intact cabin structure standing upright amidst literally thousands of tons of ship parts. The cabin appears to be part of the Texas or officers' quarters from abaft the pilothouse. There is no simple explanation for its survival, as it is of far lighter construction than the portions of broken hull around it. This cabin was apparently added in 1918 (Canadian Railway and Marine World 1918:126) for officers accommodations. Its separation from the surrounding wreckage may be the result of being relatively lightly attached to the structure, which enable it to separate as a unit. The cabin now contains no artifacts and the portholes have been removed.

Continuing in a southwesterly direction, other sections of the ship's hull may be found as much as 300 feet beyond the large concentration. The large field lies under a pair of ledges, but the remainder is spread across a flatter rock bottom. Recognizable pieces of structure include identifiable portions of side, with shell plating, vertical frames, and distinctive longitudinal stringers; spar decking, in some cases with mooring bitts on it; and double-bottoms. This scattered material probably came from the midships portion of the hull that lay originally on the shallower part of the reef.

Site Formation Processes

The extreme distance between features of the GLENLYON wreck proved to be 960 feet; the ship measured only 345 feet in length. The condition and orientation of the wreck is almost certainly a result of the movement of ice floes over the site. Historic accounts describe the ship lying on the shoal and slowly beginning to break up. Witnesses say that the decks rose amidships, which indicated that the ship's bottom was caving in, and with rigid vertical I-beam stanchions running down the centerline, it forced the decks up. Not long afterward, the ship's back broke just forward of the boilerhouse, and the integrity of the hull failed. Once the ship broke, the two halves began to settle on either side of the reef, the bow to the inside and the stern to the outside; the heavy boilers settled out into the shallow water on the rocks, along with portions of the collapsed midships section of the hull. Those lighter parts of the hull that lie in the shallowest water were the easiest moved by drifting ice, and they are the ones that seem to have been carried farthest. The bow and stern portions of the ship ended up somewhat protected from the ice by the rocky ledges against which they came to rest, and they have consequently move little since the sinking. Considering the alignment of the islands and shoals in the Menagerie group, there is only one direction in which ice could logically drift, and that is toward the southwest. It is logical to assume that any further, undiscovered parts of GLENLYON lie in that direction, probably consisting of the lightest parts of the ship's fabric or those that came to rest in the shallowest part of the shoal.

The fractures of the hull structure may also be the result of decades of ice action. Many of the steel shell-plates have simply been torn apart. Some failure has been along seam lines, but much is through the plates. Other than ALGOMA, the wreckage of GLENLYON is the only metal wreck of Isle Royale that has been completely broken up. Other wrecks have not been disarticulated to the extent of

GLENLYON. GLENLYON is also the shallowest of the metal wrecks, except for the bow portion of COX that is also severely fractured and dispersed. The relatively small size of the structural remains of these two wrecks reflect markedly the powerful destructive forces active in the shallow waters of Lake Superior.

Another aspect to be considered in the fracturing of the Isle Royale vessels is the variation of steel used. A comparative metallurgical analysis of the steel compounds used in construction coupled with the nature of natural impacts would give insight into the use-lives of vessel hulls of the Lakes for periods represented by the Isle Royale shipwrecks.

Fig. 5.40.

GLENLYON

ISLE ROYALE NATIONAL PARK
National Park Service
Submerged Cultural Resources Unit

Planimetric View

J. Livingston & L. Nordby

Depths in italics

Fig. 5.41. Larry Murphy detailing the anchor pocket of GLENLYON Photo by Mitch Kezar.

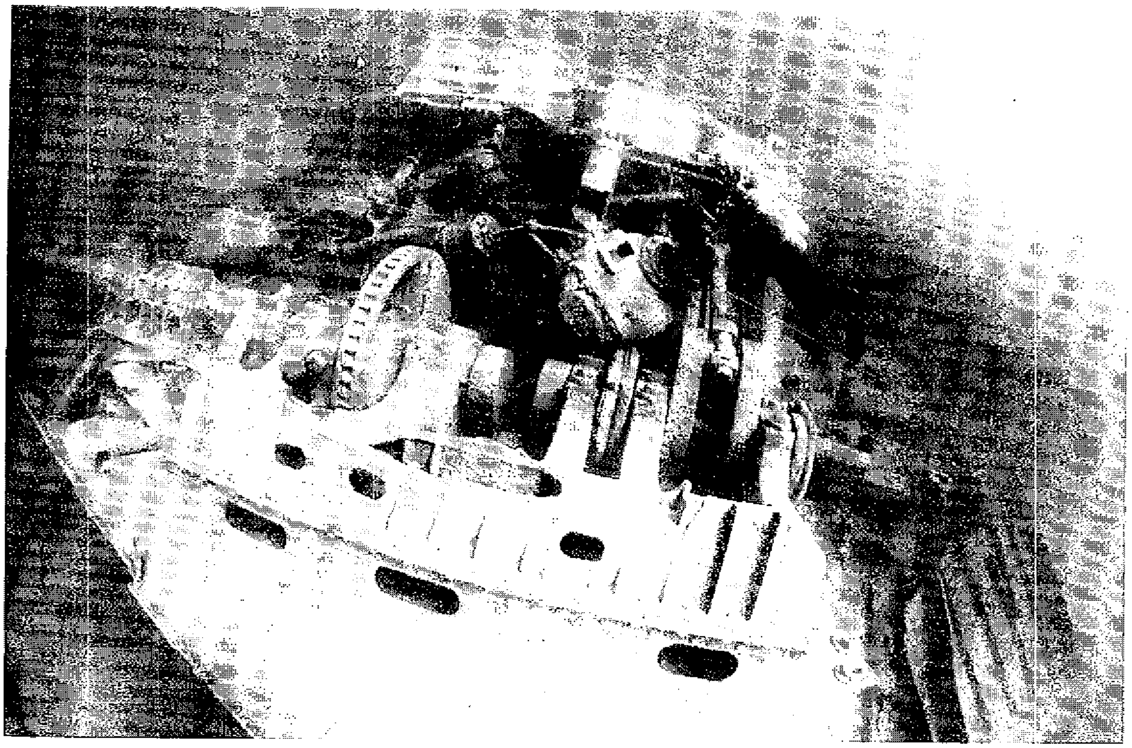


Fig. 5.42. Archeologist Dan Lenihan examining the triple-expansion engine of GLENLYON. The engine lies on its port side in 30 feet of water at GLenlyon Shoals. Photo by Mitch Kezar.

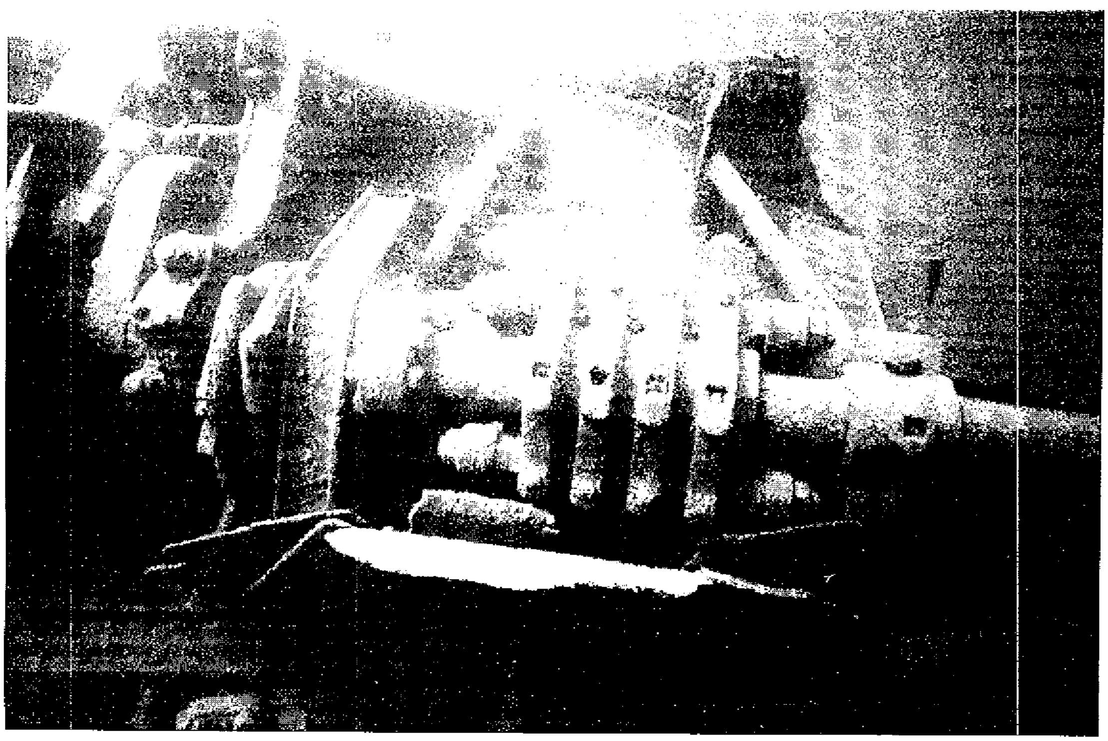
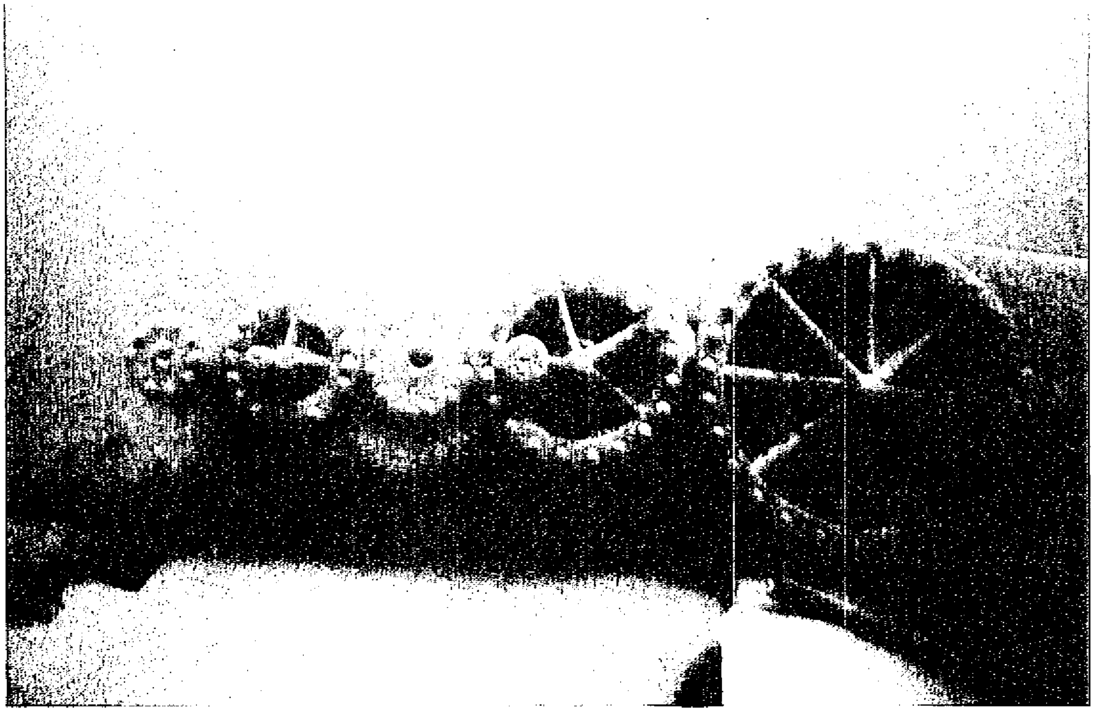


Fig. 5.43. Detail photo of the multiple-collar thrust bearing of GLENLYON. NPS photo by Larry Murphy.



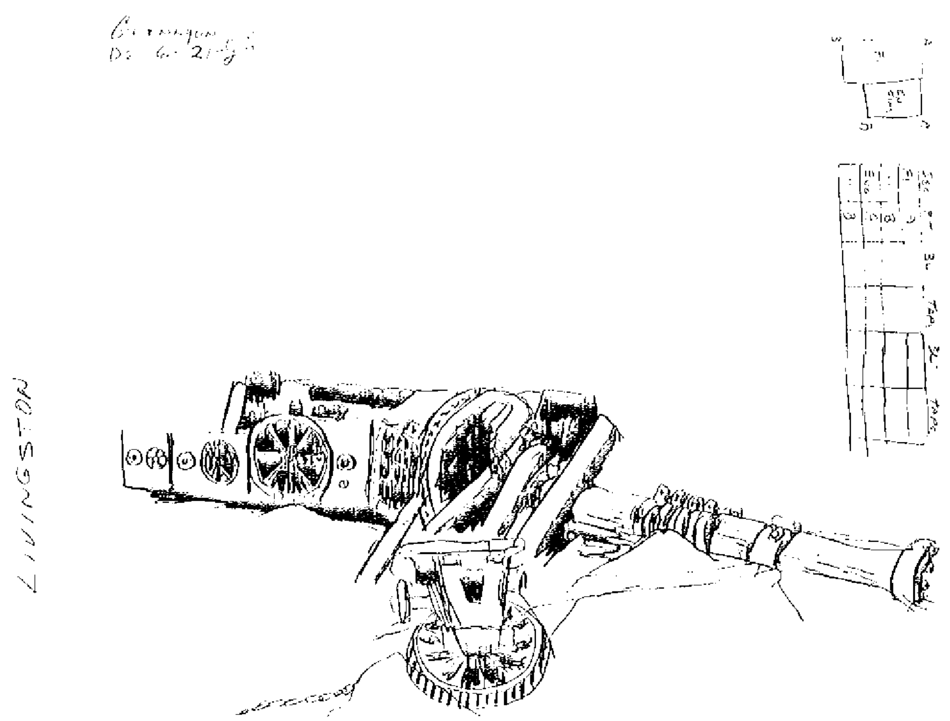


Fig. 5.44–5.45. Views of GLENLYON steam engine and main shaft from the top. NPS photo by Larry Murphy and Mylar field drawing by Jerry Livingston.

AMERICA: SITE DESCRIPTION AND ANALYSIS

Site Location

AMERICA is in the channel between Thompson Island and the main island, known as North Gap, out of Washington Harbor at the south end of Isle Royale. The vessel is 0.7 statute miles from the northeast tip of Grace Island on a true bearing of 331 degrees. The vessel is marked by a privately maintained obstruction buoy in North Gap channel. AMERICA can be located in the channel by rounding the northeast end of Thompson Island entering Washington Harbor, using the white daymark beacon on Thompson as a point of reference, on a true bearing of 119 degrees and traveling a distance of 0.2 statute miles. The position of AMERICA is $47^{o}53'39''$N and $89^{o}13'15''$W .

Site Description and Analysis

The wreck event that resulted in AMERICA finding a final resting place against a steep underwater cliff in the channel to Washington Harbor is well documented. Considerable changes in the vessel remains have occurred due to both natural and cultural transformational processes; but, in a comparative sense, AMERICA is a very intact and accessible shipwreck. Sport divers have devoted more dives, by far, to the exploration of AMERICA than any other site at Isle Royale. It is renowned well beyond the regional diving population as a spectacular dive.

The heavy recreational activities have contributed significantly to site transformational process. Normally, contemporary salvage is the major source of human-induced change to a historic wreck site occurring after the initial sinking. In the case of AMERICA, both initial salvage efforts and later attempts to raise the hull resulted in some notable effects on the site, but slow vandalism over the years by sport divers before the Park asserted management control has resulted in the vessel being largely stripped of portable artifacts.

The most visually dramatic post-depositional effects on the site, however, were a function of natural forces at play on the wreck over the years. Major ice build-up in Washington Harbor and North Gap channel has torn away or crushed the majority of bow superstructure and the forward hull above the main deck level. The bow is just under the surface and the lowest point of the stern is in 75 feet of water. Impact from ice is apparent to a depth of at least 30 feet (Fig. 5.46).

Post-depositional effects accounting for the major structural changes to the the vessel are from ice damage. There is also evidence of purposeful modification from salvage efforts. The vessel's archeological value has been considerably diminished by removal of portable artifacts by sport divers.

The hull of AMERICA has both a stern and port list. Measurements of the hull-list angle were taken at various points on the ship. Readings were taken with a small plumbline and 180-degree protractor affixed to a square, plastic slate. The device provided a direct reading of degrees of slant angle from vertical. The stern list is between 21 and 24 degrees, and seems to be somewhat more pronounced at the bow, where there is a 26-degree port list, a result of the combination of bottom topography and a 2-foot 8-inch deadrise in the hull.

A swim over the hull from bow to stern brings many features into view (Fig 5.47). The windlass is the most imposing of the shallower deck features. Historical records indicate the steam powered windlass is the original.

The windlass has two friction drums or warping-ends on each side. These were used to tighten the mooring lines. Two horizontal mooring pipes, which are parallel to the deck and extend through the hull and resemble the hawse pipes, are located forward of the windlass. The mooring lines were run through the pipes and wrapped around the slowly turning friction drums to move the ship along the dock, or tighten the lines. The loose band toward the center of the windlass from the warping ends around the cylinder is the brake.

The windlass was enclosed on the main deck just forward of the saloon deck and pilot house. Ice damage has removed the forward structures and wooden portion of the side of the hull. Forward of the windlass is a small hatch at the forepeak. This is the chain locker in which the anchor cable was kept. AMERICA carried two anchors of 2,100 pounds and 1,900 pounds. The 1928 Hull Inspection recorded that both anchors were fitted with 60 fathoms (360 feet) of anchor chain. The 1965 salvors reported 200 fathoms of anchor chain in the chain locker (Marshall Salvage Report to Carlock Dec. 3, 1965, on file Isle Royale National Park). Apparently the salvors removed the chain; the locker is now empty. There is no record as to the present location of the anchors, which were removed by the Corps of Engineers during WWII (J.R. Marshall 1974, 1986 interview with Holden; Capt. Alfred Sorenson 1982 interview with Labadie).

On the port side just forward of the windlass is a double-acting pump. This pump was mentioned in the 1928 Hull Inspection report and was termed a fire pump. A similar pump was located on the site of MONARCH (Fig. 5.35).

The pilot house and forward cabins were removed by ice. It is uncertain how far toward the stern ice impact to the cabin and boat deck went prior to the abortive 1965 salvage operations. The salvor's reports indicate they removed much of the superstructure. The report states they removed "a great deal of the damaged superstructure .... A large portion of the damaged second deck ... opening the area over the engine ... and the area around the opening ... has been shored" (Duluth News Tribune Oct. 25, 1965).

Although AMERICA was originally rigged to carry 6 lifeboats, only five were required in its later years of operation. The lifeboats were metal and about 20 feet long, 6 feet in breadth and 2 1/2 feet in depth, capable of carrying about 18-20 people. In 1928, the Hull Inspector ordered a rail be constructed where the sixth lifeboat had been carried. The davits were attached to the cabin deck. It is assumed from the location of a loose davit discovered on the cabin deck that the fifth lifeboat was carried on the starboard side, which means the added railing was on the port.

There is a raised skylight on the boat deck measuring 12 feet long and 7 feet wide at the stern and 9 feet wide at the forward edge, and about 2 feet high. The openings in the side of the skylight are open, and there are no indications that they ever contained glass. Aft of the skylight is a 4 1/2-foot opening that was the stairway down to the cabin deck. Originally, there was a spiral staircase, which was replaced by a stairway in the 1911 alterations. Just forward of the hatch is a round opening for the galley stack, which now contains the corrugated air-lift pipe left by the 1965 salvors. This pipe extends down into the storage room aft of the galley, which is below the main deck.

Below the skylight of the boat deck is the promenade area of the cabin deck. This was an open area and contains the emergency tiller. The steering quadrant was below on the main deck. The aftmost cabins were just forward of the skylight, and there was a set of double doorways that opened out onto the promenade space. Unfortunately, little of the cabin structure remains on the starboard side; however, there is a bit more of the cabin structure on the port side. The interior has been mostly cleared away. Each cabin had a square window, some of which can be seen on the port side of the hull on the cabin-deck level. One window remains on the starboard; the superstructure is broken at the second cabin window from the stern.

Forward of the skylight is a set of stairs that is partially blocked with sections of the cabin deck (Fig. 5.49). Descending these steps, which have become popularly known as the "ball room stairway", one enters the social hall. The social hall is mostly empty, only containing a steam radiator in the aft starboard corner. The floor of the social hall is cement and scored to resemble flagstone. Above the radiator is a window into the purser's office. There is a heavy silt accumulation in the purser's office, but the bulkhead-mounted counting boxes can still be seen (Fig. 5.50).

Directly toward the stern of the social hall is a double doorway that leads into the dining room. The doorway to the left is the purser's office.

The dining room is on the main deck at the stern and is a little over 25 feet long. Circular dining tables were mounted on the stanchions. On the forward port side is the pantry with a door that opens into the dining area. The door to the purser's office is on the starboard in the hall leading to the dining room from the social hall at the base of the main stairway.

Surrounding the dining room and social hall area is a narrow walkway extending from the stern to forward of the engine. Two toilets are in the stern on each side of the ship, aft of the dining room. There were double doors leading from the social hall to the walkway, and single doors leading from the dining room on each side near the stern. Some of the doors may be seen in the wreckage on the port side of the hull just inside the gangway and on the Lake bottom off the port side. The double doors were aligned with the aftmost gangways in the hull and were used to provision the galley, which is below the dining room.

The starboard aft gangway is blocked by a vertically-hinged hatch, which could be partially opened for ventilation and viewing. The forward gangways were covered by hatch covers held on place by 4x5-inch strongbacks, the slots for which can be seen attached to the gangway frames in the forward gangways.

The bulkhead of the dining room has square windows, and the hull had port holes. All the port holes have been removed from the hull. The port holes in the aft section of the hull open into the walkway, except for the two that open into the heads.

The stairs to the galley are directly under the stairs in the social hall. These narrow steps are steep, but they can easily be negotiated by a diver. There are cabins or pantries on both sides of the hall leading to the galley. Originally the ones on the right as the stairs are descended (port side of the hull) were cabins intended for service personnel. The ones on the left were for storage. In the deck of the hall there is a small open hatch that is an access to the shaft bearing.

AMERICA as originally built, and before the 1911 lengthening and alterations, had the galley, refrigerator, and crew's mess forward. The passenger dining room was also forward up on the promenade deck. Presumably the galley and dining area were moved aft during the major alterations done in 1911. The 18 feet of length were added forward of the boilers, and would have altered the original spaces. In addition to the length, another gangway was installed.

The galley contains the stove on the aft bulkhead, sinks, counters and shelves. In the aft bulkhead is a doorway leading into a storage room. The end of the air-lift pipe, which is visible on the boat deck, can be seen in this storage room. This store room became known as the "forbidden room" after a diving fatality occurred there in 1976 (see Chapter VII). The door of this store room was wedged partly open, and it was implicated in the fatality. The investigation assumed the diver had entered the room and became disoriented during a silt-out and was unable to exit the narrow opening. The "forbidden room" became a focal point for many divers, some of whom undoubtedly pushed their limits passing through the narrow open doorway into the silt-laden room. In 1983, after consultation with the Superintendent of Isle Royale National Park, SCRU personnel removed the door to decrease the danger to visiting divers. The door was removed by prying up on the bottom edge with a lever, lifting the door off its hinges and letting it fall inward, where it remains.

On the other side of the bulkhead of the galley area and social hall are the engine spaces. There is a passageway through the bulkhead at the top of the galley stairs. Directly on the other side was a 4-foot wide hallway with a doorway on the starboard side that was one of the normal accesses to the engine spaces. The other was forward on the same side opposite the high pressure cylinder. The missing bulkheads of the engine spaces were evidently removed by the 1965 salvors.

Bulkheads exist for what once were the chief engineer and assistant engineer cabins on the starboard side of the engine. In addition, the baggage room and stewards' quarters bulkheads are partially intact.

The engine room of AMERICA is a remarkable example of turn-of-the-century Great Lakes marine engineering, and offers a well-preserved, three-dimensional display of engineering details mostly unavailable from written documents of the period. The virtually complete engine room is fully plumbed, with asbestos insulation still present on most of the pipes. All accessories, valves, and some of the steam gages remain. A swim through the engine room is a step into the technological past, without the filters of restoration or interpretation. An understanding of AMERICA's engine room is informative and helpful in understanding the machinery remains of the more broken up vessels of Isle Royale. It is also a useful place to start in developing an understanding of the much larger and more complex machinery spaces of the larger intact vessels of Isle Royale. EMPEROR, for example is a much larger and more complex version of AMERICA's engine room.

The engine room of AMERICA can be entered by dropping feet-first through the grated walkway near the forward port corner of the engine. A brief description of the machinery and larger features will be discussed as if one immediately faced the stern on the port side of the engine and continued in a circular route around the stern of the engine and forward up the starboard side.

The most imposing sight as one reaches the bottom and faces the stern is the large silver-painted pipe that must be passed. This pipe is the overboard discharge for the condenser and is connected to the outside hull through a discharge valve. An example of this arrangement can be viewed on MONARCH (Fig. 5.34). The condenser is the large rectangular-shaped feature on the port side of the engine. There is a similar pipe that goes between the condenser and the low pressure cylinder of the engine. This is the eduction pipe and routes the used steam from the engine to the condenser.

Immediately to the right is a dual-acting, steam-driven water pump. The 1928 boiler inspection report describes the pumps of AMERICA as having a 4-inch diameter and 8-inch stroke. This is the bilge pump, and it may have been the last piece of machinery operated on the vessel. The bilge pump was overcome by the rapidly rising water from the pierced hull as the ship sank. The long hole in the hull that sank the ship is in the vicinity of the engine and boiler spaces and can be viewed on the outside of the hull at the turn of the bilge on the starboard side. On the inside, just below the bilge pump near the very bottom of the hull, is the bilge injection pipe and the sieve-like rose box. Also in this area are the injection pipe and valve for the condenser. The larger valves close to the bottom of the hull near the forward of the engine are seacocks.

Proceeding toward the stern the electric generator or dynamo is on the right and just ahead is the switch and fuse panel. The generator supplied the ship's electric power and was controlled by the knife switches on the switchboard. Many of the switches have been removed as souvenirs.

At the stern of the engine, the shaft connection can be seen. Along the stern bulkhead are broken shelves and racks for spare parts and tools. Around the engine on the starboard hull is another pump. On the engine cylinder casing is painted an American flag. Historical documentation indicates the crew of AMERICA were well known as a competent and proud bunch. The fact that they painted the flag on the engine reflects this contemporary characterization of them. A comparative study of the mechanical revisions and decorative embellishments done by engine crews on the various Great Lakes vessels could tell us much about the behavior of people in a completely technological work environment, if approached from an anthropological perspective. The Great Lakes is one of the few places that have an environment conducive to the preservation of this kind of information.

The engine controls are on the starboard side of the engine, and the engine was operated from that side. There are two additional pumps on the forward engine-room bulkhead that separates the engine spaces from the boiler room. These pumps are the boiler pumps, one the main and the other the auxiliary. Above the starboard pump is a control panel containing valves and gages for boiler feed. The remaining valve handles on the 7 pipes were painted red. Above the feed pumps and the feed-water control panel is the main steam-gage panel with holes to mount 6 gages. Again, this panel, which is often looked at by the engineers, has been decorated with a hand-painted star and was outlined in red. Egress from the engine room is the same location as the entrance.

Going out of the engine spaces and proceeding forward brings the boiler room into view. The boilers are intact, they did not explode as the vessel sank. There is no breeching present, and the stack, pilot house, texas and cabin decks are missing forward of the boiler room. Only a few beams and frames exist above the engine room.

The stack was removed by the 1965 salvors. Their salvage report to the Park superintendent gives the following information:

> The remains of the ship's funnel, weighing some seven tons, were severed from the boilers with a cutting torch, and with the assistance of the cruiser, drifted over the side. This exposed the steel room over the engine and boilers.

On the port side directly forward of the engine are the remains of a Ford Model T truck that was being transported as cargo. The vehicle is hardly recognizable after being stripped by divers. Intermixed in the wreckage on the port side forward of the Model T is a hardwood roller with an iron wheel attached. Nearby is a leather belt of the same width as the iron wheel attached to the roller. This wood and iron roller is identical to the friction drums located on MONARCH (Fig. 5.32). They were used to handle cargo. A rope was passed around the slowly-turning hardwood drum, and cargo was lowered into or raised from the hold. The leather belt is a conveyor belt and was undoubtedly used to drive the drum, probably by an electric motor. The drums were turned by a shaft running fore-and-aft.

Forward of the boiler spaces is the coal bunker, still containing coal. The coal scuttles, which are round insertions into the deck, can be seen in the diagram on the starboard side. The port scuttle is hidden under the deck wreckage. Nearby is a hatch cover. This is not original, but constructed and left by the 1965 salvors. Across the deck in the port wreckage are three corrugated pipes, one with a small hatch cover still attached. These were also part of the 1965 salvage efforts.

There is a 5 foot by 6 foot 4-inch hatch on the centerline forward of the coal bunker. This was a cargo hold. On the bottom of the hold is tar that has spilled out of buckets, some of which are still present. There are also packing-box remains, but most everything else has been removed.

There is another similar hatch about 12 feet forward of the cargo hold. This was the hatch access to the crews quarters, and there are stairs leading down. The wooden crew's bunks remain. The smaller hatch that is off-center to the port also leads to the crew's quarters. This hatch, which may have been originally a vent or dumbwaiter before the 1911 alterations, is a vent and exit for the crew quarters.

One additional piece of AMERICA wreckage has recently been located. In October 1984, Park Ranger Ken Vrana and seaplane pilot Tom Wunderlich observed what appeared to be a piece of a vessel's pilot house on the side of Washington Harbor opposite the hulk of AMERICA. Closer inspection by Park staff indicated what is probably the roof of AMERICA's pilot house at a depth of 15 feet. They report it being 10 x 12 feet with a 2-foot square "manhole" on top.

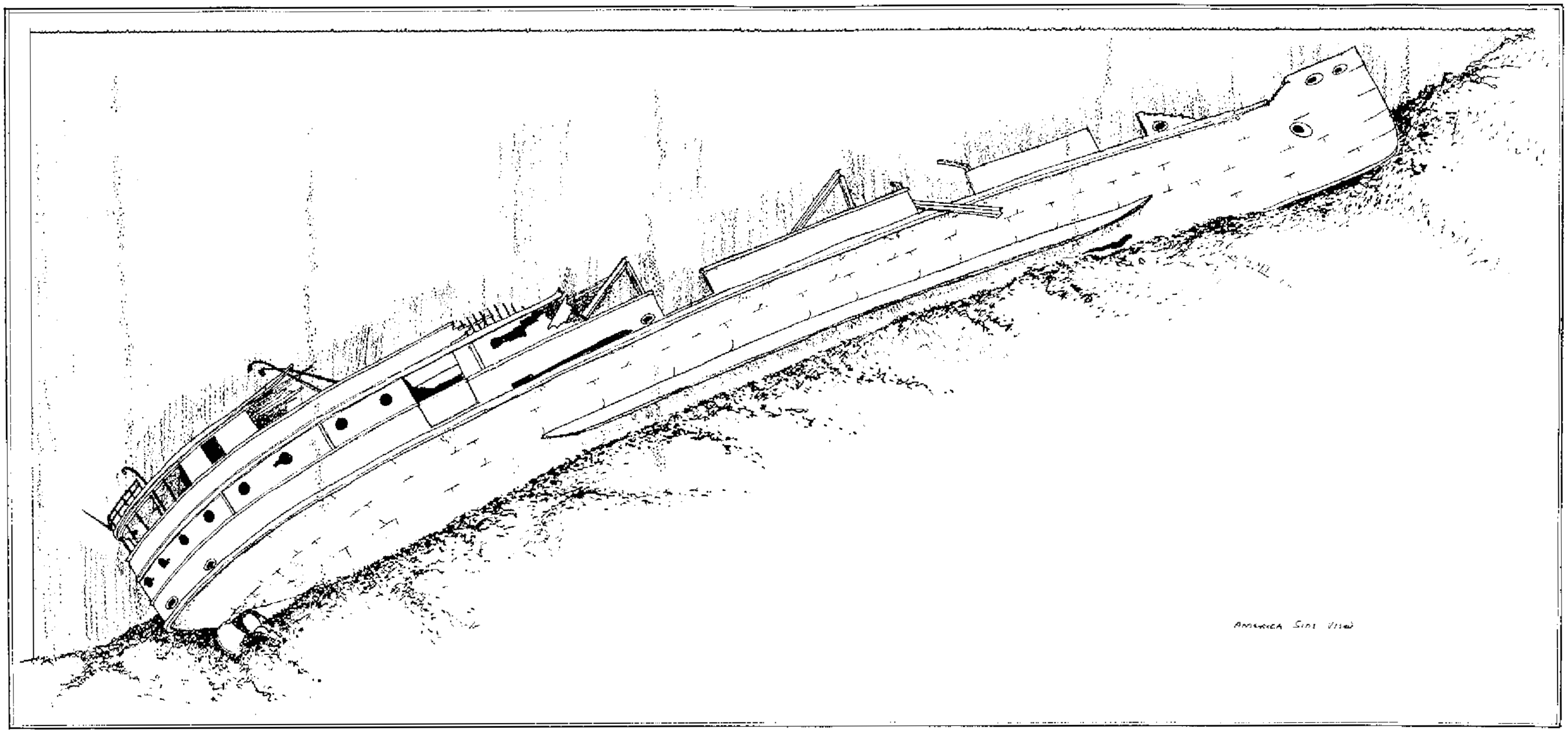


Fig. 5.46. AMERICA in situ in the North Gap of Washington Harbor, Isle Royale. Perspective view from starboard stern. It is rarely possible to see the whole ship from this point. This illustration is a composite drawing from several dives. Illustration by H. Thom McGrath.

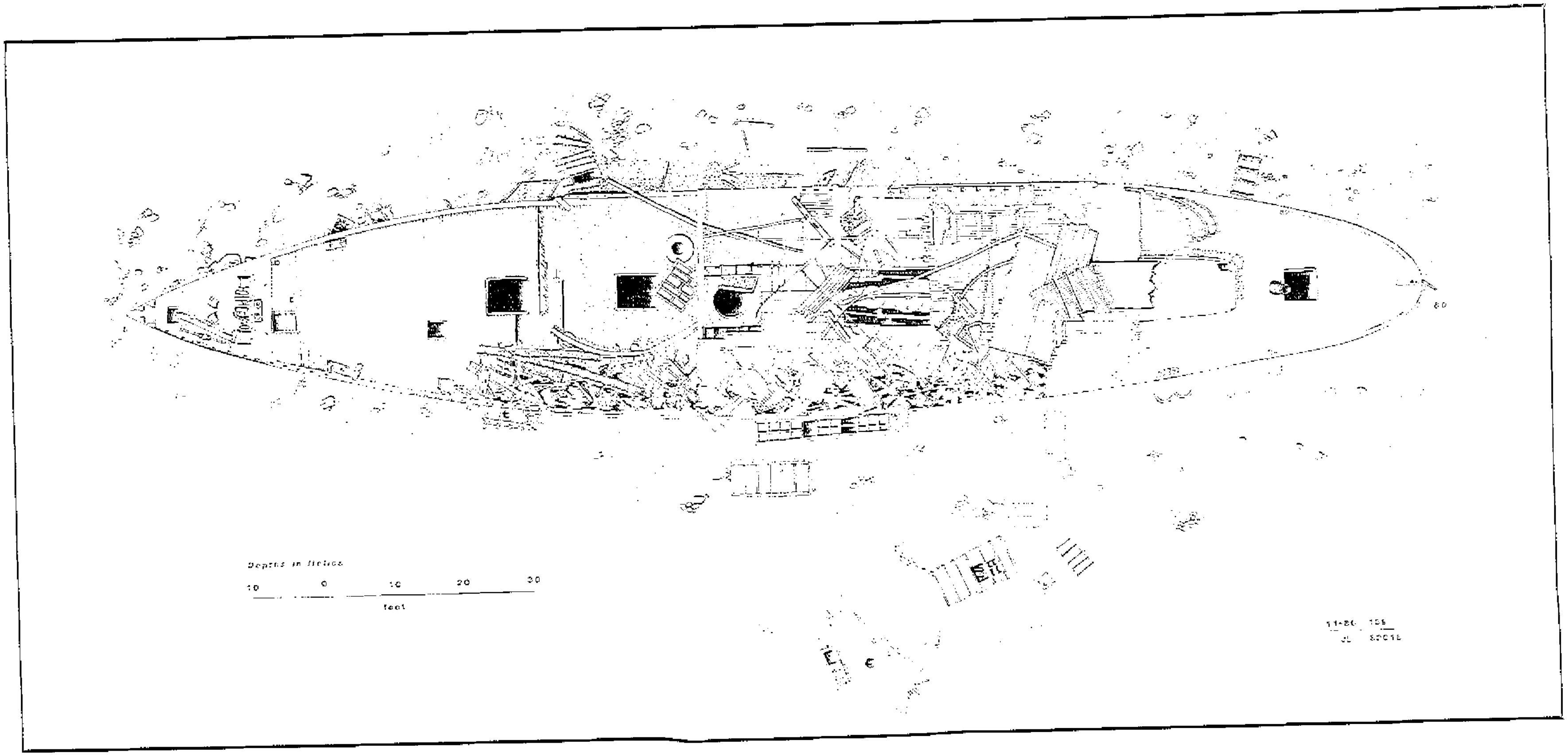


Fig. 5.47. AMERICA site map. Drawing by Jerry Livingston.

Fig. 5.48. NPS SCRU diver Ken Vrana examines the fine-lined bow of AMERICA. Photo by Mitch Kezar.

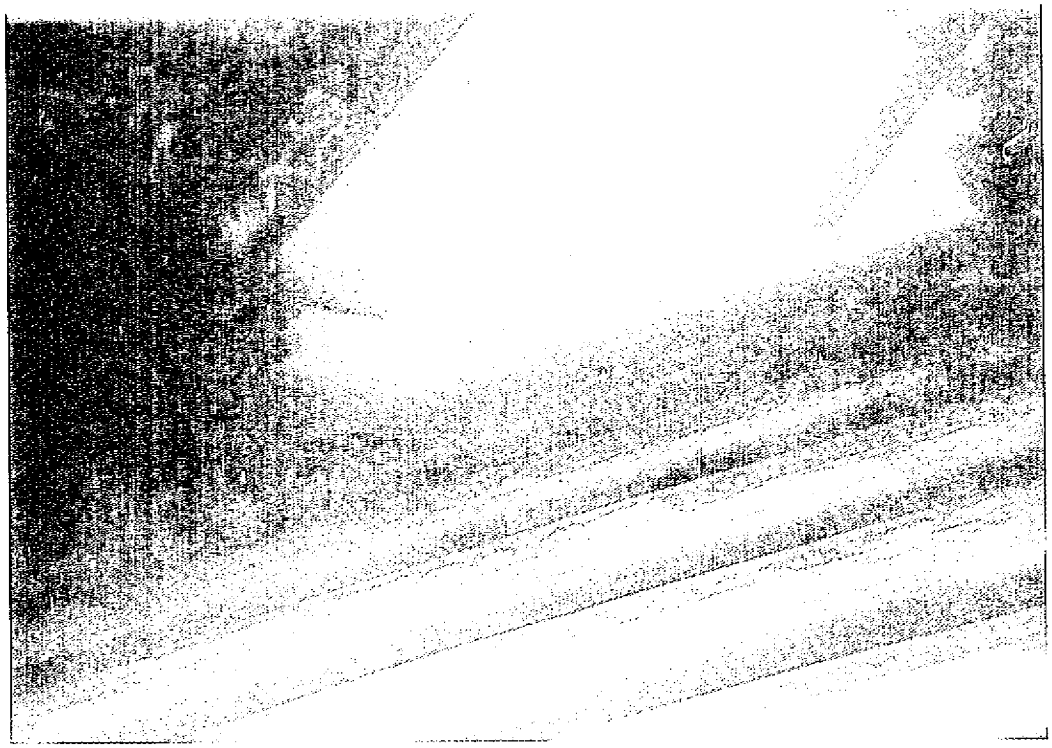


Fig. 5.49. View up the main stair case from the floor of the social hall. The stairs are partially blocked by collapsed stern cabin bulkheads. NPS photo by Toni Carrell.

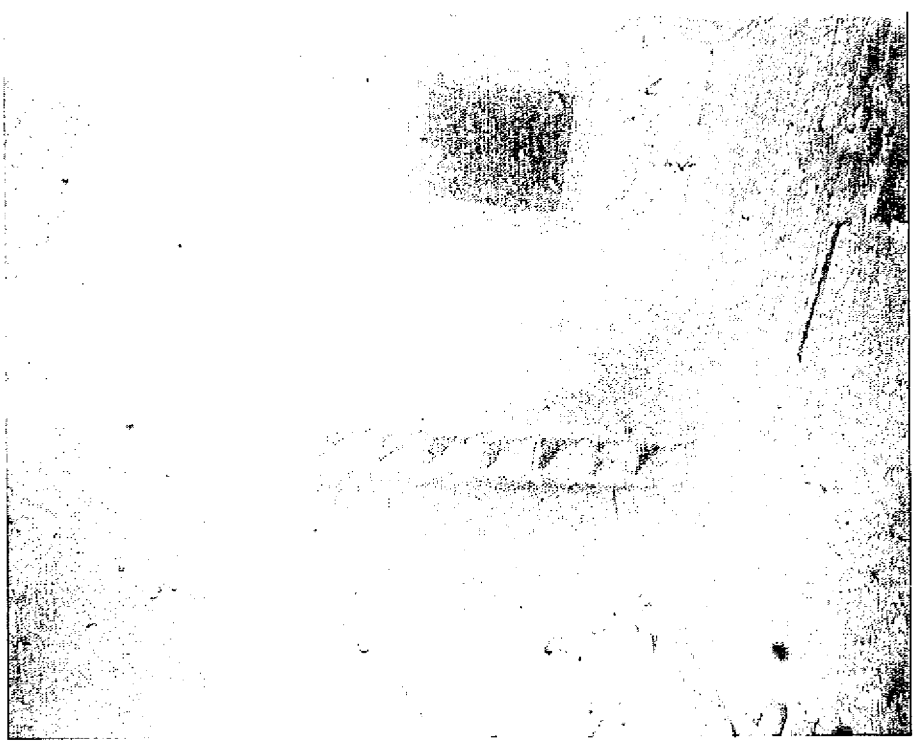


Fig. 5.50. View of the purser's cabin showing file boxes and silt accumulation -- a potential diving hazard encountered in the interior of AMERICA. The purser's cabin was directly aft of the social hall. NPS photo by Toni Carrell.

GEORGE M. COX: SITE DESCRIPTION AND ANALYSIS

Site Location

The wrecks CUMBERLAND, CHISHOLM, and COX are on a shallow reef southwest of Rock of Ages lighthouse on the south end of Isle Royale. The vessels are within a square, 3,000-feet on a side, with its geographic center at 47°51'28"N and 89°19'32"W. The center is 3.9 statute miles from the starboard-hand nun buoy at Cumberland Point on a true bearing of 275 degrees. It is 336 degrees true from the starboard-hand nun buoy southwest of Rock of Ages lighthouse and 222 degrees from the lighthouse a distance of 4,000 feet (useful for chart plot). On-site location is best using North Rock: the site is 258 degrees true, 2.4 statue miles from the rock. The wreck of the passenger steamer GEORGE M. COX lies less than a mile east of the CUMBERLAND/CHISHOLM site on a separate ridge of Rock of Ages Reef, just south of the southernmost tip of Isle Royale, in depths ranging from 15 to approximately 85 feet.

Site Description

The wreckage lies in two main fields, with the bow half of the ship scattered on a flat shoal, and the nearly-intact stern portion on the side of a gently sloping ridge about 150 feet southeast (Fig. 5.51). None of the superstructure remains in the shallower water, but some of the upper deck framing may be seen in the deeper water associated with the stern wreckage.

The bow portion of the ship has been fragmented by the action of waves and ice, so that it now covers a field approximately 350 feet in length, with some sections of hull another 200 feet away to the east. Most of the bow lies in shallow water, varying from 15 to little more than 25 feet in depth, although smaller portions have been swept from the shoal into deeper water surrounding it -- probably the result of drifting ice or currents. Relatively strong currents, which swept over the reef in a southwest-to-northeast direction, were observed during field work at the site.

Historical photographs show COX perched on the reef with its bow high in the air and its stern underwater (Fig. 4.20, 4.21). Island residents and commercial fishermen reported that the ship rested in that position for many days before the strain broke the ship's back, and the hull was broken cleanly in two just forward of the boilers. When the delicate equilibrium that held the ship on the rocks was destroyed, the stern began a slide backward into deeper water, and the bow settled on the reef to begin its collapse and disintegration.

Before the ship broke up, wholesale scavenging was done on board, including the removal of bedding, foodstuffs, hardware, and tackle by local fishermen and others (see Chapter IV). Heavier equipment was removed by commercial salvors. The ship's ten metal lifeboats were among the items removed at this time. An examination of the wreck site indicates that other more extensive salvage was also attempted, although its extent is not clear from either historical documentation or observations on the site. Heavy cables may be seen, for example, around the ship's four Scotch boilers, and it appears that there was some effort to raise them. It is not known when this attempt was made, but it could have been in May 1933, when the salvage tug STRATHBUOY was on site (New York Times May 29, 1933). There is also a large wooden timber associated with heavy cable in the wreckage of the bow, and it may be inferred that this is a remnant of some commercial salvage work. The timber is about 16 feet long and 6x10 inches in cross section, with iron work at one end. It appears to be a boom from some sort of derrick. Aside from those two elements, there is little tangible evidence of large-scale salvage work on the wreck, and the orientation and condition of the wreck may be attributed entirely to natural causes. The exception is the removal of smaller artifacts by sport divers, which has been noticeably thorough. Virtually none of the thousands of fittings and furnishings associated with the passenger and crew quarters can be found on the site.

The array of wreckage on the reef offers some fascinating insights into the ship's structural characteristics and into the circumstances of its loss. Probably the first, most obvious, and most enduring impression of the ship is its very light construction. The structural elements are all lightly built by comparison with other ships of the Isle Royale population, although contemporary accounts considered it to be heavily built, and one of the strongest vessels of its class afloat (Marine Engineering 1901:458-460). It would be of considerable interest to compare COX with contemporary vessels not considered heavily-built.

The frames of COX are small in cross-sectional dimension, the keel is built up of light steel plates, and the floors are very narrow. The shell plating is correspondingly thin. Everything about the hull construction suggests a smaller vessel than COX. Indeed, the ship originally was smaller. It was built 233 feet in length, and later lengthened to 259 feet in 1908; it was originally fitted with two decks, and was later given a third.

All indications are that COX was originally built for speed. The hull form was a deep "V" configuration with considerable deadrise, much like in a yacht. The ship was clearly designed for speed and not for carrying capacity, and it had unusually fine lines as a result. The desire for speed is further evidenced by the four large boilers, which were more than adequate for a 259-foot craft, and unusually powerful for the ship's original 233-foot dimension. In the first six weeks of operation, the vessel broke the record for the run between St. Joseph, Michigan and Chicago. The average speed was 19 3/4 miles per hour, which gave it a ranking of the one of the fastest boats on the Lakes (Ibid.).

The ship's design had nothing to do with its running up on Rock of Ages Reef, but it certainly contributed to the vessel's loss as a result of that incident. Major portions of COX's hull bottom may be seen on the reef, and much of it shows clear evidence of contact with the rocks. The bar keel, which extends 7-ins. below the ship's bottom, is made up of several plates riveted together. The keel is folded over at right angles to starboard for a distance of at least 50 feet where the ship slid onto the reef. The ship's bottom is dished and ruptured on the port side where it apparently ran over the rocks. It must have caused immediate and massive flooding. One section of the bottom along the centerline is caved in more than a foot, perhaps the point on which the vessel balanced so precariously before it broke in half. This section of bottom appears to have articulated with the section of the hull under the boilers, which is either fragmented or missing.

The forepeak section of the bow, about 20 feet in length, lies near the shallowest part of the reef, largely intact to the collision bulkhead (Fig. 5.52). The ship's distinctively oversized hawse eyes are both there, although the starboard one, along with the attached hawse pipe, has been wrenched away from the shell plating. Both anchor chains run through the hawse eyes to their respective anchors, which lie close by. It was reported that the original Baldt stockless anchors of COX each weighed 2,840 pounds (Marine Engineering 1901:458-460). The anchors are painted white, like the rest of COX, but there are also conspicuous traces of the ship's original emerald-green paint underneath, remnants of the old Graham & Morton era. COX's windlass is also lying 12 to 15 feet from the section of forepeak, in close association with the chains.

The forepeak stands about 45 degrees from vertical, and the lower portions of it are buried in gravel and rocks so that none of the forefoot can be seen. There would be some value in examining the extreme forward part of the ship's keel to determine exactly where the bow impacted with the shoal when COX grounded. From all appearances, the first impact occurred just a few feet aft of the forefoot, and the ship seems to have glided swiftly up a gradual slope to wedge itself firmly on the rocks. It was reported that the ship was doing at least 10 miles per hour when it hit the reef (Daily Mining Gazette May 30, 1933). The inertia drove the ship well up on the reef.

An effort was made to establish the location of the ship's impact, and a shallow depression was found in the reef, which was about 30 feet to starboard (east) of the present day fore-and-aft axis of the stern portion of the wreck. There is reason to believe that the ship slid up into that depression when it ran aground, because the water on either side of the depression is too shallow to have admitted the ship without a terrible impact. Furthermore, numerous rivets from the ship's hull were found wedged in the cracks and crevices in the rocks of the depressed area, while none were observed on the rocks on either side. No gouged marks were found in the rock, however, which would have further substantiated the impact location.

The wreckage strewn in the shallow area on the flat of the shoal appears to represent the entire forward half of COX, including the forepeak, keel and associated deep floors, the bottom, and the sides of the hull. At least ten discrete pieces of wreckage may be attributed to that part of the ship, varying from about 10 feet square to more than 70 feet in length.

Among the large sections of shell plating and frames is also a field of wreckage and debris extending nearly 100 feet in length, which includes steel pipes, columns, beams, angle-bars, cables, and nondescript pieces. There are also machinery parts, some evidently associated with a large freight elevator known to have been installed in the ship. Although few of the pieces are joined together, many can be identified from COX's original builder's plans. The "midshipsection" of the builder's plans illustrates 7-inch diameter pipe hold-stanchions under the main deck, 6-inch I-beams supporting transverse deck beams and "Z-bar" frames made up of steel angles. Components of each description were observed in the scattered debris on the shoal, and it may be assumed that they represent the framing of the whole forward half of the ship, which has been slowly and relentlessly disassembled by more than 50 years of natural site processes.

This portion of the bow wreckage is interesting because of the diversity of the remains lying there, and because of its easy access; the central concentration of remains, dubbed the "junk-yard" by sport divers, lies in about 20 feet of water. It must have been staggering in its profusion, rich with the artifacts sifted by gravity from COX's salons and cabin, before it was picked over by divers and swept of its lighter debris by decades of currents, waves and ice floes.

Some of the debris in the area may be from cargo carried by the ship, as it is difficult to attribute some of it to the ship's structure. Virtually nothing is known, however, about the nature and extent of cargo carried by COX on its last voyage. It is known to have carried large cargoes in its earlier days, and inasmuch as it was given a freight elevator during its 1932 reconstruction, it may be assumed that it was intended to carry heavy freight in its last role, too.

The stern portion of the COX wreck consists of a little more than one-half of the ship's 259-foot length, lying substantially intact on a gently sloping bedrock bottom (Figs. 5.54, 5.58). The ship lies on its port side, with a huge mass of tangled structural debris alongside on the port side and forward of the hull. The wreckage scatter includes machinery, structural elements from the hull, and portions of superstructure and rigging. The dominant feature at the site is the ship's hull, which is impressive in its dimension, but still betrays a certain fragile quality by the extent of its distortion and the nature of its damage. There is also a distinct grace about the form and proportion of the stern, where there is enough integrity of the ship left to preserve some of its original beauty.

The stern measures 140 feet in length, and there are other sections alongside and underneath it which are 30 or 40 feet long. The keel is preserved unbroken, but the hull around it is twisted almost ninety degrees, so that it is almost inverted at the fantail and nearly at right angles to the bottom at its forward extremity; specifically, the angles rotate from 195 degrees at the fantail to 290 degrees at the forward end. There are huge tears in the hull as a result of the exaggerated torsion (Fig. 5.53). The tears correspond to structural features within the hull. One tear extends longitudinally for 70 feet, just to the starboard side of the keel, and another runs transversely about 20 feet from the rail to the keel, along the line of the afterpeak bulkhead. The longitudinal tear exposes the entire length of the propeller shaft, and the propeller itself has been wrenched from the stern-bearing. The propeller is displaced in a forward direction about 20 feet from its proper location, and although this was not confirmed by field observation, it leads to the conclusion that the engine has been torn from its foundation in the hull, and also lies some 20 feet forward of where it should be. Some displacement of the engine was observed by the commercial salvors who visited the wreck in 1933: "the bottom of the steamer was torn out, the engines jolted from their moorings and the vessel is listing toward deep water ...." (New York Times May 29, 1933).

Site Formation Processes

When the condition and orientation of the hull are compared with physical aspects of the Lake bottom in the vicinity of the wreck, they suggest a sequence of events that would explain many of the seemingly unconnected details. A process can be identified that leads from the historical photographs of the wreck event to the conditions observed during the recent field work.

Photographs and historical research show that GEORGE M. COX rested on the reef approximately amidships following its stranding, with its stern under water and a list of about 10 degrees to port. A search of the reef led to a 10-foot deep spot in the middle of a 6-foot shoal, and there is some possibility that COX struck the sloping side of this ridge, to be funneled into the 10-foot groove or depression by its momentum. With its bottom badly torn, it filled quickly, and because it rested just forward of amidships, the stern settled, lifting the bow high out of the water. The unsupported weight of the bow caused the hull to fail at the point where it rested on the reef; the immense tension on its structure would have focused at the sheer strakes, the bands of steel shell plate running along the ship's side just under the deck line. A historical photograph shows the hull failure to have been just forward of the boilers or almost precisely amidships. The bow settled on its port side in the shallow trough formed by the upper surface of the reef, and it went to pieces there, probably not long after the hull broke. The same photograph showing the ship broken in half does not show any sign of the bow portion in the shallow water nearby.

The stern half of the ship stood briefly on the slope of the reef, with its forward end resting in just a few feet of water and the aftermost portion jammed into the bottom supporting the whole weight of the wreck. Storm action caused the wreck to begin shifting, and it soon began to descend the slope astern of it. With the weight of the whole wreck borne by the projecting shapes at the stern, the propeller, rudder shoe and stern frame were all torn away as the ship moved backward down the rocky surface and turned slowly onto its port side, in the direction it was originally forced by the wreck event. Several parts torn loose in the descent indicate the wreck moved more than 100 feet astern in the process, and about 30 feet to port as it rotated onto its side. The rudder shoe, for example, lies almost exactly 120 feet forward of its proper hull location, and under the starboard side of the wreck; the railings from the upper deck at the stern lie in the same area, and fully 150 feet forward of their original location on the stern of the ship (Fig. 5.51). Both seem to have been torn off while the wreck lay some 120 feet forward of its present position and slightly to starboard. It was also during the backward slide that the propeller and shaft were forced through the bottom of the hull, leaving the terrible rent that is so dominant a feature of the ship's bottom today, and undoubtedly wrenching the engine from its mounts. Some historical accounts assert that the ship's engines were torn loose by the impact of striking the reef, but this seems unlikely, and certainly the long tear in the bottom plates did not occur at that time.

The ship's four Scotch boilers (Figs. 5.55, 5.57) lie just forward of the after section of the hull, and their support cradles or "saddles" lie still further up the slope, some as much as 30 feet away. Curiously, all four of the boilers are upright, in spite of the fact that the stern portion of the wreck lies on its side. It appears that the section of ship's bottom, which supported the boilers, is completely broken up. The bottom of the hull may have been broken during the wreck event, and later by the weight of the boilers bearing down on the hull as the stern section moved down slope.

Evidently, there was an effort to salvage the boilers, which would explain the steel cable around the boilers at the site, as well as why the boilers are upright and the hull that contained them is on the port side. A section of bottom, with centerline keelson structure intact, was found lying a considerable distance from the boilers on the opposite (or east) side of the reef, in about 70 feet of water; inasmuch as it contained through-hull fittings that appear to have been associated with the boilers, it seems likely that it was the section of the bottom between the bow and the stern that supported the boilers. It is not known how this section of bottom became so far removed from the remainder of the wreckage, but the possibility cannot be discounted that the wreck was blown up by commercial salvagers to free up the boilers for salvage, although such an attempt was clearly unsuccessful. There was no other indications of explosion observed.

COX's superstructure was apparently relatively intact until the wreck came to rest in its present position, because the remains of the deck structures lie around the stern wreckage, very near their appropriate locations. Even the remains of the smokestack can be seen just to the port side of the wreck, lying flattened on the bottom amid the shambles that were the cabins. Boat davits and other portions of the superstructure are easily distinguished in the same large field of wreckage. This appears to be the only Isle Royale wreck site with such extensive remains of wooden superstructure, although CUMBERLAND, MONARCH, ALGOMA, HENRY CHISHOLM and AMERICA all had similar wooden cabins.

On the opposite side of the reef, at the foot of an abrupt drop off and in a long gully nearby, are other portions of COX wreckage, including several steel tanks, a gangway door, sections of the ship's side, and the one short section of bottom possibly associated with the boiler spaces, which may have come from the missing section of hull amidships. A part of the bulwark from the forecastle also lies there. Ice movement is the likely mechanism of movement for the structural elements located in this gully. Wooden framing members were observed that did not belong to COX at all, but had the characteristics of HENRY CHISHOLM's hull construction. The distinctive shapes of the frames distinguished them as having come from a ship's bow (Fig. 5.59). The attributes of the frames closely match those of CHISHOLM and indicate the bow may have been completely disarticulated. Other wreckage is suspected to lie between the two sites, perhaps including portions of CUMBERLAND's missing bow.

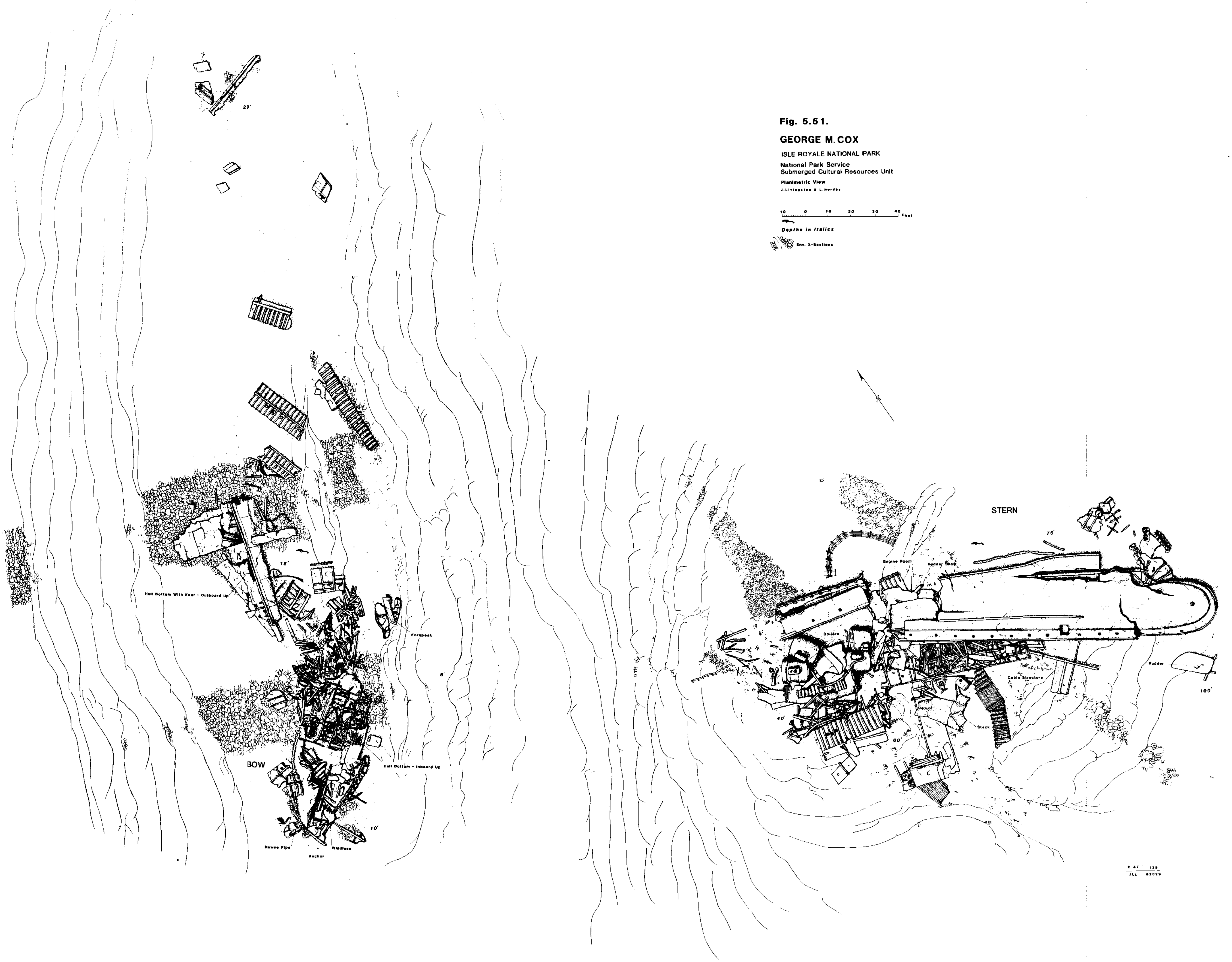


Fig. 5.51.
GEORGE M. COX
ISLE ROYALE NATIONAL PARK
National Park Service
Submerged Cultural Resources Unit
Planimetric View
J.Livingston & L.Nordby
10 0 10 20 30 40 Feet
Depths in Italics
Env. X-Sections
BOW
STERN
Hull Bottom With Keel - Outboard Up
Hull Bottom - Inboard Up
Forepeak
Hawse Pipe
Anchor
Windlass
Engine Room
Rudder Shoe
Boilers
Cabin Structure
Stack
Rudder
29'
15'
8'
10'
40'
60'
70'
100'

Fig. 5.52. Forepeak and chain locker of bow of GEORGE M. COX. NPS photo by Toni Carrell.

Fig. 5.53. Larry Murphy examines the main shaft of COX through the longitudinal crack in the hull. NPS photo by Toni Carrell.

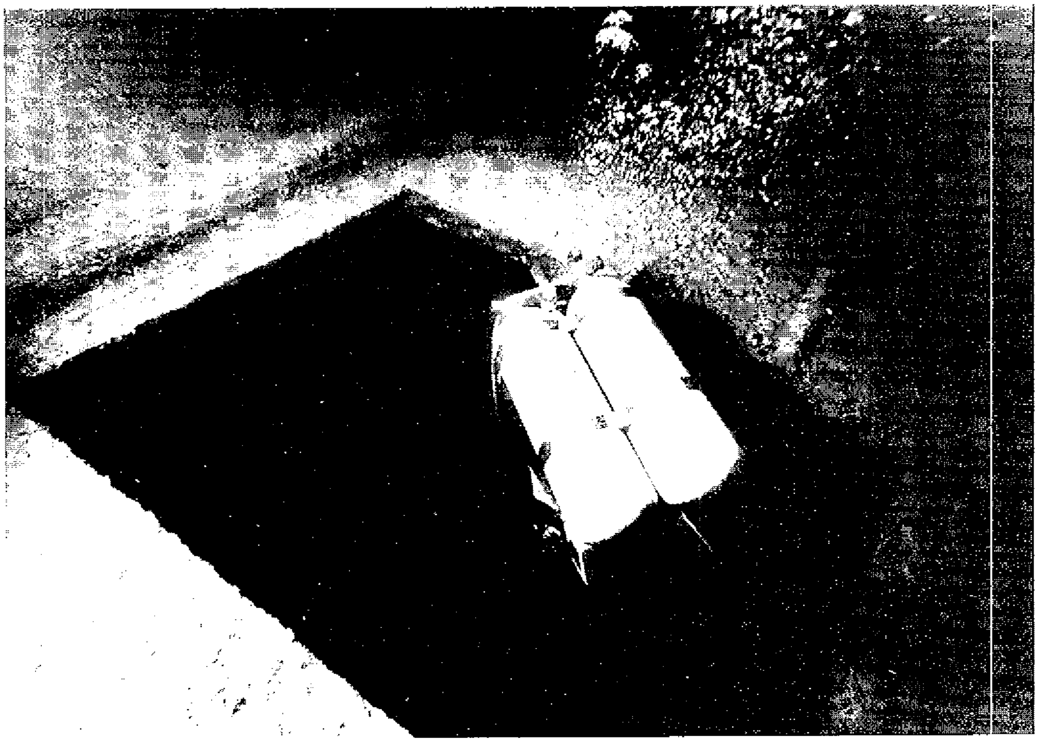


Fig. 5.54. Larry Murphy drops through starboard stern gangway to examine interior of COX. NPS photo by Toni Carrell.

Fig. 5.55. Steam drums atop Scotch boilers of COX. Steam drums were not common features on Lakes craft. NPS photo by Larry Murphy.

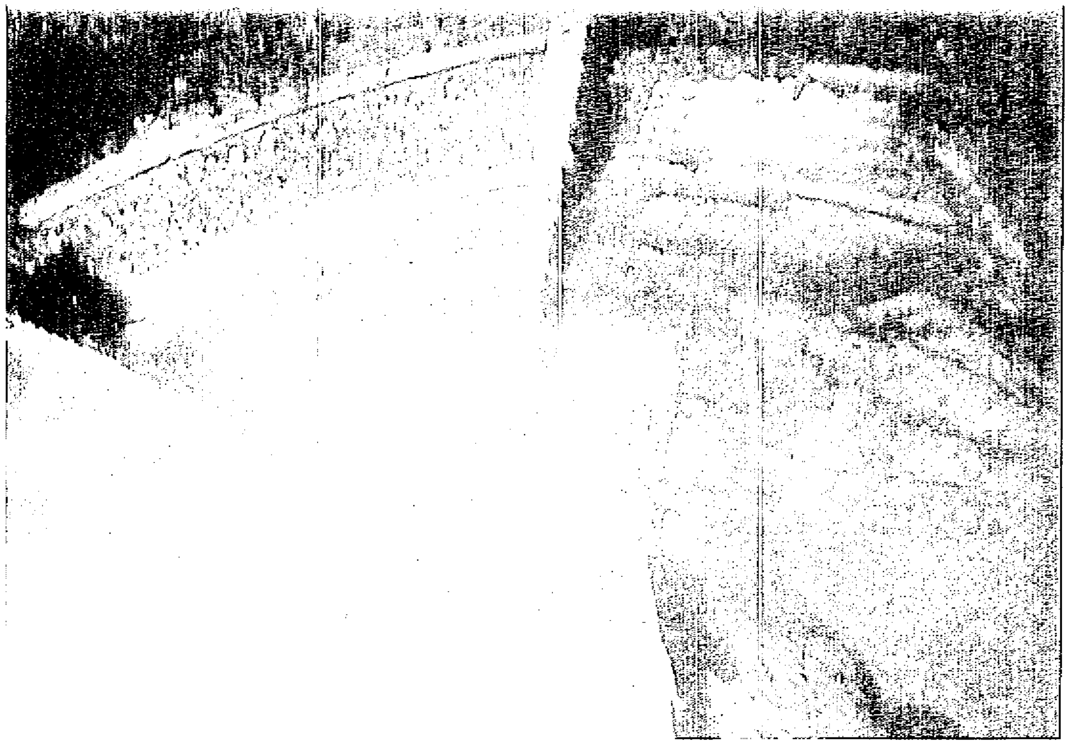


Fig. 5.56. Interior of COX aft of engine spaces. NPS photo by Toni Carrell.

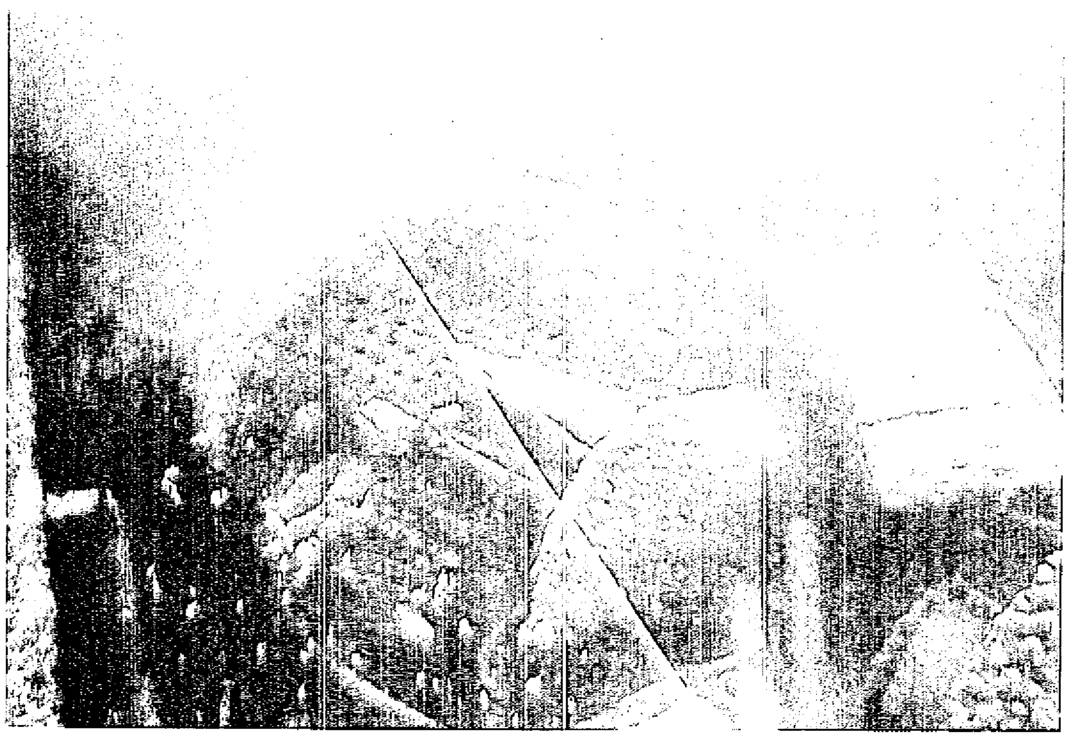


Fig. 5.57. COX boilers with nylon base line used for site mapping operations in place. NPS photo by Larry Murphy.

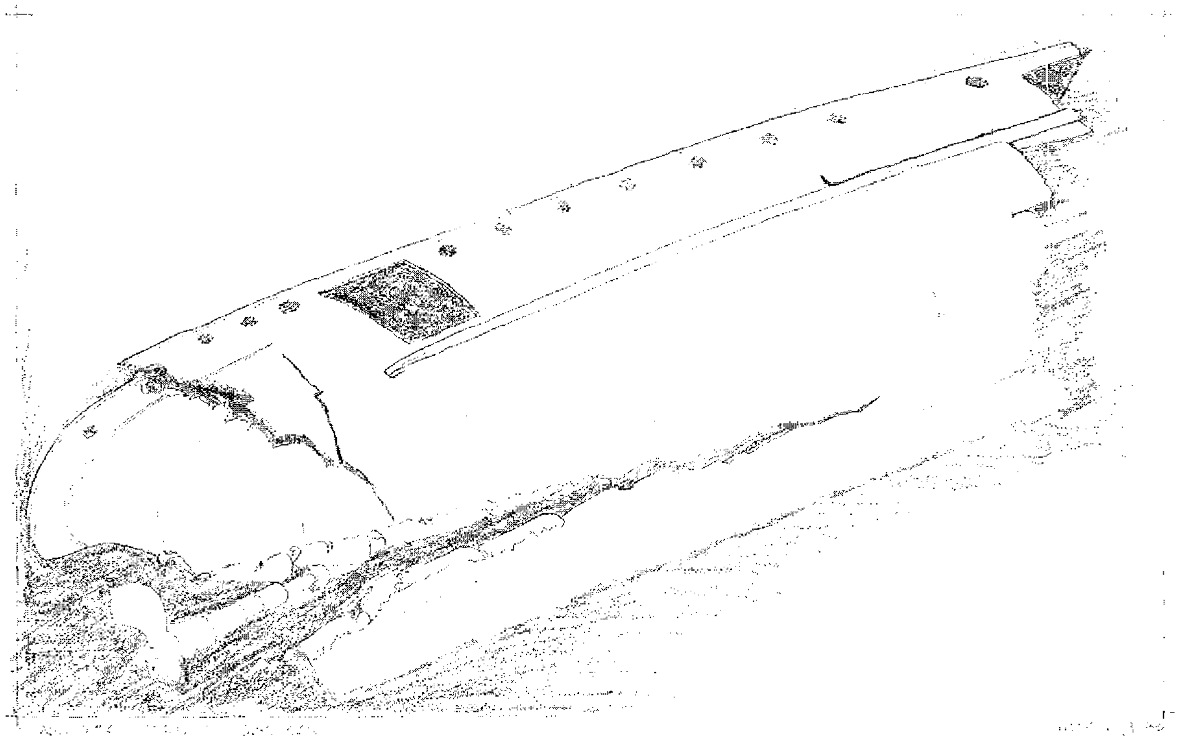


Fig. 5.58. Field drawing, artist's perspective of stern of GEORGE M. COX. Drawing by H. Thom McGrath.

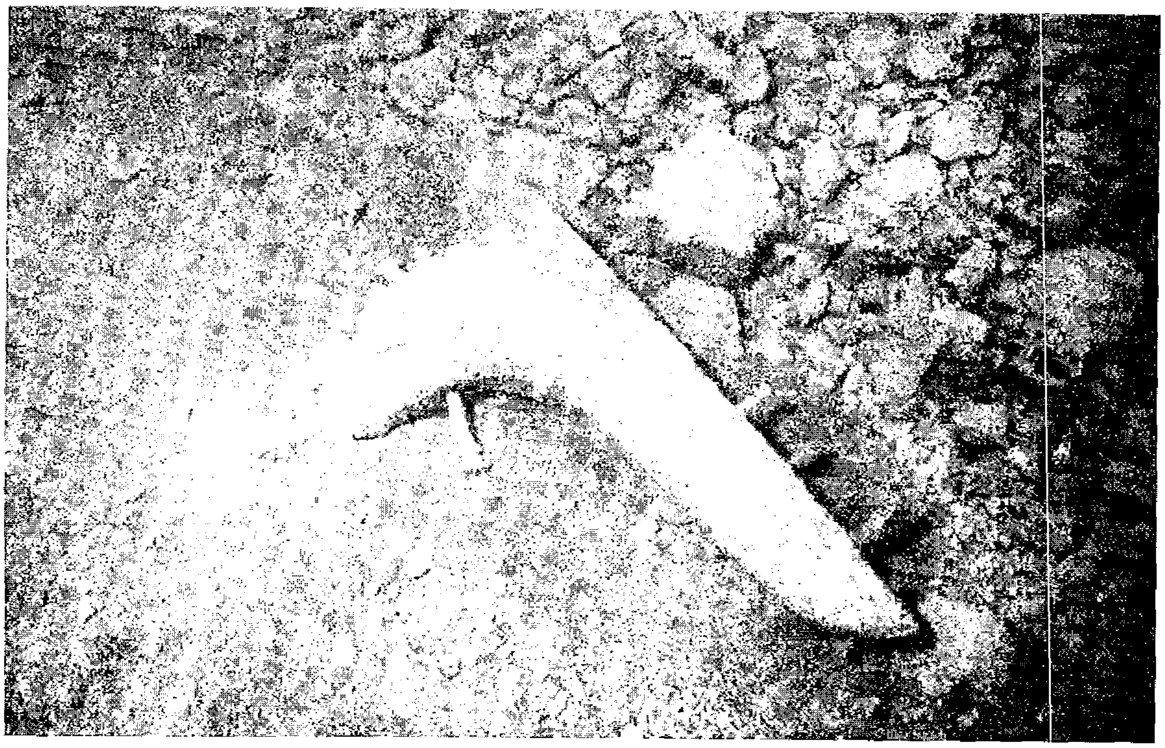


Fig. 5.59. Ship knee located in a deep water ravine near the bow of COX. This element is evidently from CHISHOLM. NPS photo by Larry Murphy.

CHESTER A. CONGDON: SITE DESCRIPTION AND ANALYSIS

Site Location

CHESTER A. CONGDON is on a shallow reef, known as Congdon Shoal, south of Canoe Rocks at the northeast end of Isle Royale. The charted position of the vessel is 2.0 statute miles from Hill Point on a true bearing of 14 degrees. It is 279 degrees true from the starboard-hand nun buoy at Locke Point and 271 degrees true from Blake Point Light. The site can be located in water by rounding Blake Point and setting a course of 271 degrees true and traveling a distance of 4.3 statute miles. CONGDON is located at $48^{\circ}11'36''$N, $88^{\circ}30'52''$W.

Site Description

The site of CHESTER A. CONGDON offers numerous exceptional exploratory dives to visitors and students of Lakes vessel technology alike. An interesting swim can be made from the bow (Fig. 5.60), over the wreckage field to the top of Congdon Shoal, and then to the stern (Fig. 5.61). Elements from the hull and deck that contained the first 9 hatches lead up from the bow and across the top of the reef. Many of the shallower fragments show evidence of ice and wave impact in addition to the torn plates from the wreck event. There are bottom sections that show the scalloped shell plates, which appear as if they were draped over the frames, typical of grounding damage and heavy ice impact.

The aft section can be followed down to the engine room and stern cabins. The stern is laying at a very steep angle and drops quickly to 180 feet of depth. There was no contemporary salvage on the stern. The only removal of material has been done through the actions of sport divers.

The bow can be penetrated through a number of entrances. The pilot house and forecastle deck cabins can be entered through the doors along both sides. The room below and forward of the pilot house is the sitting room, with the captain's quarters aft. The captain's office and living quarters can be entered on the forecastle deck. Much of the panelling is intact. The pilot house has narrow oak strips on the walls and a white-painted ceiling. The captain's quarters and the private quarters on the spar deck were walled with quartered oak.

The windlass room can be entered easily through the salvage hole in the deck. The hole, although it looks much like a hatch, is the result of salvage operations to remove the windlass. On the port side of the bow deck, the frame for the stairs leading into the windlass rooms can be seen. In the windlass room, the forward mounts for the windlass are in place. The chocks and bitts are also present.

Moving aft, the owner's staterooms and private quarters can be seen. This area, like the rest of the bow, was completely salvaged, but the bulkheads and some fittings are left. Immediately below on the lower deck, are the chain locker forward, the dunnage and lamp room on the starboard, the hall and forward crew quarters on the port.

CONGDON is an important and impressive site. It offers a relatively safe dive on the bow, where there are few portable artifacts. Divers wishing to penetrate the wreck can do so in the pilot house and forecastle cabin. Deeper penetrations are more serious. The bow section can withstand heavy diver visitation with little additional impact. The mooring buoy should allow this to be done with a relatively high degree of safety.

The stern section, however, should be treated somewhat differently. The stern is a serious dive by any standards, and heavy diving may increase the attrition of portable artifacts that remain in the undisturbed engine and cabin areas. The CONGDON stern, along with KAMLOOPS, are the least dived sites in Isle Royale and, consequently, the best preserved -- a result of their inaccessibility due to depth. Neither of these sites should be buoyed, and diving on them should not be encouraged.

Site Analysis and Formation Processes

CONGDON, lost in November 1918, is the largest sunken vessel known in the waters of Isle Royale. The 532-foot vessel was lost in dense fog while making a timed run from Thunder Cape to Passage Island. Historic accounts indicate the ship hit the southern reef of Canoe Rocks at a speed of 9 knots (see Chapter IV).

The shoal that is now the resting place for the bulk freighter rises from 180 feet deep on the seaward side to a narrow point of solid rock, which is just under the surface. The reef drops quickly on the shoreward side to 110 feet deep. The ship apparently hit the southern edge of the shoal in 18 to 20 feet of water near the bow, with the stern over the deep water on the seaward side.

The first reports of damage stated that the forepeak, number 1 and 2 starboard tanks and number 1 port tank were full of water (Cleveland Plain Dealer, Nov. 8, 1918). The initial assessment was that the vessel could be freed, if the cargo was removed. These reports indicate that the original hull damage was not severe, probably only shearing of rivets and opening of seams in the bottom of the hull. Had there been significant distortion of the hull, more involved salvage operations than lighterage would have been initially discussed. Only lightering tugs and barges were involved in the first salvage attempt.

Unfortunately, a southeast gale interrupted the lightering operations. After a day of 55 miles per hour winds, the stern section broke and sank in deep water. After sinking, the stern was still attached to the bow section along the hull on the starboard side and deck plate, although the port side had been fractured. The stern hull section listed to starboard as it sank (Fig. 4.24)). The tearing of the hull was undoubtedly the result of the working of the still-bouyant stern section (some 400 feet of the hull) as it was buffeted by the waves created by the gale. The bow section was solidly aground, with the increased deadweight of the water in its flooded forward tanks. The first two tanks extended below the number 1 hatch (to frame 29). During the storm, the stern section acted much like a lever moved by the waves, which tore the port shell plates aft of the number-six hatch.

Historical accounts indicate the bow remained above the water for only a short period (Figs. 4.23, 4.24, 4.25). By the end of November, the bow was reported to be in 50 feet of water, but salvage of forward-end machinery had already been made (Fort William Daily Times Journal Nov. 29, 1918; Lake Carriers Association 1918:142-143). Examination of the bow section shows a virtually complete salvage operation, one that undoubtedly was conducted before the bow submerged. All machinery, steering and navigation gear, windlass, chains and anchors -- even the sinks, tubs and toilets were removed. A large, rectangular hole was cut in the forward deck to remove the capstan and lift out the windlass. Considering that only gas cutting-technology available at the time, there can be little doubt that this hole in the forward deck-plate was cut before the deck was submerged.

The bow section of CONGDON sank upright at the base of a steep cliff with the stempost facing upslope, tilted up at an angle of 59 degrees and about 35 degrees to starboard, in 60 feet of water (Fig. 5.60). The aft portion is 110 feet deep. The bow gives the appearance of having been cleaved from the rest of the vessel and is a singularly spectacular sight for divers.

Evidence of the sequence of events that led to the deposition of CONGDON's bow in such an unlikely position is to be found in the general area, and on the bow itself. Steel hull construction techniques also contributed to the formation of this site.

The bow section is comprised of the first 24 frames of the ship. At frame 24, the blueprints show a reinforced, water-tight bulkhead from the keel to the forecastle deck at the aft end of the forward cabins. This tended to form the forward section of the vessel into a strong, integral unit.

After the stern sank in the gale two days after the wreck, the bow section was attached to the stern primarily along the bottom and lower side on the starboard side. The contemporary photographs show that both the port and starboard hull sides were severed, the port side at hatch 6, and the starboard, aft of hatch 9. The port side of the hull is raised in the air indicating that the rupture is complete on that side and that the separation extends to, and probably through the hull bottom on that side. The principal attachment appears to be along the lower starboard side. There were probably stress cracks along the bottom and sides of the forward part as a result of the levering of the stern section prior to its sinking.

In the absence of historical documentation on the activities of the salvors, the separation of the bow portion must be considered as the result of natural forces. Although the bow was accessible and cutting torches were used to salvage the windlass, there is no indication that the salvors attempted to recover the bow portion intact.

A possible sequence of depositional events can be constructed based on the material remains. The port side separated first, with the bottom buckling and separating as the heavy bow portion began to sink. As the bow unit sank and began to slide down the steep underwater cliff, the port shell plates forward of the number 6 hatch (around frame 48) were torn loose from the port bow, both along the side of the hull and the bottom. Construction elements that can be attributed to this section of the ship can be seen on the top of the reef and along the slope above the bow to the north of the stem. As the bow gathered momentum, the starboard side remained attached to the stern long enough to turn the bow to the starboard as it moved downslope. The bow separated from the restraining starboard hull remnants and slid stern first down the cliff. Because of the last attachment of the hull being along the starboard side, and the configuration of the rock face, the bow portion shifted to the south as it descended.

Examination of the aft portion of the bow section reflects the events as described. Along the port side (Fig. 5.66), the hull plates are sharply bent toward starboard. On the starboard side, the torn plates are bent both starboard and forward. There is a puncture on the starboard side of the bow that evidently is the result of detached hull elements sliding down the slope sometime after the bow had reached the bottom of the incline. Later, the starboard deck stringer plate and shell plates, including sections of the bottom, moved down the hill to their present location.

There is impact damage on the stempost of CONGDON. The depression is 6 feet long, deep enough to displace the first two frames and crumple the shell plates. The stem is folded over to starboard. The area begins below the water line at the level of the lower hold-stringer. Although the damage is severe, it does not appear to have ruptured the plate seams. It seems unlikely that this damage was caused during the initial impact with the reef. If it had been, it would be expected that there would be further damage to the bow as the inertia of the ship forced the bow up and over the obstruction responsible for the stem damage. The forefoot of the bow is undamaged, indicating it did not come in contact with the reef.

There are at least two possible explanations for the damage to the stem. It may have occurred earlier in the operating season, a result of a slow-moving contact with an obstruction. The damage was not severe enough to require immediate repair, but probably would have been repaired during the winter layover.

The second possibility is that the stem damage was done as the bow section moved down the steep slope during its sinking. If this is the case, the impact may have contributed to the turning of the bow and tearing of still-attached shell plates as the bow slid along the submerged cliff face. It is possible that further examination, mapping and identification of the hull fragments between the bow and stern section will lead to a more complete understanding of the wreck event and depositional sequence for this site.

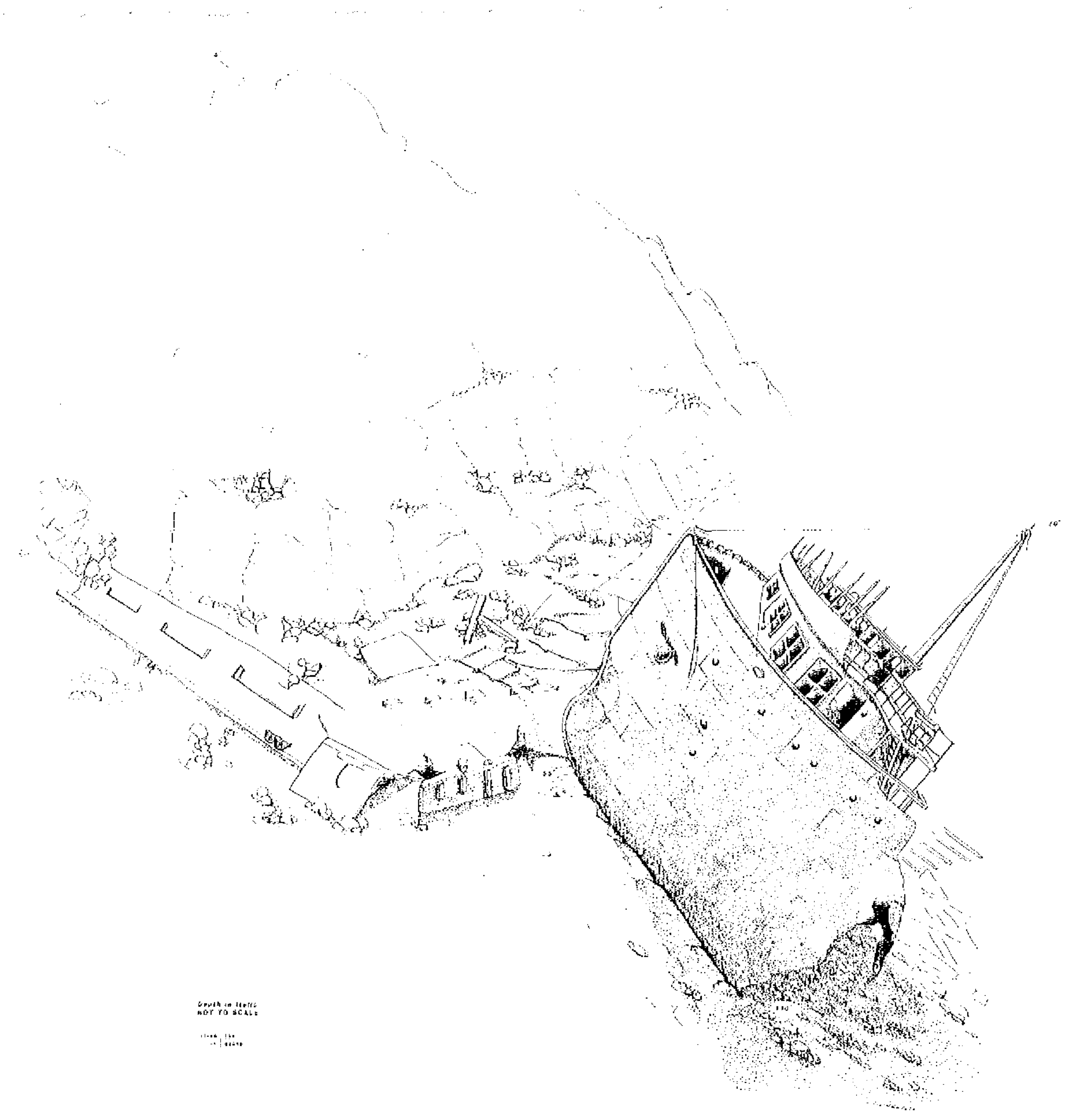


Fig. 5.60. CONGDON bow, artist's perspective. Drawing by Jerry Livingston.

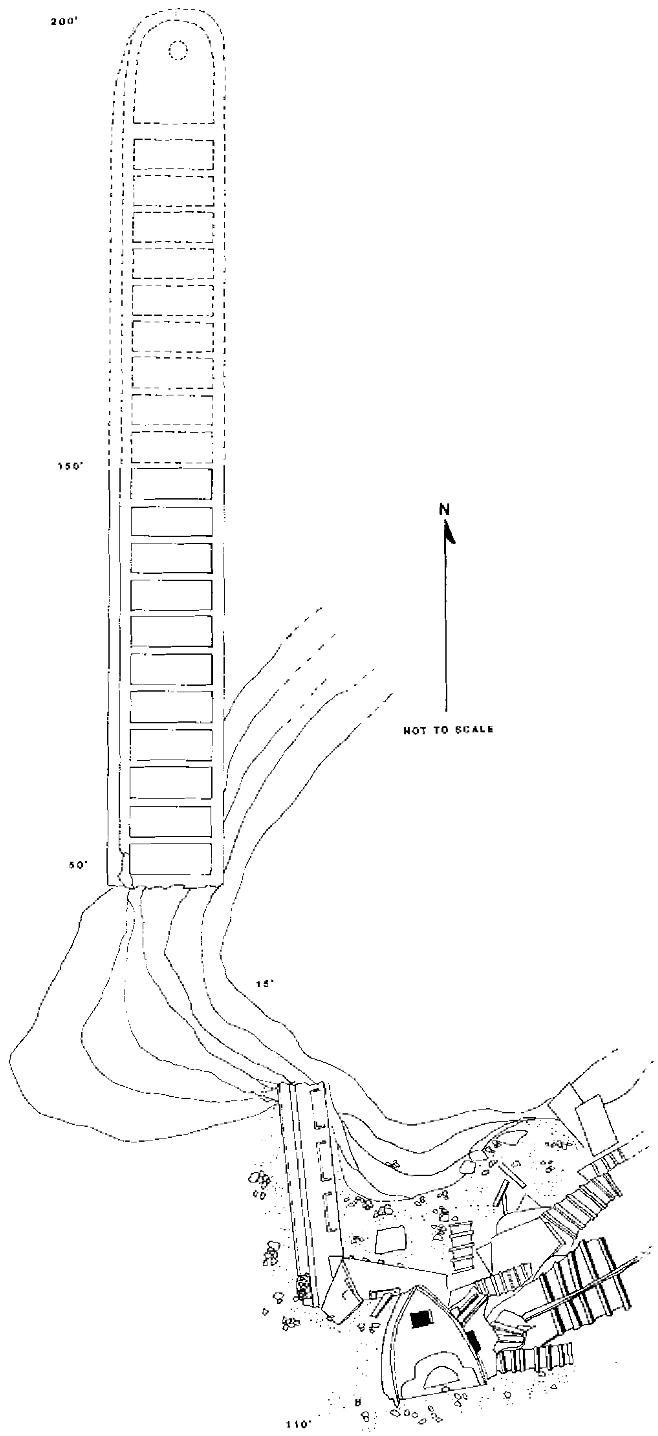


Fig. 5.61. Drawing depicting the relationship of bow and stern of CHESTER A. CONGDON on Congdon Shoal. Drawing by Jerry Livingston.

EMPEROR/DUNELM: SITE DESCRIPTION AND ANALYSIS

EMPEROR and DUNELM, because of their proximity, will be treated together as two components of a single site.

The site lies to the northeast of CONGDON on Canoe Rocks. EMPEROR is the second largest and most recent of the 10 major shipwrecks of Isle Royale. DUNELM was a stranding, and little remains to mark the site.

Site Location

EMPEROR is resting on the northeast end of Canoe Rocks located at the northeast end of Isle Royale. The charted position of the vessel is 1.9 statute miles from the starboard-hand nun buoy at Locke Point on a true bearing of 298 degrees. The site is 33 degrees true from Hill Point and 281 degrees true from Blake Point Light. The site can be located by rounding Blake Point and setting a course of 281 degrees true and traveling a distance of 3.5 statute miles. The vessel location is $48^{O}12'02''$N and $88^{O}29'30''$W. Historical coordinates were telegraphed to the Ottawa Department of Transport on June 4, 1947. These were given as: $48^{O}14'06''$N and $88^{O}28'24''$W. About 100 yards east of the EMPEROR bow are remains that are ascribed to the DUNELM stranding incident.

Site Description

The stranding of DUNELM was the earliest of the known disasters (1910) that have left a material record on Canoe Rocks. The steel package freighter, like the other vessels of Canoe Rocks and vicinity, was downbound from Port Arthur. The freighter, carrying a cargo of wheat and flour, ran aground on the rocks during a December snowstorm. Salvors were summoned after the owners gave the ship up as lost. The Canadian Towing and Wrecking Company secured a "no cure--no pay" contract from the underwriters and eventually managed to free the vessel, despite heavy seas and severe cold.

What is probably the site of DUNELM's stranding was located in 1982 by members of the Submerged Cultural Resources Unit northeast of the bow of EMPEROR on Canoe Rocks. The two anchors, chain cable and lifeboat frame (Fig. 5.73) are all that mark the site.

It is not clear why the anchors and cable remain on the site. A prudent captain would surely have dropped anchors after grounding to ensure the distressed vessel did not sink and slide off into deeper water. The contemporary newspaper accounts state that there was concern that the waves would push the stranded vessel, with 14 feet of water in the engine room, off the reef into deep water (Detroit Free Press Dec. 21, 1910). The anchors and chain cable appear to have been dumped, rather than set. Anchors and cable are usually items that are salvaged because of the high resale value. There is no indication in the historical record located of the reason for the salvors leaving the anchors on site. An explanation may be that the anchors and cables were dropped to lighten the ship. Follow up docmentation dives were conducted by volunteer Scott McWilliam and Park Ranger Ken Vrana in 1984. Following is an excerpt from their dive records.

> The anchor stocks are six inches wide and tapered, being 12 inches deep at the base and 8 inches deep at the top. A large pile of chain lies around the anchors and the payed-out chain runs approximately 30 degrees from the anchors.

The only other material remains in association with the anchors is the frame of what is most probably a lifeboat. The origin of the lifeboat remains is unknown. It is unlikely the frame is from EMPEROR. Historical documentation indicates there were two wooden lifeboats carried on EMPEROR, one port and one starboard on the stern boat deck. Two life boats associated with EMPEROR were reported found in Todd Harbor soon after the wreck (Toronto Evening Telegram June 26, 1947). One of these boats is reportedly sunk in Pickett Bay and the other southwest of the NPS campground. Again, McWilliam's description from the 1984 dive:

> The writer measured the lifeboat from stem to stern and found it to be 22 feet 6 inches in length. A second piece of lifeboat was measured at the gunwale and found to be 14 feet 10 inches in length and the attached portion of hull 3 feet 2 inches at the widest point from the gunwale towards the keel. Flakes of white paint could still, upon close examination, be found.

The argument could be made that the anchors and lifeboat remains are not from DUNELM at all, but related to some other unrecorded wreck event. Although that is certainly possible, the fact that historical photographs of DUNELM aground and being towed (Figs. 4.29, 4.30), show the lifeboats and anchors missing adds strong support for them being related to that ship. This hypothesis is further strengthened by the fact that all anchors and lifeboats associated with the nearby EMPEROR are accounted for.

EMPEROR is one of the most dived sites of Isle Royale. Stinson (1980:15) rates the site as the third most visited shipwreck in the Park, however recent review by Vrana (Chapter VII) of Park diving-visitor registrations for the years 1980-85 indicate EMPEROR is the second most dived site behind AMERICA. The continued popularity of this site can be attributed to the visual impact of this imposing site. The stern remains are nearly intact, while the bow has been subjected to serious ice impact, but is still quite recognizable.

The vessel is in two major sections (Fig. 5.62). The bow is in shallow water ranging from 30 to 80 feet. The intact stern section starts in about 80 feet and goes to a depth of 150 feet at the propeller. The hull broke just forward of amidships. There are 17 of the original 30 hatches intact between the stern cabins and the hull break.

The stem and small portion of the bow is raised upward at a steep angle following the shallowing rock cliff face. Some of the wreckage appears to have been pushed beneath other elements, somewhat in an accordion fashion, although probably the result of collapsing, rather than occurring during the wreck event, according to historical accounts. The spar deck and forecastle deck are missing. Along with the deck structure, all traces of cabins, furnishings, head fixtures and artifacts are gone. This is a remarkable amount of material to have been removed from the site, whether from natural or cultural agents. There is also no evidence of the captain's cabin, furnishings, pilot house or rigging to be found among the bow remains. The unaccounted for material includes at least 8 sinks, 3 tubs and 3 toilets (as indicated in the blueprints).

The appearance of the bow section today is the result of the wreck event and natural processes. The structure is flattened and broken. Hulls sides are lying with hatch coamings on top of the ore. Undoubtedly ice has had the most impact to the remains. Nearly 4 decades of shelving pack ice riding over the rocks and shallow portions of the reef are considered to be the agent responsible for the structural breakage present.

The windlass and chain locker are present in the bow wreckage (Fig. 5.64). The windlass was mounted on the main deck, beneath the forward crew's quarters. The starboard anchor is still shipped, although it has slipped out of the pocket. The port anchor looks as if the windlass disengaged and the anchor fell to the bottom. Neither anchor was intentionally dropped during the wreck event, according to historical accounts. Original specifications called for two 7000-pound anchors and 180 fathoms of 2 1/4-inch (diameter) chain cable. Presumably, the original anchors and cable are the ones on site. Additionally the vessel carried a 2800-pound kedge anchor, which has not been located.

There are two tank-like structures mounted inside below decks on the hull that may be seen. Their function is unknown. In the vicinity there are 5 and 6-inch diameter air-supply pipes and 2-inch pipes for forward water service.

The deck winches are still mounted on the twisted, nearly vertical deck. These steam operated deck winches were used as mooring winches and also to open and close the telescoping hatch covers. Near the port bitts, there is a square deck hatch that allowed access to the number 1 tank.

There are 5 fairly intact hatches aft of the bow structure (Fig. 5.62). The holds still contain the reddish Steep Rock Mine ore (Fig. 5.63). The hull sides have collapsed and the port side is twisted. Roller chocks and bitts are located on the spar deck level. The roller chocks were mounted on the outside edge of the deck and the bitts were even with and just forward of the edges of the forward hatch.

Within the port hull side wires can be seen running longitudinally within the lightening holes of the frames. These wires connected the mate's and engineer's telegraphs forward in the pilot house with those in the engine spaces. The whistle wires were also within this wire bundle.

The partially intact stern is an unforgettable diving experience. As one descends the buoy line, which is attached to a pad eye near the forward edge of the stern cabin roof, the ship's form materializes and the ventilators come into view. The larger pair forward vent the boiler room, the medium sized ones open into the engine area and the smaller vents go to the galley and crew areas. There is a small deck structure also on the roof. Aft, the stern steering wheel is, unfortunately, missing.

Other features visible on the cabin roof include the engine skylight, which was probably blown out during the sinking, and the coal bunker. The coal bunker extends along the front of the stern cabin. The galley coal was carried in the smaller bin on the port side. It is curious that the ship left port with a partially-filled coal bunker.

As one descends over the forward edge of the bunker and roof that covers the aft deck winches the vessel name may be viewed. EMPEROR is painted in black letters on a white background along the forward overhang of the roof (Fig. 5.68).

Forward of the winches is hatch 30. The hatch covers were metal, and there were no canvas covers over the hatches. The battens are mostly intact. The corners of some of the hatches have been bent upwards, a result of the escaping air as the ship sank.

The stern is lying at an angle of 23 degrees from vertical with a 3-degree port list. The mast has bent to the stern to 29 degrees from its normal stern rake of about 8 degrees, and shifted to 18 degrees to port (Fig. 5.65). The shifting of the mast is most likely the result of the practice of using the top of the mast as a convenient mooring location for dive boats. For many years a line with a buoy was attached to the top of the mast and a dive boat, sometimes several, would use it for a mooring line. The use of the permanent NPS mooring line will prevent further damage to the mast.

The stern cabin may be entered or viewed through the windows and doorways (Figs. 5.70, 5.71). There is no glass anywhere, presumably blown out when the ship sank. On the port side the forward cabin contains 6 bunks and was the quarters for the deck hands. Proceeding to the stern, one can view the crew's dining room, kitchen and pantry areas. (Lake boats often do not follow the nautical terminology familiar to oceanic vessels.) Cooks' quarters were the aft-most cabin. On the stern the two spare prop blades are in place inside the bulwark (Fig. 5.69). The stern winch, emergency tiller and bitts are present.

Continuing around the stern to the starboard side, one can view the the aft-most cabin, which was a private dining area, with the officer's dining room forward. Both had two windows and a single doorway. A cabin with two bunks on the stern bulkhead is forward of the officer's mess and aft of the bathroom. Forward of the bathroom is the engine room entrance, the first engineer's cabin with a single bunk and the second engineer's cabin with two bunks on the stern bulkhead. The forward cabin with four bunks was shared by the four firemen (Fig. 5.66). Three firemen were lost in the wreck.

The engine room may be entered through the skylight. The emergency wheel and throttle are intact (Fig.5.72). The engine room is an important collection of a working engine room of a ship with nearly four decades of alterations and revision by the numerous crews that worked the vessel. This is a rich opportunity to collect data relevant to the anthropological questions concerning the interactions of people and a technological environment. The engine room of EMPEROR will provide a rich source of data for those in the future interested in such questions, as well as those of a historical nature. It is important that attrition and impact be limited in the machinery spaces of EMPEROR.

Site Formation Processes

There are remains of 8 hatches between the relatively intact 5 forward hatches and the intact stern portion of the hull. This mid-ship section of the hull is clearly the most damaged.

The principal factors for this heavily damaged section are a combination of wreck events and natural features and processes. The general configuration is a result of the heavily damaged hull bottom settling on the contours of the rock cliff face. The dense, heavy cargo weighted down the floors as the hull sides twisted and broke in a seemingly haphazard way. The hull beams are torn, and some appear to be missing from the wreck concentration. Beam ends probably became detached during the wreck, and the collapse of the hull sides reflected the nature of the bottom damage as the ship ground to a halt.

The historical documentation, of which the Preliminary Inquiry (conducted by Capt. W.N. Morrison June 6, 1947) is the most useful, gives some indication of the wreck events pertinent to the site formation process. The following is summarized from that document, which contains the testimony of 10 of the surviving crew members and officers. Most agree on the basic wreck sequence.

EMPEROR was underway at a normal running speed of about 11 knots when it struck Canoe Rocks. There was an initial "jar" and the ship continued to scrape along the rock for a short period. The Chief Engineer reported that the initial crash woke him up and he found the second engineer had shut off the engine because he had lost the the shaft or wheel; i.e., damaged the prop. The chief tried to turn the shaft with the engine, but there was no resistance. Immediately, the forward portion of the vessel began to settle. Indications are that there was an initial jolt and the ship continued sliding along or over rocks. It is not clear how long this occurred, but one testimony said "4 or 5 minutes, maybe longer, before coming to a complete stop." There was one report that stated there was a slight starboard list. About 20 minutes later the stern sank rapidly. The stern section broke and may have rolled to starboard and then to port as it sank.

Reconciling the testimony of the survivors and the material record gives an indication to what likely occurred during the wreck event. Additionally, historical photographs e.g., Detroit Free Press June 11, 1947) show the bow sank in just over 50 feet of water. The bottom of the pilot house was under water, indicating a 50-foot water depth.

The first contact with the Canoe Rocks reef must have been at the very stern. The ship came close enough to the reef to cause the initial "jar" and shear off the propellor blades. Investigations of the screw of EMPEROR reveal that the hub is bare; the blades have been sheared off (Scott McWilliam personal communication). This explains why the chief engineer had no resistance on the shaft when he attempted to restart the engine. It is interesting to note the contact with the reef was such that the rudder was not unshipped as is usual in wrecks. In fact, the rudder shoe does not appear to be bent at all, indicating there was no contact with the reef. The prop blades were sheared off and probably remain in the location of initial contact, yet to be found.

At the initial contact with the reef, the ship, which had now lost power, began to slow rapidly. Survivors said they heard the sound of the hull scraping along the rocks for some time, apparently minutes. When the ship stopped and rapidly began to sink, it went down bow first, indicating a side, rather than bow contact with the reef. The stern does not seem heavily damaged, so the hull must have been in contact with the reef in the area of hatches 6-13, the area of most damage.

Observations of the hull damage, which occurs mostly in the vicinity of hatches 6-13 from the bow, point to an initial contact with the reef along the starboard side, rather than a bow-on ramming of the rocks. A surprising aspect of the survivors testimony is the indication that the wreck was a series of jolts and scrapes, hardly what one would expect from the impact of a 525-foot vessel carrying more than 10,000 tons of iron ore moving in excess of 11 knots smacking into a rock reef. If the ship had hit in the bow the inertia would have carried it up onto the reef, and it could not have begun to sink in 50 feet of water. None of the survivors reported any shift to the stern as the vessel sank. According to testimony the pilot house was visible from the lifeboats as the survivors rowed away.

The evidence points to EMPEROR hitting Canoe Rocks on the starboard side of the hull with a glancing blow. The pilot error responsible for the wreck was a course change, which should have taken place at Trowbridge Light, being executed late. When the downbound course is plotted on a chart, it is evident that the later the change takes place, the more parallel the ship's course becomes to Canoe Rocks. The hull must have hit the rocks with a glancing blow to damage the prop blades first, and then sink bow first.

The hull broke as it sank, and, considering the relationship of the main hull pieces, it shifted to starboard. The rolling of the stern reported by some survivors is evidence that this occurred during the wreck event. The separated hull sides are closer together on the starboard side than on the port.

The breakup of the hull on the surface after the bow was down indicates some of the forces at work on the hull. The break happened after the hull was opened up sufficiently to rapidly sink the vessel. The hull bottom must have been nearly severed, putting the deck under considerable compression as the bow sank while the stern was still afloat. Some of the deck beams in the main damage area have been broken through the bracket plate on the port side. The rolling of the ship, and the hull twisting it represents, put tremendous torsion force on the hull. This force is evident in the way the hull sides in the main damage area are twisted both in- and outward. The hull sides tended to collapse after the support of the deck beams was removed.

The stack of EMPEROR was probably loosened as the stern twisted and sank. The stack is still attached and lying to port. It fell with sufficient force to partially collapse the roof and port bulkhead of the stern cabin (Fig. 5.67).

There is a crack in the bulkhead between the boiler and engine spaces. This, along with some of the natural collapse of wooden cabin bulkheads, has led some to add credence to the story of the boilers exploding. The boilers are intact. The common-sense notion that hot boilers explode when submerged in cold water has not been substantiated in the wrecks of Isle Royale. The boiler of CUMBERLAND is damaged, but the damage does not appear to be the result of an explosion. One of GLENLYON's boilers is broken up, as is much of the steel hull. The other does not appear to have exploded.

The notion of exploding boilers on sinking steamers has been around for a long time. It was reported by at least one survivor that the boilers of EMPEROR exploded (the night steward in <u>Montreal Gazette</u> June 5, 1947, see Chapter IV). The rapid quenching of the hot boilers and fires would probably sound like an explosion in the midst of the stress of a shipwreck. Observations of the boilers themselves indicate this actually rarely, if ever, happens. In the case of EMPEROR, testimony by W. Gallagher and Engineer on duty when the wreck occurred, indicated that the boiler steam was "practically at the blow-off stage," and direct observation of the boilers of EMPEROR confirm they did not explode.

The fact that boilers rarely explode during shipwrecks was also noted in the Lake Carrier's Association bulletin (1938:7):

> That boilers do not explode [during a shipwreck] has been known to Lake seamen ... for years. Any number of steamers that comprised the old wooden fleet, submerged in rather shallow water were found, when raised, to have boilers intact. In recent years we have had several marked examples [of the same thing] furnished by steel bulk freighters ....

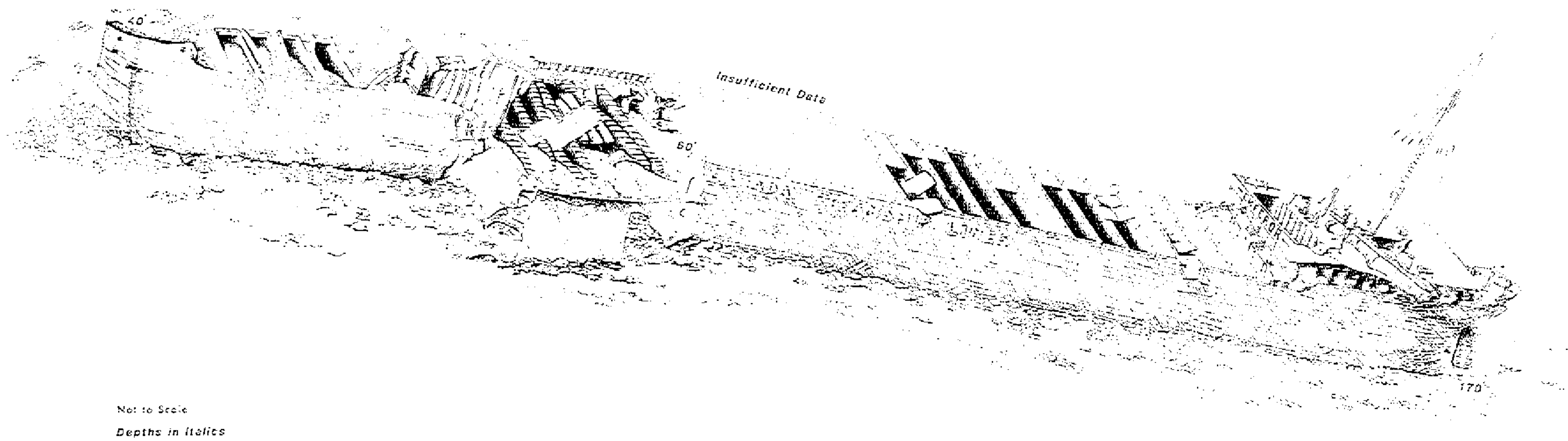


Fig. 5.62. EMPEROR, artist's perspective. Drawing by Jerry Livingston.

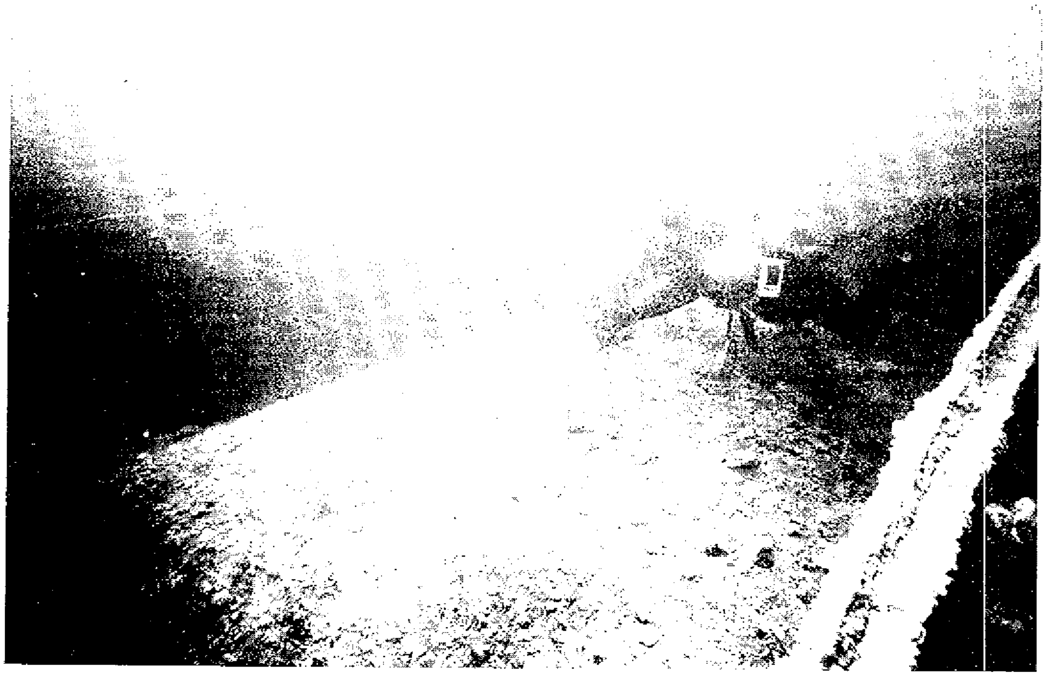


Fig. 5.63. Dan Lenihan examining the cargo of EMPEROR. The ship was loaded with more than 10,000 tons of Steep Rock Mine ore. NPS photo by Larry Murphy.

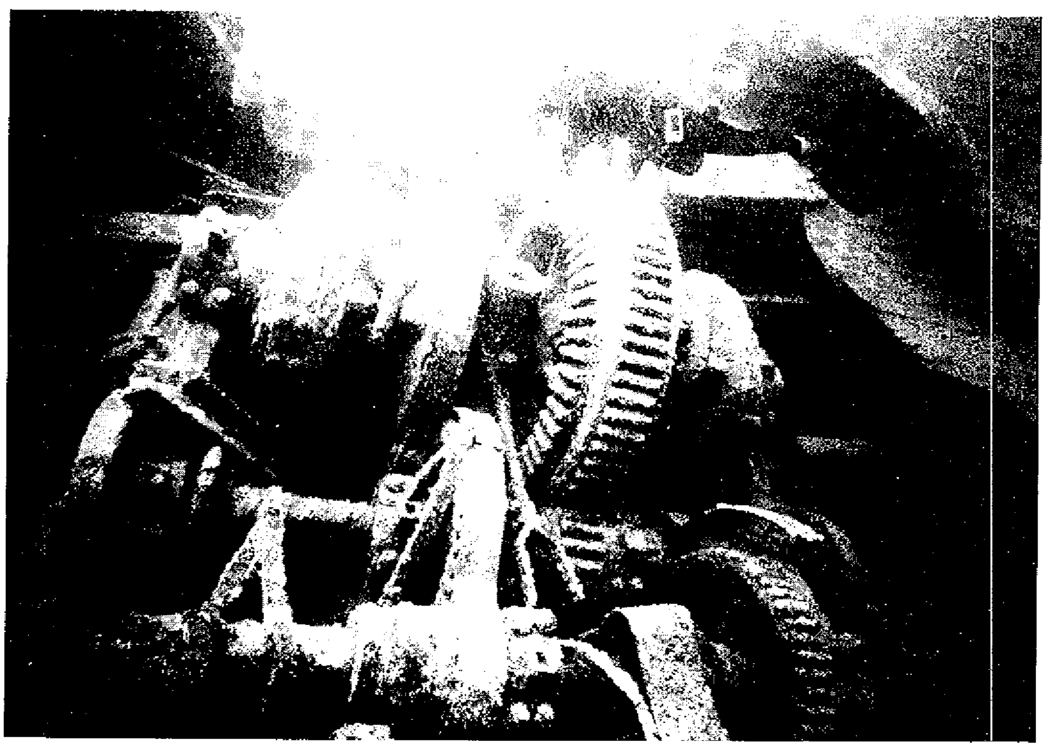


Fig. 5.64. Dan Lenihan recording the windlass of EMPEROR. NPS photo by Larry Murphy.

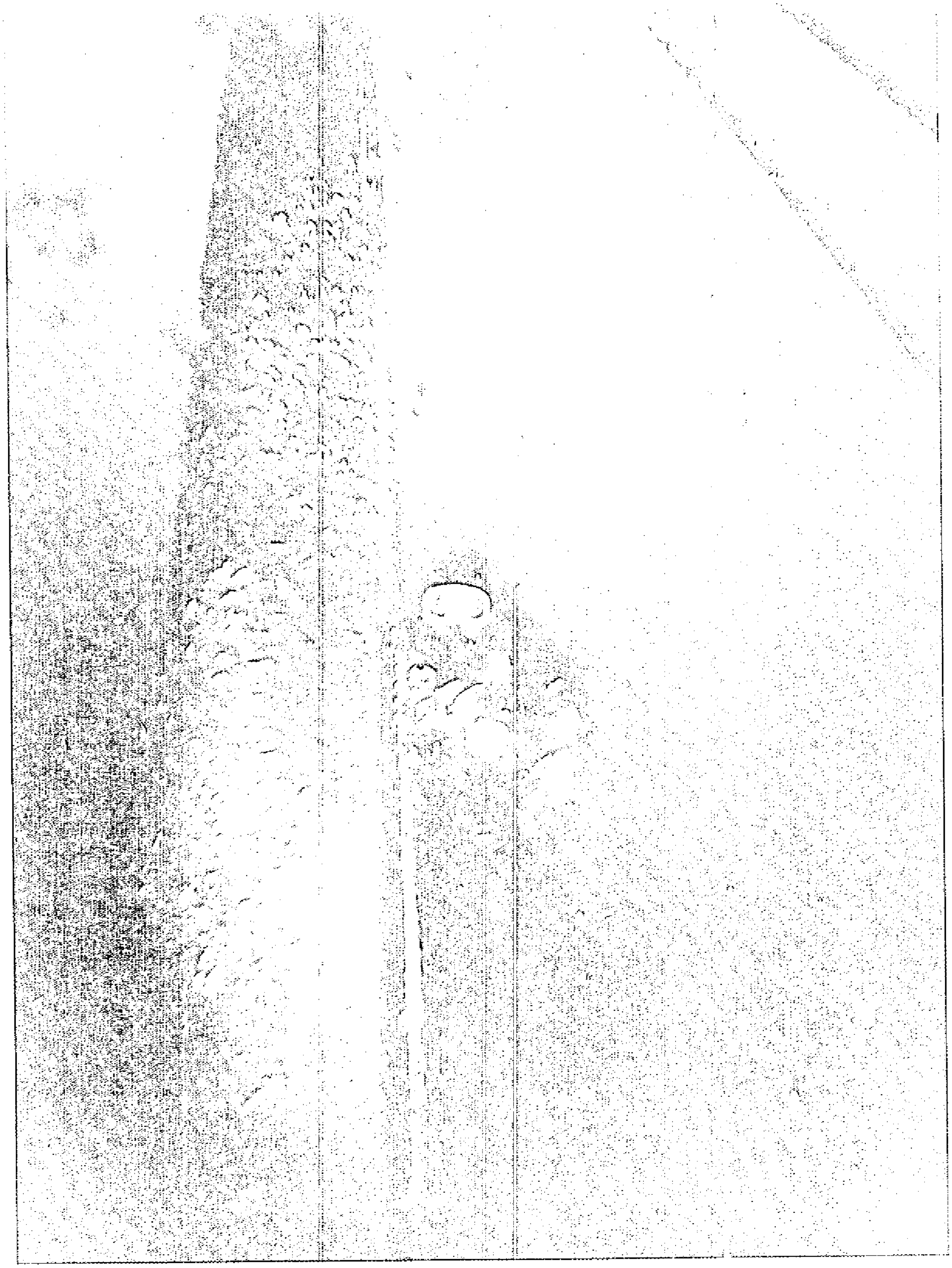


Fig. 5.65. Larry Murphy ascending the stern mast of EMPEROR. Mast has shifted to the stern and to port as a result of mooring dive boats to it. Port list is visible in photo. NPS photo by John Brooks.

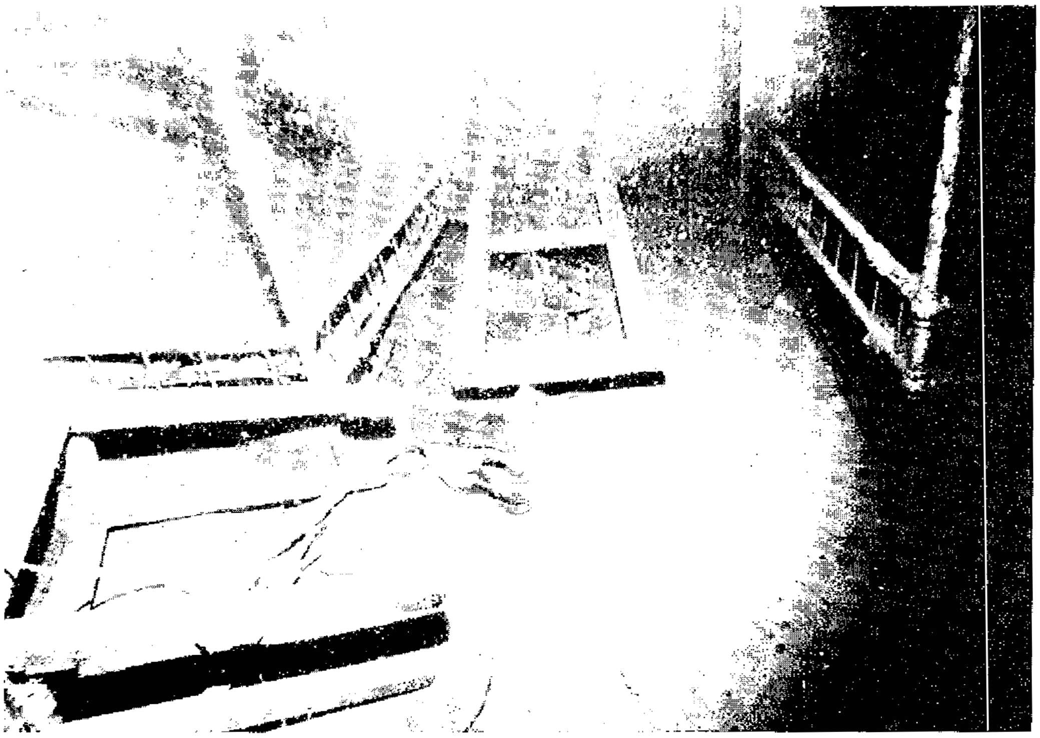


Fig. 5.66. View into the firemen's cabin, which is forward on the starboard side of the stern. There were three firemen lost in the wreck of EMPEROR. NPS photo by Larry Murphy.

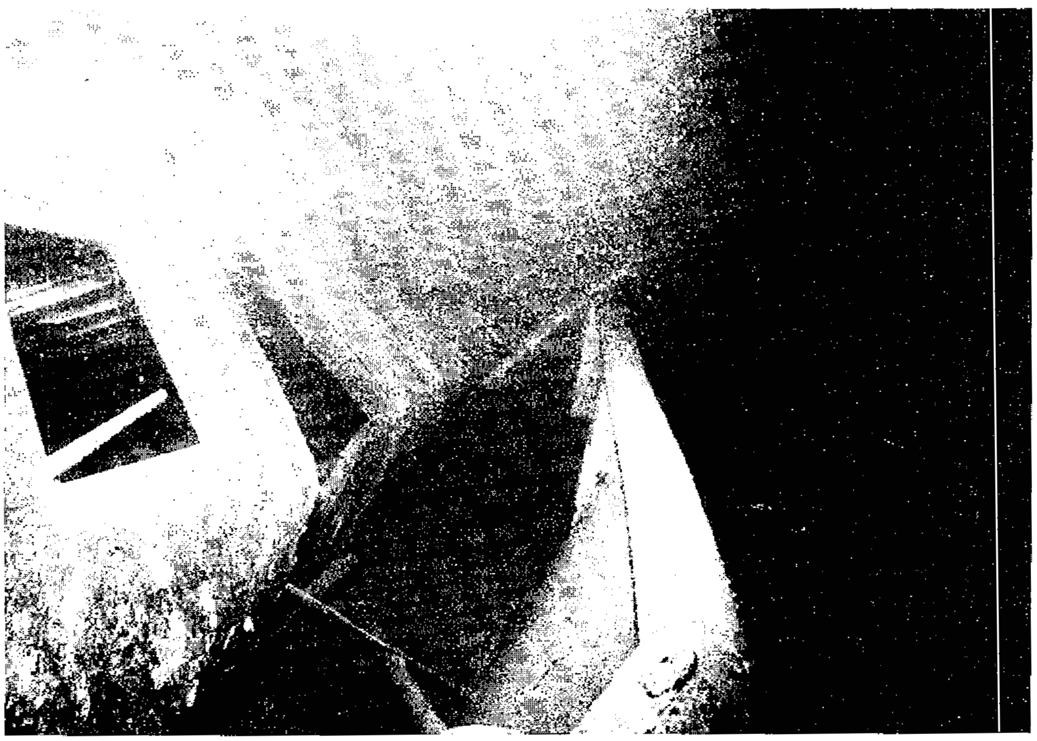


Fig. 5.67. Stern cabin of EMPEROR showing compression of the bulkhead as a result of the collapse of the stack. NPS photo by Larry Murphy.

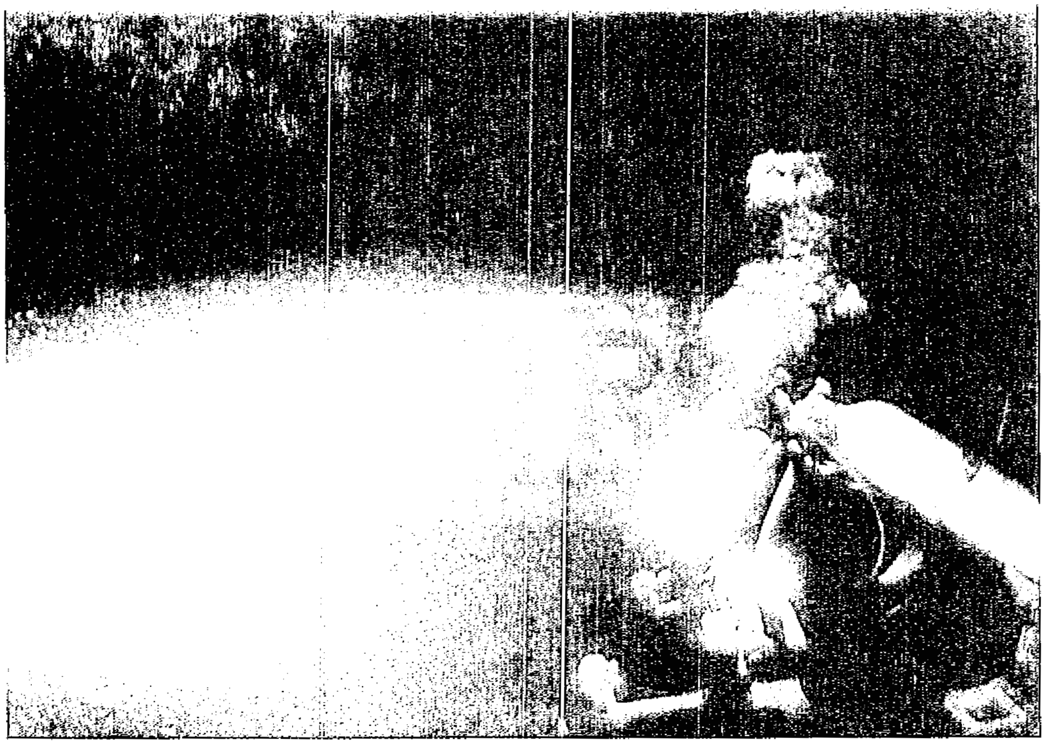


Fig. 5.68. Video operations operations on stern cabin of EMPEROR. Video diver – Larry Murphy. NPS photo by Dan Lenihan.

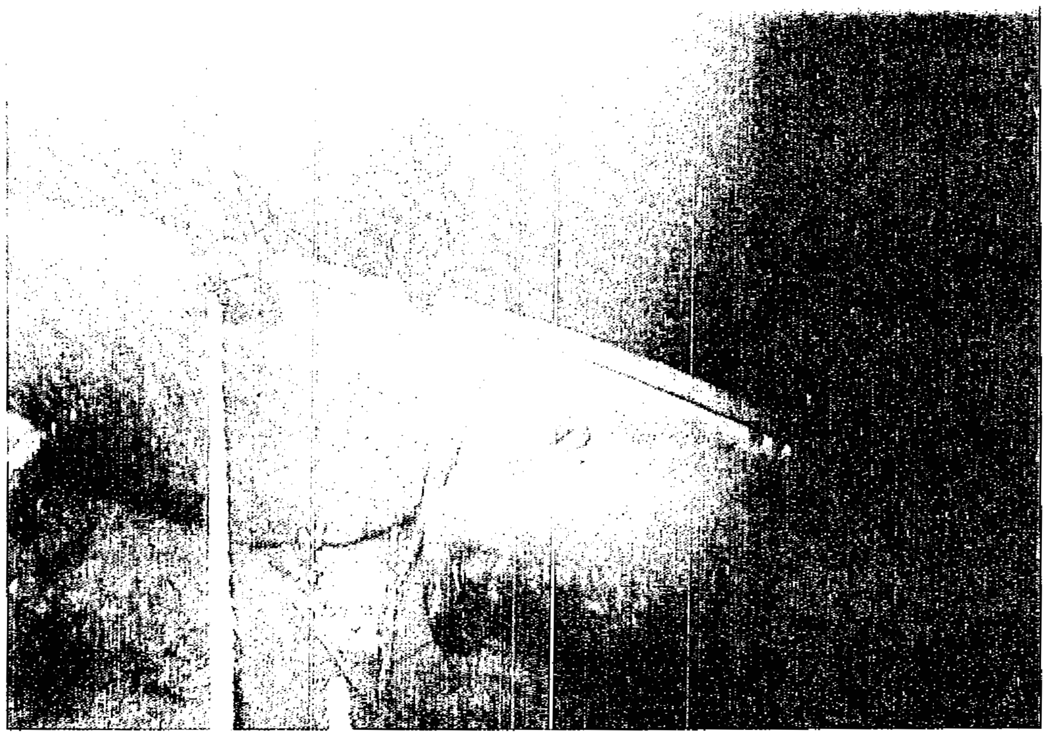


Fig. 5.69. Dan Lenihan examining the spare prop blades on the stern of EMPEROR. NPS photo by Larry Murphy.

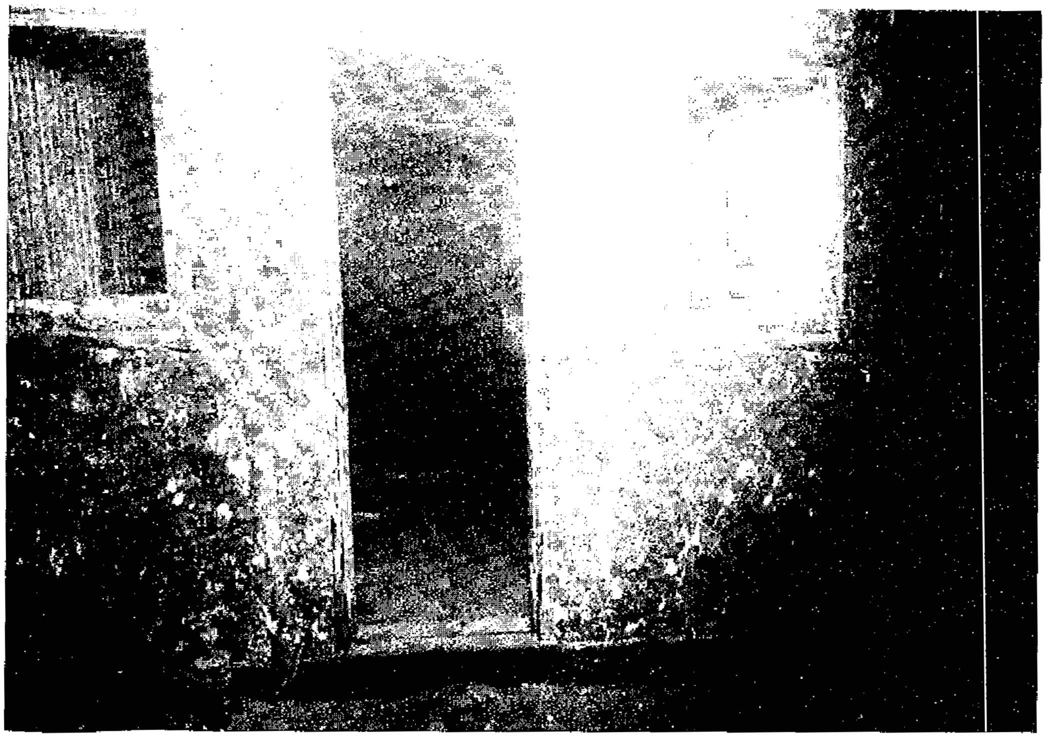


Fig. 5.70. Starboard stern cabins of EMPEROR, showing the state of preservation of Lake Superior shipwrecks. NPS photo by Larry Murphy.

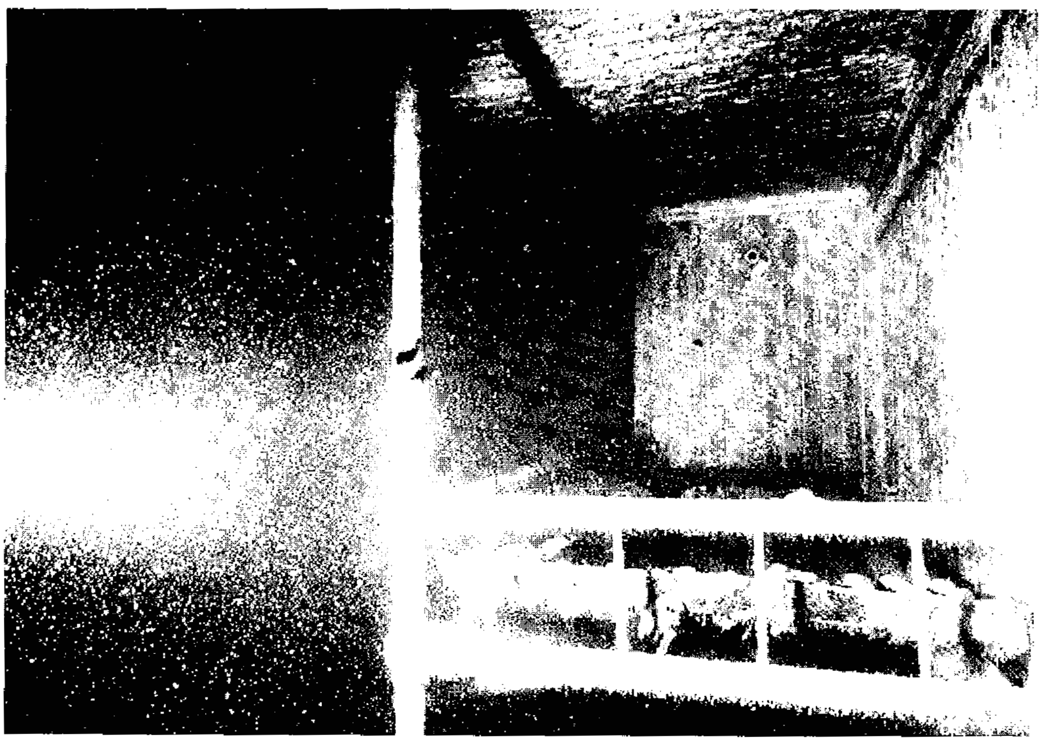


Fig. 5.71. Bunks inside the starboard stern cabin of EMPEROR. NPS photo by Toni Carrell.

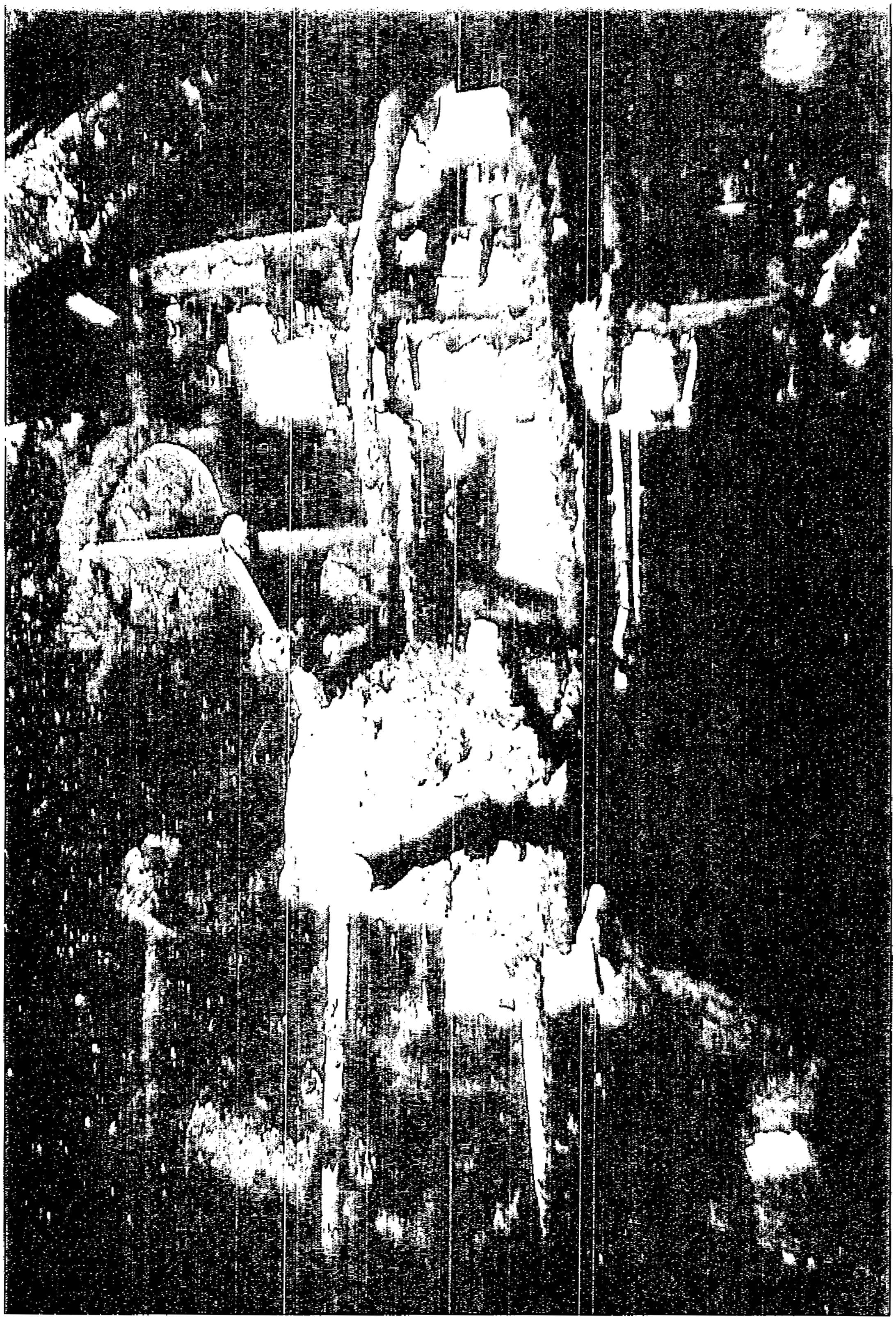


Fig. 5.72. Auxiliary controls of EMPEROR in engine room. NPS photo by John Brooks.

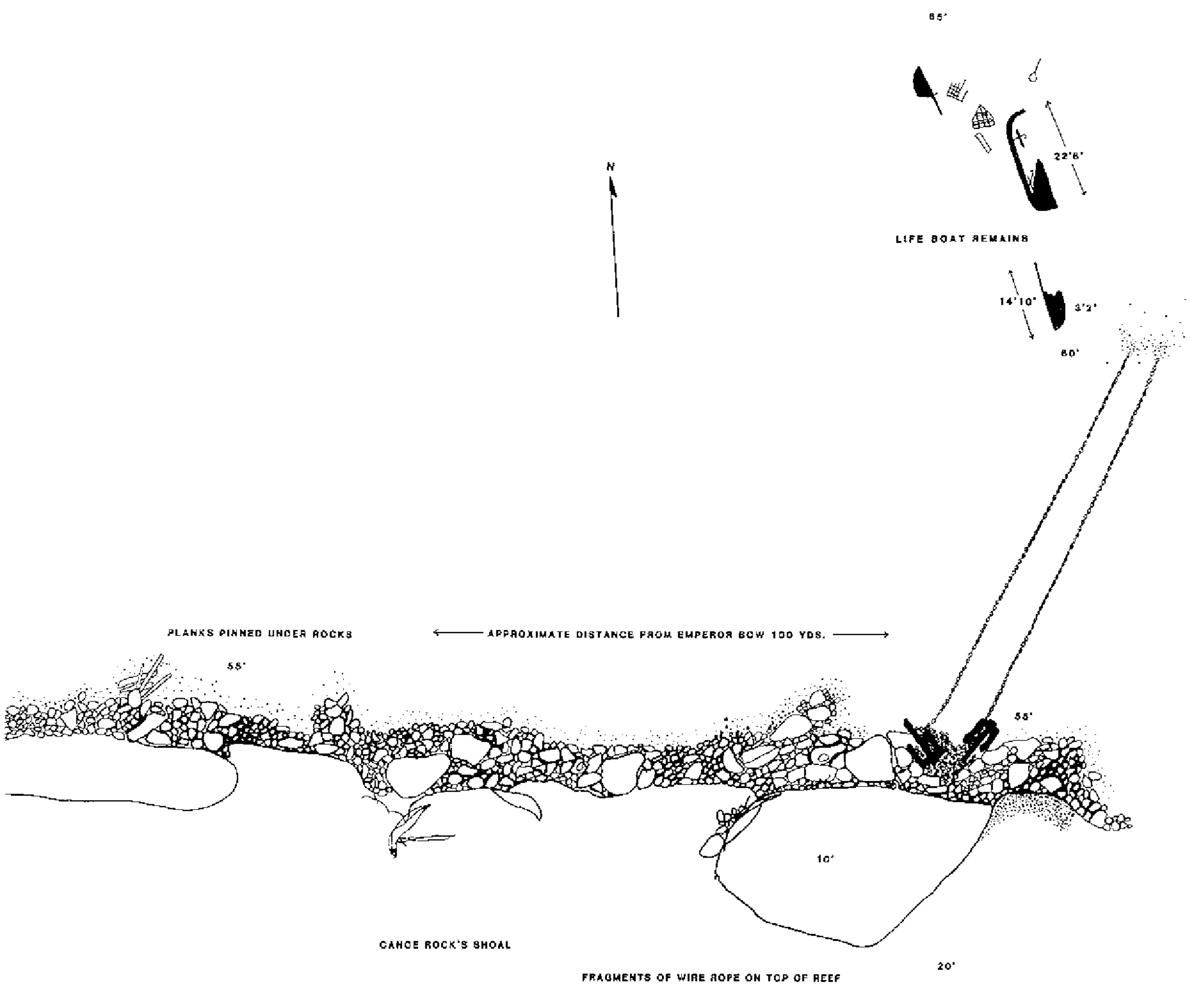


Fig. 5.73. DUNELM stranding site. Drawing by Scott McWilliam.

KAMLOOPS: SITE DESCRIPTION AND ANALYSIS

Site Location

KAMLOOPS is directly offshore from Kamloops Point (12 o'clock Point on older charts) on the north side of Isle Royale at the north end of Todd Harbor. The vessel's location is at 48°5'6"N and 88°45'53"W, which is 1.8 statute miles from the western tip of Hawk Island on a true bearing of 232 degrees.

Site Description and Analysis

As indicated in the historical record section of this report, the wreck site of KAMLOOPS is more shrouded in mystery than any other wreck at Isle Royale. It is a classic case of "went missing," where a vessel disappears during a storm leaving no survivors. Bodies were eventually found at Isle Royale and speculation, ranging from reasoned to wild, abounded for many years, but it became clear over the years that the historical record itself is never going to satisfactorily answer the question of what happened to KAMLOOPS. In August 1977, this became a question for historical archeology when KAMLOOPS was discovered by sport divers off of Twelve O'Clock Point at Isle Royale. There is now a material record to work with and, much as in the case of a pathologist working on the remains of what had been a missing person, the archeologists adopted the role of sleuth; inevitably balancing written and oral perceptions of the past (history) with the hard facts of what can be seen, measured, and felt.

So far, due to logistic and safety problems inherent in diving a site the depth of KAMLOOPS (the wreck lies at a depth ranging from 180 to 260 feet), we have only been able to attain tantalizing glimpses of the remains, but already they have been sufficient to permit rejection of several theories of what happened to the ship, and have suggested several new areas of inquiry. Let us review the major implications of the historic record that have bearing on reconstruction of the wreck event.

KAMLOOPS was last seen by those who lived to report their observations December 4, 1927. Three people saw KAMLOOPS from the bridge of QUEDOC, another Lake vessel that was itself in peril from sea and weather conditions. It was several months later that flotsam associated with the ship began to be recorded at Isle Royale These residues included human bodies, life jackets, portions of a lifeboat, and significantly, some pieces of spars that would have indicated that the ship itself, and not just a lifeboat full of survivors, had played out a final drama at or near Isle Royale. There is also a second-hand oral history account by a fisherman friend of Roy Oberg that the fog whistles could be heard blowing all night at the end of the island when the ship went missing (Roy Oberg personal communication to Labadie). Although this oral account may sound weak on the face of it, the authors of this volume have learned to take very seriously the oral accounts of Isle Royale "old timers." At least equal weight is given to their memories as is accorded to accounts of contemporary newspapers.

This still leaves the archeologist with only a few hard pieces of evidence. One knows from history that a ship went down, but that leaves the questions of where, when, and how. The where question was solved by empirical observations of sport divers in 1977. This reinforced earlier empirical observations by fisherman Milford Johnson Sr. that his nets were being caught in wreckage off of Twelve O'Clock Point and by Roy Oberg that his bottom scanner was indicating what looked like a shipwreck in the same area.

The question of when is not so easily dealt with, because any number of scenarios could have resulted in bodies and some spars being found at Isle Royale. Did the vessel go down in the violence of the storm? Did it lose power for some reason and drift into the island? Did it capsize from ice build up, or drift into the shelf ice and stay afloat near Twelve O'Clock Point for days, weeks or months?

The following are empirical observations made by the research team based on interviews with sport divers, deployment of remote operated vehicles in an NPS/National Geographic joint venture in 1986, and from personal observations of NPS divers who have briefly visited the site on several occasions. These will be treated as a material-evidence chain.

The largely intact vessel lies on its starboard site 400 feet from Kamloops Point with the bow pointing about 270 degrees on a magnetic compass bearing (Fig. 5.74).

Beginning from the stern, the following relevant factors have been noted. First we will consider those observations made by researchers through the eyes of the remote operated vehicle (ROV), which is our most reliable source.

1. Debris from the wreck, consisting of portions of the deck-cargo, was found two or three hundred feet shoreward of the ship, indicating it capsized there before settling in deeper water. The debris lies at the foot of a ten-foot deep ridge, but there is no solid evidence at this time the ship struck that spot.

2. The rudder and propeller do not seem to be damaged. The rudder is on the centerline and properly fastened at top and bottom, and there is no damage to the shoe. There is about 15-degree angle on rudder to starboard, but no evidence of grounding in this part of the ship.

3. Several of the scuppers in the stern had rubber hoses in them, probably indicating anticipation of a hard freeze. Hoses were ordinarily put in scupper pipes at time of winter lay-up to prevent bursting from extreme cold.

4. Davits on both sides were found empty; the port (upper side of wreck) davit has chocks still in place, some of the tackle still hanging in davits, guy-wires are also hanging. Both starboard davits are also empty, but the starboard life boat chocks are knocked down, indicating the probability that the starboard boat was intentionally launched. Historical records indicate that one boat was found near shore following the ship's loss, evidently the starboard one. The assumed port boat lies in about 230 feet of water near the wreck, where it seems to have fallen from the davits after the sinking. Because the ship appears to have rolled and slid down the slope on its starboard side, it may have had a starboard list for some time before its loss, which would have precluded use of its port lifeboat.

5. ROV entered and explored bunker or coal chute (not absolutely certain which of the two), but did not observe stack breeching at deck-level; the smokestack has been reported missing, but we were not able to confirm this. We observed coal in bunker or chute, which indicates that the vessel did not run out of fuel.

6. Several engine-room skylights were found opened, apparently by divers, and appear propped open on lower (starboard) side while held open by gravity on port (upper) side (Fig. 5.75). The skylight over officers' mess also reported accessible by divers, although this was not observed.

7. At least one door was found open on the port side of the after deck house, probably an entry to the pantry or icebox.

8. The engine seems intact from ROV observations, although the chain fall was missing from the traverse bar which is used for lifting the pistons. Cylinder heads were observed, but at this point there is a very tantalizing clue that could not be positively confirmed. At the extreme end of the field of vision of the remote operated vehicle, it appeared that the head may have been removed from the high pressure cylinder, leaving the bare studs exposed. Many reruns of the videotape of this portion of the ROV dive did not result in agreement on this observation by all the team. The importance of this point will be made clear in the analysis presented later in this discussion.

9. One human body was confirmed present in the engine room by the ROV. Reliable accounts by sport divers indicate there are more, with the number varying from two to five. The body observed and filmed by the robot vehicle seems to be in a sopafied state. This could not be confirmed by touch, but the appearance is white and appears textured. Adipocere formation is common for submerged corpses. This is a process in which soft tissues are converted into a soft waxy-type substance, frequently compared to soap. That this condition should still be noted after fifty years is remarkable, but apparently not unique, in the Great Lakes, since at least one other case on an Isle Royale shipwreck is known. Again, there is not convergence from viewers of the tape regarding the issue of whether or not the clothing has survived intact. Although common sense would suggest this to be the case, and some divers have reported that at least one of the individuals was wearing bib overalls, this is not confirmed by the ROV. It is clear, however, that decomposition was variable, neither the head nor feet remain on the corpse. The tibia and fibula of the legs extend out from the generic white mass of the body.

10. Divers have secured the emergency steering wheel with a padlock and chain (Fig. 5.76); lamps and compass are missing from after binnacle, although the hood is in place and appears not to have been tampered with.

11. Examination of the ship's hull near the bow shows serious damage to shell plating at the turn of the bilge on the port side, extending approximately fifty feet from approximately 65 to frame 50. The damage consists of dished and buckled plates and collapsed frames. The flat of the ship's bottom was not observed, but the damage did not appear to extend inward to the bottom. Although the damage was substantial, no ruptured plates were observed; the damage seen could account for leaks, but more than likely not massive flooding; other more serious hull damage is suspected. Inasmuch as the ship heeled over to starboard, damage on that side seems probable; this is further supported by the launch of the starboard boat, which suggests a starboard list, and therefore flooding on that side.

12. Portions of the ship's port side were viewed, and the freight gangways examined. Those observed were still secured and presumed to be watertight. Stern details were also examined, including the propeller and rudder, and then the hull was viewed for some distance forward of the stern. Damage to the shell plating was observed at the turn of the bilge on the port side, extending from approximately 18 to frame 32. The damage was similar to that found at the forward end, consisting of stove-in plates and frames forced in about a foot or two. No actual ruptures in the shell plates were observed. Some corrugation of bottom-plating appeared possible in the area, but was not confirmed.

13. Working toward the bow, little additional hull data was gathered, but the Mini-Rover was able to do a relatively thorough search of the forecastle and associated superstructure. The ship's pilothouse is missing, and it appears to have gone to pieces when the ship went down. Historical accounts indicate portions of the structure were found near the shore. The false-floor and all of the instruments were also missing, except for a single vertical stanchion in the center of the pilothouse, the framing for a stairway at the starboard-side after corner of the house, a spotlight from the roof, and a wood storage-box of uncertain use that was outside the house on the port side; both bridge wings are still in place. Lower portions of the superstructure appear undamaged; the texas deck was examined on the port side. Deck details, such as a sounding reel, mooring bitts, and rail stanchions, were observed. Examination of the structures offered no obvious clues about the vessel's loss.

14. Several features were observed indicating attrition from use by sport divers. Portions of the cargo had been stacked on the side of the ship, probably in preparation for removal (quart and gallon cans of paint in two crates), and the ship's two port-side navigation lamps were removed. It is not clear whether the navigation instruments were removed from the pilothouse, or were lost at the time of the sinking.

15. Examination of hull at the forward end also revealed a plume of mud covering stem and anchor-pockets, preventing the observation of anchors or chains. Several of the portholes in the port side of the forecastle were found opened, presumably as a result of storm damage; fastners for the covers were seen inside, and while they did not appear broken or distorted out of shape, it is not thought likely that the ports were opened intentionally. The letter "K" was also viewed on the ship's port bow, painted in white.

There are two other observations about the KAMLOOPS site that were made by sport divers, but not confirmed by this research team. If true, they may have a great deal of bearing on the reconstruction of the wreck event. The first is that at least one bow anchor chain comes out of the mud in which KAMLOOPS bow is buried and extends seaward some distance. The second is that when found by divers the ship's engine room telegraph was set to "Finished with Engines" (both ordered and answered in this position), which indicates that the machinery was totally shut down at time of loss.

Analysis

The above empirical observations can now be used as a chain of evidence in concert with the historical record to allow a much more educated discussion of the KAMLOOPS wreck event and the formulation of hypotheses that accommodate the most reliable aspects of the historical and material records.

1. Inasmuch as the ship lies at least fifteen miles from the nearest point where it would have been safe under prevailing conditions, it must be assumed that it was disabled at the time of its loss and not under command. No experienced mariner would have purposely navigated a ship to that vicinity with northwest winds at gale force coupled with poor visibility. The nearest shelter would have been either in Thunder Bay or back behind the island via Blake Point.

If the ship was disabled and drifting, its anchors should have been down; confirmation of the disposition of its anchors would provide valuable clues about the ship's condition at the time of its loss. Divers have reported that the ship's telegraph also shows evidence of the machinery being shut down (in "Finished with Engines" position); this, too, would substantiate the ship was disabled for some time before its loss. It would have been suicidal to let the ship lie so near a lee shore in the prevailing gale, if it could have possibly worked its way into open water.

2. If the steamer's high-pressure cylinder head was, in fact, removed, it would answer a basic question about the ship's loss: it would establish beyond a doubt that the ship was broken down from some hours before sinking, and it would explain why it ended up off Twelve O'Clock Point in so vulnerable and exposed a position. It would also suggest why some of the crew were at work in the engine room when the ship foundered. It would not explain the bottom damage.

Damage to the ship's hull is not surprising, but the nature of the damage observed is not easily explained. It is clear that the ship struck bottom, and it would be easy to conclude that it struck the ten-foot spot only a few hundred feet from where it rests, but that appears to conflict with the material record. The ship lies with its bow "upwind" relative to the conditions at the time of its loss, and probably at anchor. If its bow was kept into the wind (as any responsible master would have done), then it would have struck the shoal stern-first. We know that did not happen, as is evidenced by the sound condition of its rudder and shoe. To have struck on its port side, it would have come ashore bow-on or nearly broadside. That could have been done only if the anchors were not out, which seems unlikely. The probability is, then, that it struck somewhere else. If it can be assumed that KAMLOOPS struck subsequent to a breakdown, then the only place it could have struck is upwind, or some twenty miles away in the Welcome Islands.

The evidence seems to suggest that KAMLOOPS battled the storm all the way across Lake Superior, but suffered some disabling accident to its engine, perhaps to the high-pressure cylinder, just as it reached the safety of Thunder Bay. It appears to have drifted into shoal water, damaging its port side so that it began leaking and developing a starboard list. In that condition and with its pumps going, it drifted downwind all the way to Isle Royale's windward shore, all the time with its anchors down. It would have fetched up just short of the rocks, apparently settling deeper and deeper. With daylight, a portion of the crew seems to have been put ashore on the starboard boat, while the engineer and a few others stayed aboard to pump and attempt whatever repairs were possible. Fishermen reported hearing distress whistles blowing all through the second night (see Chapter IV). After lying off the north shore of the island for some hours, the ship seems to have flooded so much that it finally laid over on its side and went down by the bow, plunging down the underwater slope and into the mud. The smokestack is probably alongside the wreck in the debris field. This conjectural sequence explains what is known of the vessel's loss and its present condition.

In addition to the richer understanding of the vessel itself and the wreck process, several other remarks can be made from the archeological investigation that deal with past depositional processes and Park management considerations.

KAMLOOPS bears dramatic testimony to the preservation potential of deep shipwrecks in Lake Superior. The condition of inorganic and organic remains is astounding, significantly superior to what one may expect of the same ship and associated materials if they had never been lost, but tied to a dock in Duluth for fifty years. The siltation over the site is minimal, and apparently constant. The only active impacts to the site as an archeological/historical entity is the removal of certain enticing objects by sport divers.

One aspect of the past wreck natural deterioration process noted, but not expected, was the ridges of oxidization that nppeared most dramatically on the ship's propeller. This phenomenon may be evident on other metal shipwrecks in fresh water, but none of the authors of this volume have recalled seeing this in the field or in the literature. The only exceptions are observations made during deep dives on TITANIC, where these rivulets of oxidation formed dramatic displays and were called "rusticles" by the Woods Hole research team.

KAMLOOPS is, in the archeological sense, a treasure trove, since it composes not only an intriguing remnant of an historic event in Lakes history but because it contains a cross section of material culture that represents a synchronic snapshot of contemporary life in the region. "Package freight" is precious to the archeologist because it is a random reflection of subsistence needs. It is an intriguing place to dive, but there is some indication that its value as a time capsule for future generations will continue to diminish unless some restrictions are placed on access.

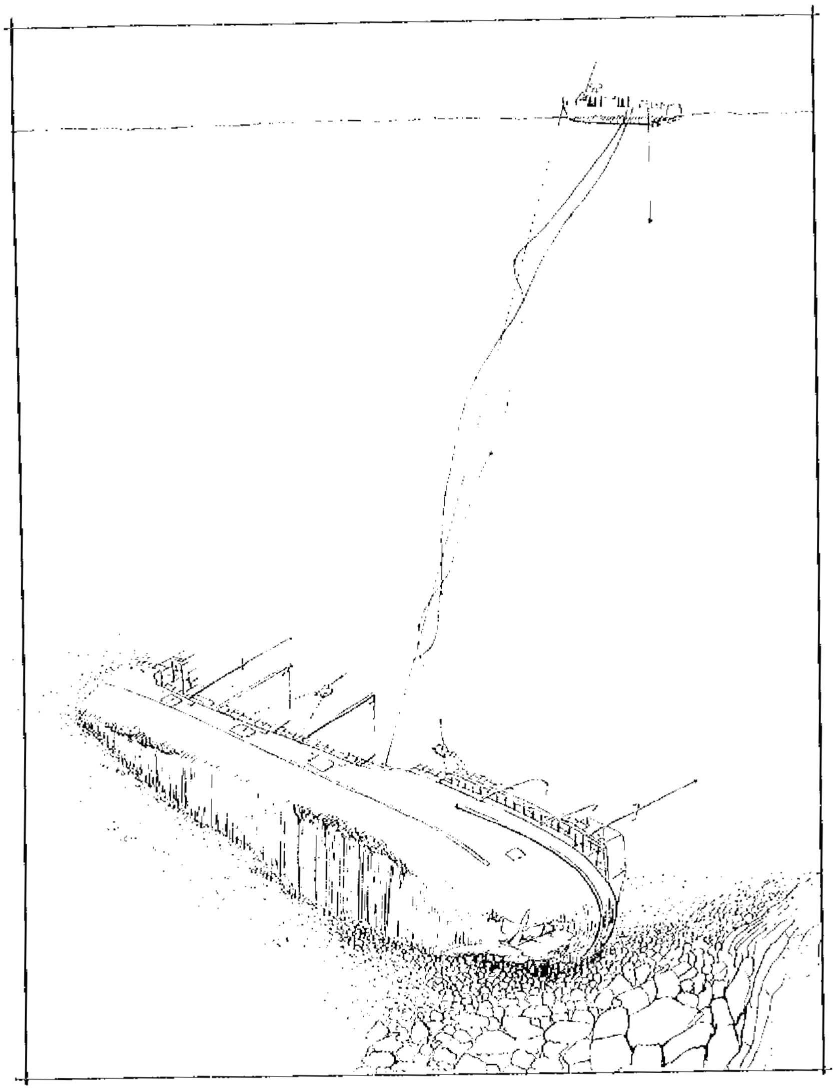


Fig. 5.74. a. KAMLOOPS, artists' perspective. Composite drawing by C. Patrick Labadie, Scott McWilliam, Jerry Livingston.

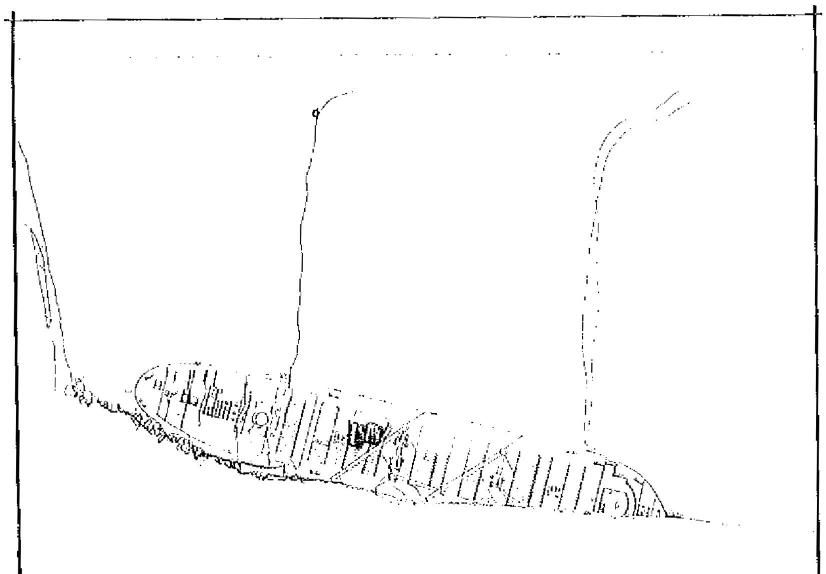


Fig. 5.74. b. KAMLOOPS, artist perspective. Drawing by Scott Mcwilliam.

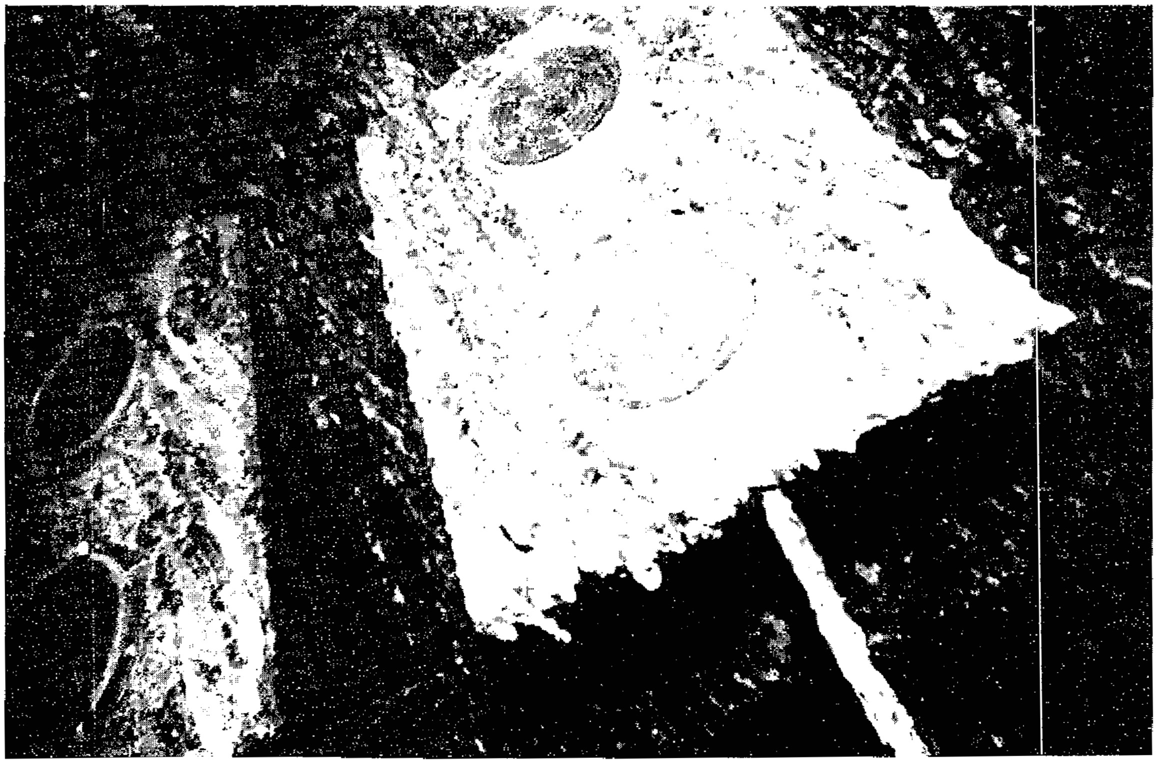


Fig. 5.75. KAMLOOPS' engine room skylights. ROV photo by Emory Kristof courtesy of National Geographic Society.

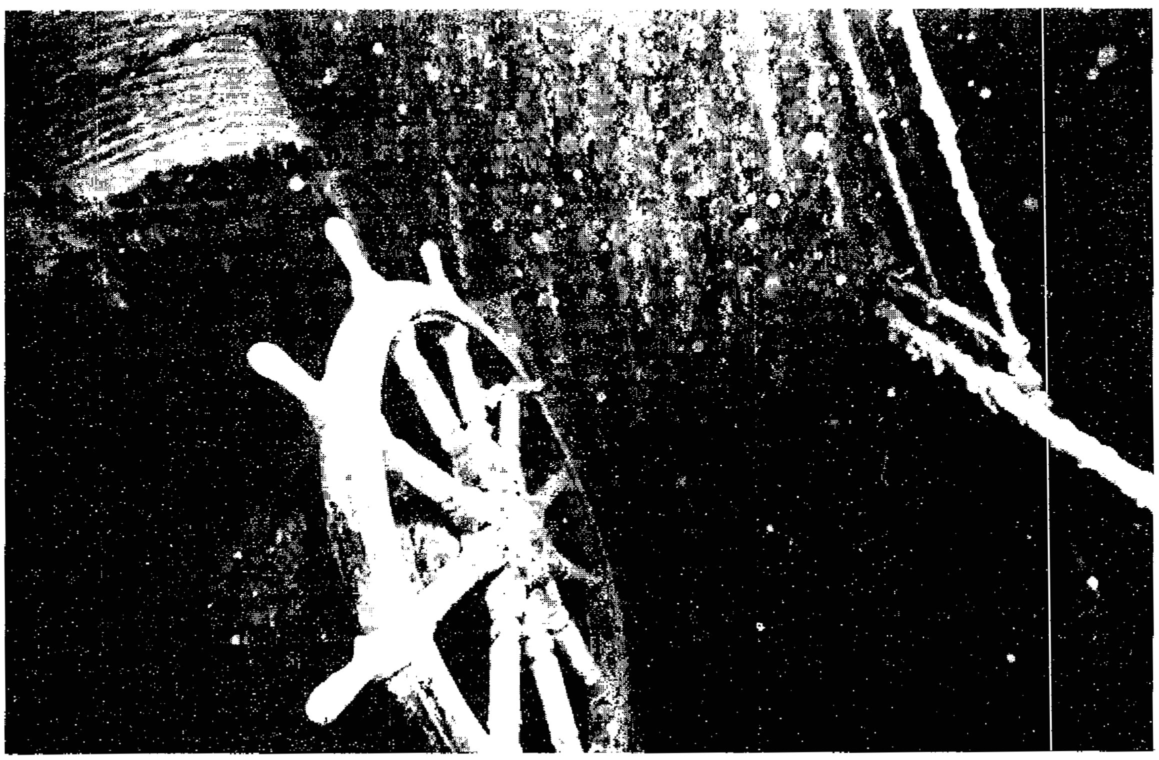


Fig. 5.76. KAMLOOPS' stern wheel showing chain placed by sport divers. ROV photo by Emory Kristof courtesy of National Geographic Society.

CHAPTER VI. UNDERWATER COMPONENTS OF LAND-BASED SITES AND OTHER SUBMERGED CULTURAL RESOURCES

Introduction

As the title implies, this chapter is devoted to a discussion of non-shipwreck sites. More specifically, the sites are water-related locations of human activity that, through accident or design, have cultural remains both underwater and on land. These maritime-based sites with their underwater components are an integral part of the history of Isle Royale. Since nearly every human endeavor at Isle Royale involved interaction with water, an investigation and discussion of only shipwrecks would present an incomplete picture of the island's full range of submerged cultural resources.

With that in mind, an effort was made during each of the five field sessions to examine underwater components of land-based sites and to include an overview of that class of resource in this chapter. The review presented here is intended to be neither comprehensive nor exhaustive, but representative.

Prehistoric sites were not included in this study because, to date, no prehistoric terrestrial sites with underwater components have been identified on Isle Royale. One isolated find of a prehistoric pot did occur in 1985 and is discussed in this chapter. Also it should be understood that this project was intended for documentation and evaluation of known sites; survey for new sites, of any type, was not a primary research objective.

Since the inception of the research at Isle Royale, Park managers have provided support for all aspects of the project, including the work on the underwater components of land-based sites. Assistance included boat and personnel support as well as access to research materials. Park staff interest in, and concern about, non-shipwreck sites has increased steadily. In the Spring of 1986 an order was issued by Superintendent Thomas Hobbs prohibiting diving on all land-associated underwater archeological sites (Superintendent's Orders, April, 1986). Investigation of any sort, including that done by professional researchers, can only be undertaken after obtaining special permission from the Superintendent. These sites were closed in order to provide maximum protection to fragile cultural remains. This order clearly demonstrates the continuing commitment of Park administrators to a program of comprehensive cultural resources management.

This chapter is organized into three major sections, a historical overview, discussions of individual sites investigated, and other known or suspected sites including a brief discussion of vernacular watercraft found around Isle Royale. The overview focuses on the range of human activities on the island from early historic exploitation up through present-day government-sponsored programs. It is designed to provide the historical context necessary to both evaluate and to understand the role that these human activities played in the story of Isle Royale

National Park and to outline the potential range of physical remains that may be found.

The discussion of the individual sites includes an examination of contemporary and Service-related impacts. National Park Service operations and the underlying management concept of maintaining the park as a wilderness area have affected the island and its cultural resources. Understanding the impacts to these sites is necessary for site analysis, evaluation, and interpretation. A brief historical background and description is provided for each site, along with a discussion of the physical remains located on land and underwater. Lastly, a discussion of research potential and management recommendations are provided.

The last section of this chapter is devoted to those sites where only a brief reconnaissance was conducted, to those areas around the island where research should be conducted to determine the presence/absence of cultural remains, and to a discussion of specific examples of small craft remains known to exist around the island.

Historical Overview

This section is presented in a loose chronological order by activity. The discussion of individual sites, which follows the overview, is similarly organized. The historic era of fur trade began on Lake Superior in the middle 1600s and continued well into the mid-1800s. Documentation from the Northwest Fur Company provides evidence of fur trade on Isle Royale by 1800. Commercial fishing gained prominence in Lake Superior and on Isle Royale in the early 1830s and continues, on a very limited basis, on Isle Royale today. Lake Superior copper was well known to prehistoric Indian populations and there is evidence to suggest that Isle Royale may have been mined as early as 2500 B.C. However, the historic era of mining on the island began in the early 1840s and continued intermittently until 1894. Lumbering occurred on a comparatively small scale on the island from 1874 to 1936, mostly in association with mining operations in the late 1800s. Tourism to Isle Royale began on a very limited basis in the 1860s. By 1900 it was becoming well organized and a number of established resorts were scattered around the island. Today it is the major human endeavor on Isle Royale. Finally, government-sponsored programs, such as the U.S. Light-House Service establishment of the first lighthouse on Isle Royale in 1855 and the involvement of the Civilian Conservation Corps in the early development of the fledgling national park from 1935 to 1941, have had a lasting and deep impact on the island.

Fur Trade

French exploration and trade into Lake Superior began as early as the 1630s. The route to the interior followed the Mississippi, the St. Croix, and the Brule to the western end of the lake. The first reference to "Lac Superieur" was the Jesuit Relation of 1647-48:

> Other Algonkins [live] still farther away, on the shore of another lake ... [which] before mingling its waters with those of our mer douce [Lake Huron], rolls over a fall [sault] that gives its name to these peoples [Saulteurs or Ojibwa], who come here during the fishing season. This superior lake extends toward the Northwest .... (in Nute 1944:21).

By 1658 the first fairly accurate map of the entire lake was available to French explorers, traders and missionaries. Isle Royale, called Isle Minong at this time, was well known and prominently displayed on these early maps.

Des Groseilliers and Radisson were the first to demonstrate the economic profit of trading in furs from the Lake Superior region. These two explorers had visited the interior on several occasions and in the summer of 1660 returned to New France with a cargo of furs that saved New France from economic ruin (Beckles 1900:14). Following the lead of Des Groseilliers and Radisson, other explorers and traders quickly began exporting beaver pelts to Montreal and Quebec.

Although Des Groseilliers and Radisson made every effort to demonstrate that the best route to the north and west of Lake Superior, and therefore the best furs, was through Hudson Bay and not through Lake Superior, they were ignored by officials in France and New France. In frustration, they turned to the English who, in turn, founded the Hudson's Bay Company in 1670, in direct competition with the French.

Much of the early French fur trade centered around the foot of Chequamegon Bay, and on the south shore of Madeline Island, in the present day Apostle Islands. By 1689, La Pointe, the location of a large Chippewa village and the site of Radisson's and Des Groseilliers' cabin of 1660, had become a major French trading center of Lake Superior (Nute 1944:31-32). In the meantime the English, using Radisson's and Des Groseilliers' route through Hudson Bay, had penetrated as far west as Mackinac, competing for both furs and the loyalties of the western Indian tribes.

The declaration of war between France and Great Britian in 1689 nearly brought the western fur trade to a halt. It wasn't until 1693 that trade begin again in earnest. At that time Duluth, Le Sueur, and Perrot had won the confidence and assistance of several of the western Indian tribes; the result was a flood of furs on the market. In 1696 the King of France revoked all fur trade licenses and effectively put an end to the French age of exploration and trade in their western empire (Innis 1930).

The treaty of 1713 between France and Great Britian merely finalized a policy that had begun in 1696 and effectively turned much of the fur trade over to the Hudson's Bay Company. Over the next 10 years three French posts were established around Lake Superior in an effort to maintain a small flow of furs to the east and some measure of control in the region. However, by the end of the French and Indian wars, the last of the French outposts had surrendered and the British had control of Superior (Nute 1944:33-36). From 1763 to 1783 the British dominated Lake Superior, even though it had been divided up between Great Britian and the United States. During this period British fur trade on Superior reached its peak. It was also during this period that Grand Portage was re-established by the British as a major trading post.

American influence on Lake Superior was tenuous in the early 1800s. The republic was seeking control of the Indian tribes that were economically and militarily tied to the British. The United States needed a trade system able to compete with the large British companies in order to take advantage of Indian trade dependence. In 1808, John Jacob Astor, a veteran of the fur business, received a letter from President Jefferson telling him that the federal government would assist American traders in every way possible in order to drive "foreign competition from this side of the Mississippi ... [in order to get the] whole of the fur business passed into the hands of our citizens" (Jefferson to Astor, April 13, 1808, in Humins 1985:24). That same year Astor founded the American Fur Company and set about to develop direct competition with the British.

Astor pressed his advantage and established operations at Mackinac Island and in the Pacific Northwest. This brought Astor into direct competition with the North West Company, a British-Scottish-Canadian amalgamation of partners and firms. By the time of the War of 1812, Astor had moved into a partnership with the North West Company and the small Michilimackinac Company, forming the South West Company. With the merger also came the North West Company's French-Canadian voyageurs, guides, and interpreters who had the skills necessary to navigate and survive in the interior, and who knew the Lake Superior country better than any other traders (Nute 1944:37-43). The South West Company had access to the British-held Hudson's Bay route to the east so Astor's fur trade operation flourished throughout the war (Humins 1985:24-25).

As early as 1806, the North West Company was running two schooners on Lake Superior in connection with their fur trade operations. In 1812 two additional schooners, appropriately named FUR TRADER and RECOVERY, were launched (Swineford 1876:1). At the outbreak of the War of 1812 the schooner RECOVERY was cached in one of the inlets on the north shore of Isle Royale (Lumby 1974:19). The vessel's captain, reported to have been Robert McCargo, worked for the North West Company from 1812-1815 (Lee 1983); presumably the bay that now bears McCargo's name was RECOVERY's hiding place.

Letters of the American Fur Company allude to North West Fur Company Metis and Ojibwa laborers fishing, and probably hunting, on Isle Royale. Lyman W. Warren's letter to Ramsay Crooks is the most direct mention of the North West Fur Company's operations on the island:

> ... Among Mr. Chapmann's crew here [at LaPointe] there is an old man who tells me that he knew the place well. He says the island is large, say 50 or 60 miles. The indians used to make their hunts there on account of the great quantity of Beaver and Reindeer [Caribou]. It is [also] the place where the N West Co used to make their fishing for Fort William. ... Some information might be obtained from Capt. McCargo (American Fur Company Letters 1834-1835; Warren to Crooks, February 16, 1834.)

Competition for the fur trade during and immediately following the war continued to be fierce. In 1816, largely through Astor's influence, an act was passed by Congress prohibiting foreigners from trading in American territory. Astor used the law to gain control of the South West Company in 1817, and immediately reorganized and renamed it the American Fur Company. Ramsay Crooks and Robert Stuart were put in charge of field operations, and the company moved to monopolize the fur trade in the Great Lakes region (Humins 1985:26). In 1819 Crooks wrote to Astor telling him that their rivals at Mackinac and Sault Ste. Marie were crippled and that traders at Green Bay, Chicago, and Prairie du Chein were coming under company control (Crooks to Astor December 4, 1819, in Humins 1985:29). During the 1820s the American Fur Company dominated the fur trade in the region.

As early as 1823, the American Fur Company began looking at Isle Royale as a possible base for future operations. After Crooks and Stuart assumed control of the company in 1834, several posts were established on the island, not for fur trade operations however, but for fishing. An agreement between the American Fur Company and the British-held Hudson's Bay Company limited the American Fur

Company to fishing only while allowing trapping by the Hudson's Bay Company from 1833 to 1847 along the Northshore (Nute 1944:48, Humins 1985).

References to North West Company activities on the island can be found in the American Fur Company Letter Archives (1834-1835). Indian and French-Canadian employees of the company knew Isle Royale well; the island was also well known to British fur traders. For almost a century first the French voyageur and then the British trapper navigated both Lake Superior's southern and northern shorelines, fishing and trapping among its many islands.

The full extent of fur trading on Isle Royale can only be surmised. Alfred C. Lane (1898:3) discussed several fur trade posts, while C. C. Adams (1909:389-390) was concerned about the impact fur trade had on the island's ecology.

> The location of the old trading posts is of interest because of their relation to mammal remains, such as antlers, which have been, and may be again found. Dr. Lane cites the location of several of these posts and others are given in the U.S. Land Office map by Ives; these different posts were located as follows:
>
> 1. Near Washington Harbor, Sec. 2, T63N, R39W, American Fur Co.
> 2. Head of Siskowit Bay, Sec. 2, T63N, R37W, American Fur Co. Trading post and fishery.
> 3. On the south shore of Siskowit Bay, Sec. 35, T64N, R37W, American Fur Co. Trading post and fishery.
> 4. Near Hay Bay, Sec. 24, T64N, R37W, Hudson Bay Co.
> 5. On the north shore of Fish Island [Belle Isle], Sec. 35, T67N, R34W, American Fur Co. Trading and fishing post.
> 6. Near Card Point. (cf. Lane,'98 p.3).
>
> It would be of considerable interest if the records of the fur companies could be examined for information bearing upon the original mammal fauna of the island (Adams 1901:389-390).

Isle Royale, presumably having limited numbers of prime fur-bearing animals suitable for the fur trade, could have been trapped out in a few seasons during the North West Company era. Camp sites would, at most, have been seasonal in nature and very likely limited to a few individuals. Possible evidence of the presence of fur traders in the late 1700s and early 1800s on Isle Royale was found underwater at Cemetery Island; no sites have as yet been identified on land. It is possible that evidence of fur trade activities might be found only underwater due to limited contact of this type on Isle Royale. Identification and study of these sites could provide insights into a short-term, seasonal, narrowly defined activity that is an under-represented site type on Isle Royale.

Fishing

Lake Superior was an active center of fishing from the earliest days of human habitation. The main reason for the development of Indian villages at Sault Ste. Marie and other locations ringing the Lake was the ready availability of fish. Travelers to the Sault invariably mention in their letters and diaries not only the skill of the Indian fishermen but also the excellence of the trout and whitefish they caught (Nute 1944:172).

Commercial fishing on Lake Superior was proposed as early as 1823 by Robert Stuart, an agent of the American Fur Company. In that year Stuart wrote to Ramsay Crooks "recommending that a plan be evolved for exchanging Lake Superior whitefish for the corn, cheese, lard and other provisions which the company bought in large quantities in Ohio" (Nute 1944:173). No action was taken on Stuart's proposition until 1834, when Crooks wrote of his hopes of adding Lake Superior fishing to the newly reorganized American Fur Company.

Active exploration of Lake Superior for good fishing grounds by the American Fur Company occurred between 1835 and 1837. Isle Royale received particular attention from Crooks. He wrote to one of his agents, Gabriele Franchere, to look at "a large island not far from and directly opposite Point Quiwinan", that is, Isle Royale, as a possible fishery (Nute 1944:174). Shortly thereafter, Crooks further instructed William Aitken, the company trader in charge of the Fond du Lac area to carefully examine the north shore and to make:

> A visit to Isle Royale, if practicable for you to go entirely round it, and examine it well ... [to] better enable us to determine where we ought to place permanent posts for the fisheries (Crooks 1835 in Nute 1944:175).

Fisheries were established by the American Fur Company at Grand Portage, La Pointe, Sault St. Marie and Isle Royale between 1835 and 1837. While the first American Fur Company fishery on Isle Royale was established at Fish Island [Belle Isle] in 1837, the Northwest Fur Company had fished Isle Royale prior to 1800. Archeological evidence suggests that the Northwest Fur Company, referred to in a letter by Crooks in 1835, had a fishing station on the north shore of Isle Royale, possibly on Amygdaloid Island or Belle Isle (American Fur Company Letters 1884-35). There is also documentary evidence of a North West Fur Company fishery operation in Siskiwit Bay:

> When Mr. Aitkin was here he mentioned to me some information he had obtained from somebody in Fond du Lac who had been in the N. W. Co. service relating to a remarkable good Whitefish fishery on the "milieu" or "millions" Island .... It is the place where the N West Co used to make their fishing for Fort William. There is an excellent harbor for the vessel and it is there where the largest Whitefish are caught in Lake Superior .... (Lyman W. Warren to Ramsey Crooks, February 16, 1834).

The Isle Royale fisheries were the most productive operated by the American Fur Company. The first two fisheries were established on Belle Isle and Checker Point (1837). By the time of Franchere's visit in 1839, several additional fisheries had been established at Card Point on Grace Island, the general area around Hay Bay, Rock Harbor near the Siskowit Mine, Merritt Island and Grassy Point, and the Paul Islands. The locations of these fisheries were discussed by Franchere in the journal of his voyage on BREWSTER in 1839 and documented by Ives in his survey of 1847.

Between 1837 and 1841, the fisheries of Isle Royale produced 2,000 barrels annually, from all of the stations, while the Grand Portage station's annual production was only 300 to 500 barrels. By 1839 nearly 5,000 barrels of fish were coming out of the Lake Superior fisheries. An overabundance of farm produce and limited sales after 1839, resulted in the collapse of the fishing industry. The American Fur Company was forced to quit the fishing business in 1842 and closed all of its fisheries in Lake Superior that same year (Humins 1985).

Fishing on Isle Royale did not cease with the abandonment of the fisheries by the American Fur Company. Ives reported observing independent fishermen occupying many of the fur company stations during his 1847 survey. Independent fishermen continued to pursue their activity on Isle Royale throughout the 1850s and 1860s. Wright Island and Belle Isle were permanently occupied by fishermen as early as 1866, and at that time the Washington Harbor area was producing 1500 barrels (Glenn Merritt oral history tape). Lake Superior experienced a boom in commercial fishing by 1880. The Bayfield fisheries employed more than 250 men and more than 300,000 pounds of fish were caught and processed from the western end of the Lake (Nute 1944:181–183). Fishermen from Bayfield, Duluth and Houghton camped and fished around Isle Royale, and contributed thousands of barrels of fish each season to the market (Rakestraw 1967a:9)

Commercial fishing in Lake Superior and around Isle Royale flourished until the 1920s. Grace Lee Nute summarized the decline of Lake Superior fishing in the 1920s:

> From a commercial point of view the Whitefish had become virtually extinct along the American shore and was present in appreciable numbers only around the Apostle Islands and in the vicinity of Whitefish Bay. The catch of 1922 was only 380,000 pounds ... in 1885 ... it had been 4,571,000 pounds. Trout had increased ... to 4,954,000 in 1903, and then declined to 2,833,000 in 1922 .... Whitefish was being caught in only a few spots along the Canadian shore [in 1922]. [They] had dwindled to an alarming extent. Laws regulating the mesh size of gill nets and establishing closed seasons were chaotic and missed their purposes because adjoining areas varied so completely (Nute 1944:185–186).

Isle Royale fishing suffered the same problems as the rest of the Lake. As fishing declined, many abandoned their traditional way of life on Isle Royale and adopted new occupations. The establishment of a national park on Isle Royale further reduced the numbers of commercial fishermen on the island.

When the National Park Service established Isle Royale as a park there were approximately 45 fishermen scattered around the island. Initially, there was little sympathy from the National Park Service for permitting the fishermen to remain. Eventually, however, the Service began to appreciate them.

> The fishermen shacks and occupants are definitely a part of the Isle Royale picture, and with certain minor restrictions will not interfere with fishing by Park visitors (Shevlin 1937:6).
>
> They are excellent guides for park visitors, reliable as fire fighters or workers when employed by the Park Service, and their presence on the Island is, in my judgment, an asset (Baggley to Director, July 28, 1937).

The conflict between commercial fishing interests and the traditional administration of National Parks, that permitted commercial activities only related to official functions, remained unresolved until the 1940s. In the interim, Baggley made informal arrangements with the fishermen.

> They all had to receive permits, establish Michigan residency, and pay rental fees on buildings, docks, and other government-owned facilities. No new owners were allowed into the business, although sons could carry on their fathers' work. Similarly, no expansion could

> take place. The companies that bought the fish continued under special permit. Finally, fishermen were allowed to operate as guides under NPS control (Baggley 1937, in Little 1978:172.)
>
> ... for long range purposes, Baggley suggested that only 20 to 30 resident families be granted fishing privileges. They would be required to comply with all regulations and encouraged to improve their properties with salvage materials. He recommended that all operations "remain primitive in character and not be expanded or mechanized." Finally, he suggested that sanitation and maintenance standards be set and enforced (Little 1978:176).

In June, 1945, the Department of the Interior published regulations dealing with the commercial fishing on the island that closely mirrored Baggley's recommendations (National Park Service 1945). The regulations enabled fishermen and their children to remain in business on a long-range basis.

The appearance of the sea lamprey in the early 1950s was a blow to commercial trout fishing in Lake Superior. The lamprey had no natural predator in the lake so it was able to multiply unchecked, to the detriment of the trout population. As a result of the restrictions placed on catching trout, fishermen shifted to herring, which required more preparation than trout and sold at a cheaper price. The combination of general decline in fish populations in the lake, restrictions on trout, and low herring prices, resulted in economic hardship for many Lake Superior fishermen.

Isle Royale fishermen were also affected by the lamprey. Commercial fishing for lake trout was severely curtailed around Isle Royal because of the rapid decline of the species. At one point in the early 1960s only one fishery on the island was permitted to take trout, and those were collected for sample purposes (Rakestraw 1968:23). It was not until the mid-1960s that a solution to the lamprey problem was found. A chemical, placed in lamprey spawning grounds, killed the parasitic eel but did not adversely affect commercial fish. By 1967 the numbers of lake trout had increased sufficiently to allow fishing for the species under a strict quota system. At that time there were only six active fisheries on Isle Royale (Rakestraw 1968:23).

Today only three families still hold fishing permits for Isle Royale, none of which are commercial licenses. Trout fishing around the island, other than for sport, is limited to the gathering of fish for research by the federal and state fisheries biologists in an effort to improve management and protection of the species.

Fishing operations around Isle Royale span nearly a 200 year period that began with the Northwest Fur Company's exploitation of the north shore of the island prior to 1800 and continues up to the present day, with the seasonal occupation by fishing families with research permits. Nearly all of the settlements, particularly after the 1850s, had crib docks, a necessity around the island to facilitate loading and unloading of fish catches, supplies, and people. The range of materials that could have been lost or purposely thrown away directly offshore of the fishing stations include everything from old, unusable equipment, to fish barrels and later boxes, pickling jars, hand tools, small boats, anchors, household items, clothing, food tins, and snuff jars, to name a few. These items can provide a unique insight into the daily lives of the earliest commercial fishermen on Isle Royale through the last commercial fishing families on the island.

These sites represent a unique opportunity to study the diachronic progression of a narrowly defined activity, in a small community of people, from its simple beginnings, through its heyday on the island and in Lake Superior, and its subsequent decline.

Mining

Exploitation of copper veins in the upper Great Lakes region by prehistoric Indian populations probably occurred as early as 2500 B.C. (Bastian 1961, 1963; Barrett 1926; Crane and Griffin 1961; and Dustin 1930). Artifacts of copper, traced by mineralogical analysis to the Great Lakes, have been found in both in New England and south into the Mississippi valley (Fitting 1970).

Prehistoric mining on Isle Royale is also likely to have occurred as early as 2500 B.C. Evidence collected by Bastian suggests that there may be 100 fissure and 1500 to 2000 prehistoric lode mines on Isle Royale alone (Bastian 1961:i).

When French explorers entered the upper Lakes region in the middle 1600s, they were told stories of widespread copper deposits. As early as 1660 the French were aware of the existence of copper in the Lake Superior region (Boucher 1664, in Canadian Royal Society Proceedings 1896:99-168). In 1665 the Jesuit priest Claude Allouez was instructed to look for copper when he visited the lake. When describing Lake Superior and the surrounding country, he stated:

> ... farther to the west, on the same North side, is found the Island which is most famous for copper, and is called Minong; this is the one in which the savages have told many people, the metal exists in abundance, and in many places. ... It happens frequently that pieces of copper are found, weighing from ten to twenty pounds. I have seen several such pieces in the hands of savages; and since they are superstitious, they esteem them as divinities, or as presents given to them to promote their happiness by the gods who dwell beneath the waters (Jesuit Relations, Vol. LIV, in Hakala 1955:11)

The emphasis on the fur trade in the upper Lakes, hostilities with the Indians, and the difficulty of reaching and then mining the copper, retarded exploitation of this resource. It was not forgotten, however. In 1710 the Intendant of New France, as the region was then called, wrote:

> It is almost certain that there are copper mines on the borders of this lake [Superior] and in the islands within its extent. There are found in the sand pieces of this metal, which the savages make into daggers for their own use .... They claim that the island Minong and small islets in the lake are entirely of copper (New York Collections Documents, ix, 865, in Hakala 1955:14).

It was not until 1727, however, that the French were able to set up and operate copper mines in the upper Lakes. In 1733 La Ronde built a small vessel at the Sault for copper transport and mined copper at Ontonagon, Black River, and at the mouth of St. Anne's River [Iron River]. Indian wars and problems with the British prevented the French from further pursuing copper exploitation through the early 1760s. In 1763, with the signing of the Treaty of Paris, the French signed over their lands to the British.

The British began active exploitation of the northeast coast of the Lake Superior region by 1769. Mine cave-ins and diminished returns resulted in a cessation of operations in 1772. It wasn't until the 1830s that interest in copper mining began again. Douglass Houghton published a report in 1841 describing the copper deposits on the south shore of Lake Superior. The first modern copper mining on Lake Superior was conducted by the Pittsburgh and Lake Superior Mining Company, near Copper Harbor, in 1844 (Nute 1944:165).

Mining on Isle Royale began in earnest shortly after the opening of the Keweenaw mines, although the presence of copper on the island was well known prior to the mid-1840s. By 1846 several mines had been established on the island at various locations. The Smithwick Mine was opened in 1843 to the east of the present Rock Harbor marina. About the same time Philo Scoville opened a mine inside the fingers of the point that now bears his name. The Siskowit Mining Company carried out explorations on the island in 1844, but did not sink a shaft in Rock Harbor until 1846. Later this same company explored the north shore from Washington Harbor to McCargoe Cove and opened a silver and copper mine near McCargoe Cove. The American Exploring, Mining, and Manufacturing Company conducted explorations on Amygdaloid Island in 1846. Later this company may have been reorganized into the Amygdaloid and Isle Royale Mining Company with operations north of Minong Ridge.

Several additional mining operations were initiated on the island in 1847. The Ohio and Isle Royale Company established the town site of Ransom at the western end of Rock Harbor, the Pittsburg and Isle Royale Company opened a shaft and established Haytown Mine at Todd Harbor, and the Chicago and Isle Royale Company established a short-lived settlement in Hugginin Cove. William Ives reported on the Datolite Mine operations south of Wood Lake (Ives 1847). This operation has been attributed to both the Ohio and Isle Royale Company and the Amygdaloid and Isle Royale Mining Company (Rakestraw 1967:36).

By 1850 only the Pittsburg and Isle Royale Company and the Siskowit Mining Company were still operating. The Pittsburg and Isle Royale Company's last year of operation was 1853, while the Siskowit Mine continued to operate until 1855, when it too was closed (Rakestraw 1965:5-8).

It wasn't until 1871 that a resurgence of mining activity occurred on Isle Royale. While previous operations had been plagued by low profits and poor quality ore overall, the onset of the Civil War and the need for copper drove prices up sufficiently to make speculation in the metal profitable.

The North American Mineral Land Company began purchasing land on the island in 1871 and soon owned more than 70,000 acres, comprising much of the island. The Island Mining Company, backed by Quincy capital as was the North American Mineral Land Company, was organized in 1873 and established a settlement at the western end of Siskiwit Bay (Rakestraw 1965:13).

The Minong Ridge area, exploited prehistorically, received attention from three companies from Detroit, the Minong, the Cove, and the Ancient Mining Companies. In 1874 the Minong Mining Company and the Cove Mining Company obtained title to lands along Minong Ridge to Chickenbone Lake from the North American Mineral Land Company. Eventually all of the lands held by the Cove Mining Company were obtained by the Minong Mining Company. In 1875 the Minong Mine was established (Rakestraw 1967:43-48).

The Saginaw Mining Company began operations in 1877 at the site of an earlier exploration of the Ohio and Isle Royale Company. By 1879, however, all of the mines had closed as a result of diminishing production and poor quality ore.

For the next 10 years virtually no mining occurred on the island. In 1889, a British syndicate, the Isle Royale Land Corporation, purchased a total of 84,000 acres from both the North American Mineral Land Company and the Minong Mining Company. In 1890 a subsidiary company, the Wendigo Copper Company was formed to look for copper in Washington and Todd Harbors. The town of Ghyllbank was established that same year in Washington Harbor. Despite the use of sophisticated diamond drills and extensive exploration, copper in sufficient quantities was never found and the Wendigo Copper Company began selling off its holdings in 1892. A local paper editorialized:

> This ends the last attempt to find a mine on Isle Royale. It is probable that a million dollars has been spent on this island in fruitless explorations .... It may safely be said that there are no paying deposits on the island (Engineering and Mining Journal, 1892, in Rakestraw 1965:16).

In all, the mines of Isle Royale produced more than 490 tons of refined copper. In 1874, a mass of copper weighing nearly 3 tons was found on the island and exhibited in the 1876 centennial exposition in Philadelphia. While this may appear impressive, the majority of the ore found on the island was low grade, and produced less than one percent of copper per ton mined (Nute 1944:166).

Mining operations on Isle Royale spanned more than 4300 years of intermittent activity that began with the early Indian populations around 2500 B.C. and continued until nearly 1900 A.D. Physical evidence of prehistoric exploitation is scattered across the island. No underwater remains of this early copper mining have yet been definitively located, although evidence probably exists in the form of submerged pits with associated stone tools.

Virtually all of the historic mining settlements had crib docks, a necessity to facilitate the loading of ore and unloading of equipment, supplies and personnel. The range of materials that may have been lost or discarded immediately offshore of these settlements would reflect the full range of material culture required to support industrial operations and to provide the necessities of life for the mining population. These settlements represent a unique opportunity to examine the synchronism of early industrial sites in small, isolated communities during both the early and late 1800s.

Lumbering

Sporadic lumbering and isolated sawmills were operating throughout the Lake Superior region as early as the 1830s. These mills supplied local markets and were generally confined to supporting the needs of developing communities. It was not until the 1840s and 1850s, however, that lumbering in the Great Lakes region began moving from local supply to a wide spread commercial market. The introduction of steam-powered mills and other improvements facilitated lumbering on a large scale, but it was the demand for white pine that was the impetus for market growth. By the 1870s, supplies of white pine had nearly been exhausted in the eastern states and companies began looking toward the Lake states to fill their needs. The demand for white pine came not only from the east, but also from the midwest where population centers were rapidly expanding and materials were needed for construction.

Lumbering followed a similar pattern throughout the region. The early centers were adjacent to the railroads, that is in the lower part of the states, and gradually moved northward. The period from 1880 to 1925 saw the peak of lumbering activity on Lake Superior. Logging on the south shore occurred primarily between 1880 and 1900, while the north shore saw the greatest activity during the 1890s.

Upper peninsula lumbering lagged behind the rest of the state, and in comparison never produced the quantity of lumber that was logged from lower Michigan. Menominee, Escanaba, Grand Marais, Sault Ste, Marie and Ontonagon were among the top producers. In 1881, the Ontonagon Lumber Company began large scale logging and milling, erecting a mill that could produce 200,000 board feet of lumber and 300,000 shingles daily. The largest single producer in the lower peninsula was the Diamond Match Company of Grand Haven with a production of 75 million board feet and 30 million shingles annually (Nute 1944:196).

Lumbering in the Duluth-Superior area reflected the boom-bust cycle of the rest of the region. While mills were erected and cutting began in the mid-1850s, the general economic downturn of 1857 nearly brought the market to a halt. Construction of a railroad to the far west, commencing in Duluth, revitalized the market in the late 1860s. It was short lived though, and the panic of 1873 deadened the industry until the 1880s when lumber was again in demand. Between 1880 and 1883, eleven sawmills were constructed in the harbor, however it wasn't until 10 years later that the industry really began to take off. In 1892, fifteen mills were operating in Duluth alone, with capacities from 5 to 40 million board feet of lumber annually (Nute 1944:199). The Ashland and Bayfield region had an annual production of more than 265 million board feet of lumber.

In Houghton County the greatest demand for lumber came from the mining companies. The Calumet and Hecla Mines ordered 2,600,000 board feet of lumber and 13,000 railroad ties in one year. As mining boomed in the upper peninsula the demand for lumber remained steady.

Isle Royale saw limited lumbering in the period between 1870 and 1890, and that which did occur was in support of mining operations on the island. The Island Mining Company had a small mill set up in Siskiwit Bay to support Island Mine; the Minong Mining Company's saw mill, set up in McCargoe Cove, provided lumber for the mine, the construction of a railroad and a small community. In 1889, the town of Ghyllbank was established in Washington Harbor as part of the Wendigo Mine operation. Construction of the island's most elaborate town was accomplished with timber logged from the western end of the island.

By the early 1900s, the lumber industry was on the decline. In 1899, 462 million board feet of lumber was shipped from Duluth; that figure dropped to approximately 447 million board feet by 1906. In 1915 it dropped below 200 million board feet and by 1919 it was below 100 million. By 1923, just over 11 million board feet of lumber was produced and only one mill was still operating in Duluth in 1925. Portable mills began taking the place of the large stationary mills. Construction of highways along the Northshore and the rise of the trucking industry supplanted movement of lumber by rail or boat. Fires swept through smaller stands of less profitable timber and slash, leaving charred and unusable land. There were fires on the north shore in 1850, 1878, 1910, every year from 1913 to 1918, 1920, 1922, 1923, 1915 and 1926

(Nute 1944:204). After 1926 lumbering on a large scale in the Lakes region declined steadily. Less profitable stands were examined more closely and short-lived camps were set up in an effort to extract lumber from these areas. By 1940, the cut was one-tenth of the 1890 cut (Mason 1956:7).

In 1935, the George Mead Lumber Company established a camp at the western end of Siskiwit Bay on Isle Royale. This was probably the most extensive operation on the island. The company hired 200 men and constructed more than 17 structures to support their operations. Roads and a crib dock were built, and logging covered nearly 15 square miles of the interior. The camp was abandoned in the spring of 1936. At about this same time the CCC entered the Great Lakes region and began the process of removing slash and charred stumps from previous fires. In 1936, the first CCC volunteers on Isle Royale had cleaning up slash from the Island Mine and Mead lumbering operations as a priority.

Lumbering operations on Isle Royale between the 1870s and 1890s supported a mixed community. Schools, warehouses, offices and boarding houses were built in centrally located areas and were geared toward long-term operations. Men and their families often lived year-round on the island. Unlike their turn-of-the-century predecessors, lumberjacks at the Mead operation were single men residing in tar-papered shacks scattered throughout the proposed cut area. The main camp supported only the camp administrator, the foreman, the doctor, nurse, radio operator, head mechanic, and a few helpers and cooks. The bulk of the laborers were scattered throughout the cut area, removed from the "comforts of camp life" (Cochrane 1978:2). The operation was intended to be intensive, short-lived, and focused strictly on extracting as much timber as possible. The lumberjacks routinely left only one or two trees standing in an entire cut; that tree was for protection against charging moose.

While there are obvious differences between the settlements, reflected by their long- and short-term goals and the social milieu created by the companies, they were similar insofar as they were small industrial communities functioning in near isolation. Adaptive strategies aimed at coping with isolation are comparable, i.e. the construction of support facilities such as docks, warehouses, and offices. However, the daily routines and the lives of each would have been quite different; the lumberjacks living in widely-scattered shacks in all-male groups and the miner-jacks living with their families in a central community. Most of the visible remains of these communities have been obliterated, although each had extensive wharfs and other shoreline facilities. The range of materials that may have been lost or discarded offshore of these communities should reflect the full range of materials needed to support industrial operations. However, those material remains that can be associated with the comforts of life should be quite different, or possibly non-existent from the Mead operation. Comparative analysis of these sites represents an excellent opportunity to examine processes of adaptation to specific sets of environmental and social circumstances.

Tourism

Among the earliest literature describing the beauty and wonders of Isle Royale was John R. St. Johns' "A True Description of the Lake Superior Copper Country", published in 1846. Johns described the mining development as well as the general scenery of the island and its recreational possibilities (in Hakala 1955:63). Although Isle Royale was becoming well known for its beauty, as well as its economic assets, tourist visitation to Isle Royale did not occur with any regularity until late in the 1880s.

Before the turn of the century, John F. Johns operated a small resort business in the Washington Harbor area, at the western end of Isle Royale. Johns began fishing out of Washington Harbor in 1885 and shortly thereafter obtained title to two small islands, i.e. Barnum and Johns Islands. By 1898 he had built several small cabins and a building for dining and sitting; the Barnums of Duluth were among Johns regular guests (Hakala 1955:64). Later Johns encouraged William Booth to use a larger boat on the runs from the mainland to Isle Royale; one that could accommodate both passengers and fish, and assure guests at the resort.

Edgar Johns, John F. Johns son, relates the following story about the early resort business in the Washington Harbor area:

> ... he [John Johns] went up and saw Booth. The Booth Company was going strong on Lake Superior at that time, so he got Booth to put on a passenger boat. They used to have only a tug running down there just hauling fish, no passengers, unless they wanted to stand on deck and ride in the cold. So Booth, he put on the old T.H. CAMP[1]. He took her from Bayfield or somewhere over there ... and she was not more than half the size of the AMERICA, but she had passenger cabins on top, a certain number. They put her [CAMP] on for a couple of years. Well, she started to bring tourists so then my father got Booth to take her [CAMP] off and put on a bigger boat ... so they put the old steamer, the IRON DICKSON (sic) ... and Captain Heckter was the captain of her ... and he took on Ed Smith as chief mate. And Captain Smith, he was English ... and his mother was an Indian ... was chief mate.... When Captain Heckter got too old he retired, and Captain Smith took over, and he ran the AMERICA ....
>
> ... Well my father ran that summer resort for a good many years ... then my father talked to [Walter Singer] about coming into Washington Harbor. [Singer] said yes ... they were going to bring people back and forth.
>
> So I've seen my father stand on the dock there ... and tell the purser "no more people, I can't take them" and the deck would be full of them up there, wanting to get off .... Well that went on for a number of years, but my father and mother got too old, they couldn't do it any longer .... So my father went and talked to Walter H. Singer, and he said "why don't you take over now, and put a hotel in Washington Harbor. Well Singer thought it over and he thought it would be a good idea, so he spent eighty thousand dollars right on the big island there [Washington Island] .... Singer built a good hotel there, a good hotel.

---

[1] T.H. CAMP was later lost in what is now Apostle Islands National Lakeshore. Her certificate of enrollment states she was "Lost on Lake Superior, November 16, 1900. Foundered near Ashland".

The Singer Hotel, on Washington Island, prospered from 1904 through the mid teens. During that period, five passenger boats, originating in Port Arthur, Duluth, Grand Marais, Houghton, Apostle Islands and Saulte Ste. Marie, had Singer's resort as their destination. The resort accommodated nearly 200 tourists a season during its peak years of operation (Wolbrink and Walling 1937:15)

Elsewhere on the Isle Royale, other fisherman had similar ideas to Johns and a number of resorts were established. In addition, by the early 1900s private parties of campers from Duluth were coming to Isle Royale and staying in the abandoned Rock Harbor Lighthouse at the other end of the island (Lane 1898).

Gust Mattson established his resort in Tobin Harbor, at the eastern end of Isle Royale, just after the turn of the century. He operated the resort from 1901 until 1910, when it was sold. Eventually, the property was purchased by the Smith family who ran it until the 1930s, when it was acquired by the National Park Service (Glen Merritt, oral history tape).

Tourist Home, located on Davidson Island within Rock Harbor, was established around 1903 by Eric Johnson. Johnson, like Mattson, was a fisherman by trade.

> He had the main house, dining house, and a lot of little 10 by 12 cottages. And I can remember when the AMERICA would come, he would get the passengers off and the freight and so forth, then he'd say "Vell, now I t'ink I go build another 10 by 12". So he'd go up on the island, get some lumber together and build another 10 by 12. He had a little string of them along the island, little 10 by 12 sleeping cottages ... (Glenn Merritt, oral history tape).

The Davidson family of St. Paul bought the resort from Johnson and operated it until sometime in the late teens or early 1920s (Glen Merritt, oral history tape)y By the time of the Wolbrink and Walling report on resorts, in 1937, the operation was evidently out of business. It was not covered in their evaluation and was not mentioned as a defunct operation.

Belle Isle Resort, located on the north shore of Isle Royale, opened its doors in 1914 (Glen Merritt, oral history tape). During the teens and twenties, the resort flourished and was considered a "going operation" at the time of NPS acquisition in the late 1930s (Wolbrink and Walling 1937:2). Owned and operated by Fred Scofield, the resort was considered one of the best on the Island.

Commodore Kneutson established a resort along the south shore of Isle Royale, at Rock Harbor, shortly after the turn of the century. He operated a small camp called Park Place at the present location of Rock Harbor Lodge (Hakala 1955:64). Kneutson built a number of small cabins, and the resort enjoyed moderate success. Kneutson's daughter, Bertha, took over operation of the resort in 1922 and re-christened it Rock Harbor Lodge (Hakala 1955:64). Bertha Farmer ran a successful resort, as a sole proprietorship, until it was acquired by the National Park Service in 1938.

The only private club on Isle Royale was located in Washington Harbor. The buildings were originally constructed by the Wendigo Mining Company in 1889. Twenty acres of land and several buildings were eventually purchased by Colonel Charles H. Graves in 1902, and the Washington Club organized. In 1931 the main club house along with the servants' quarters were destroyed by fire; the club continued operation until acquired in 1938 by the National Park Service.

The visitor situation took a turn for the worse when, after acquisition by the National Park Service, two major resorts on the island slated for continued use, Belle Isle and Rock Harbor, along with the Windigo Inn, built in 1940, were placed under the management of Bertha Farmer. Farmer, "a charming hostess", did not take the same interest in the other resorts as she had in Rock Harbor. When the operation of the resorts was reviewed by a National Park Service official, it was discovered that Farmer had violated minimum wage laws, had arranged for sub-contracts without government approval, was inconsistent in lodging rates, and was serving meals that were considered mediocre. Problems with the resorts were reduced when National Park Concessions, Inc., took over management of all of the facilities in 1942 (Little 1978:152).

Boat transportation from the mainland was a critical element in tourism to Isle Royale from the very beginning. At one point, between 1910 and the late 1920s, more than five vessels were making regular trips to Isle Royale, with the various resorts as their destination. By the time the island was acquired by the National Park Service, the depression, irregular boat schedules, and the reputation of dangerous waters had taken its toll on visitation. Although there were three large pleasure cruisers that visited Isle Royale as an intermediate stop in the early 1940s, passenger transportation to the island remained irregular. The situation worsened when the cruisers reduced scheduled runs to the island and, in one case, was lost in a fire (Little 1978:141-148).

Irregular boat transportation plus the advent of World War II further impacted tourism to Isle Royale. The Belle Isle Resort and Windigo Inn were both closed in 1943 and were not re-opened until 1946 and 1948, respectively. Belle Isle was closed down again in 1947 and Windigo Inn was permanently closed in 1972 (Little 1978:153-154). The only resort that continues in operation today on Isle Royale is Rock Harbor Lodge.

From the late 1890s well into the 1930s, summer residences were established in scattered locations around Isle Royale. Many of the families purchased small islands that now bear their names. When Isle Royale was being acquired by the National Park Service, many of the private land-holders sold their properties outright to the government. Still others obtained life-leases. Limited tourism, in the form of life-lease summer residents, continues into the 1980s.

During the heyday of resort operation and tourism on Isle Royale each of the various lodges and summer residences, of necessity, were forced to construct crib docks for the loading and unloading of passengers and freight. The docks, at even the smallest resort and island residence, not only accommodated the many steamers that briefly stopped, but they also served those visitors who arrived in privately owned vessels. A less conspicuous use of the dock areas was as a dump for unwanted items. Without exception, the docks around Isle Royale's resorts and summer homes became a repository for everything from wash basins and water pitchers, fine china and tableware, champagne and wine bottles, snuff tins and perfume bottles, to a variety of personal items taken by travelers on vacation. The resort docks were also a place where the various passenger boats could easily dump their discards.

The cultural remains that can be found offshore around the historic resort docks span a period from the late 1890s through 1952, when the Windigo Inn was closed. The docks around summer residences contain material remains that extend the continuum up to the 1980s. The materials that are deposited on the bottom represent both the ordinary and mundane, as well as the lavish and expensive, which are often overlooked by historians as well as contemporary writers. These items can provide an insight into the daily lives and personal values of early fishermen turned resort owners, tourism entrepreneurs, vacationers seeking relief from allergies and the pressures of the depression and World War II, and those enjoying new economic wealth and growth following the war. In essence, the artifacts are clues to the lives of people during a time of rapid social and economic transition in the first half of the twentieth century.

Government-Sponsored Activities or Projects

Beyond the establishment of the National Park Service on Isle Royale, two government-related activities share prominence in the history of the island. The first is the U.S. Light-House Service, later becoming the U.S. Coast Guard, and the second is the Civilian Conservation Corps. Both had a deep and lasting impact on the development of Isle Royale.

The following overview of the U.S. Light-House Service on the Great Lakes draws heavily from O'Brien (1976) unless otherwise indicated.

U.S. Light-House Service: When the first U.S. Congress met in 1789, one of their earliest actions was the creation of the Light-House Establishment. Responsibility for the service was delegated to the Secretary of the Treasury. Supervision of the service alternated between the Secretary of the Treasury (1789-1792), the Commissioner of the Revenue (1792-1802), back to Treasury (1802-1813), and back to Revenue (1813-1820). In 1820, Treasury once again assumed the responsibility for the lighthouses and continued to manage them until 1853.

While it is not clear which lighthouse was the first one established on the Great Lakes, the U.S. Light-House Establishment made its appearance on the Lakes sometime between 1809 and 1820. The earliest lighthouses on the Lakes were at Presque Isle, Buffalo, and Niagara Fort Light (U.S. Light-House Establishment 1866).

In 1851, Congress directed the Secretary of the Treasury to appoint a board to review the Light-House Service and its activities. The board made a study of the Service's work and accordingly recommended that the system be completely reorganized and a permanent supervisory board be established. The creation of a board was discouraged by Treasury officials, who felt that the appointment of a single officer would be the most practical. Despite Treasury's recommendation to the contrary, Congress passed legislation creating the Light-House Board on August 31, 1852 (U.S. Light-House Establishment 1871).

Under the administration of the Light-House Board, the Service was divided into twelve districts, each with a lighthouse inspector. The Great Lakes became the tenth and eleventh districts under this system.

Between 1852 and 1859, most of the lighthouses in the United States were refitted with Fresnel lenses, replacing the earlier Argand lamps and parabolic reflectors. The use of these lenses not only increased efficiency of the lights but also resulted in a substantial monetary savings from reduced fuel consumption.

Rock Harbor Lighthouse, along the southern shore of Isle Royale, was constructed during this period. The lighthouse, completed in 1855, served Lake captains for only four years when the station was temporarily shut down. The light was reactivated for a short time between 1874 and 1879, when it was permanently deactivated.

By 1865, there were 7 lighthouses on Lake Ontario, 12 on Lake Erie, 2 on Lake St. Clair, 10 on Lake Huron; 26 on Lake Michigan and 15 on Lake Superior (U.S. Lighthouse Board 1866).

In addition to lighthouses, the Service was also charged with the management and construction of lightships. With the exception of a wooden vessel stationed at the present location of the Waugoshance Lighthouse between 1832–1851, there were no lightships on the Great Lakes until 1891. The Craig Shipbuilding Company of Toledo, Ohio, built three wooden screw steamers that year, registered as Lightship Numbers 55, 56, and 57. Numerous lightships followed in rapid succession on the Lakes.

Changes in the Service occurred rapidly during the second half of the 19th century. The first steam fog signal on Lake Michigan was installed in 1875 and lighthouses were being built at an ever increasing rate. Two more lighthouses were constructed off Isle Royale, bringing the island's total to three. Isle Royale Lighthouse, located on Menagerie Island, was completed in 1875. Passage Island Lighthouse, off the easterly end of Isle Royale, was finally completed and manned in 1882. The keepers and their assistants had barely settled into their new positions when uniforms were introduced. Uniforms for male keepers, masters, mates and engineers of lightship tenders became mandatory in 1884. In 1886, Congress once again restructured the Service and re-divided the Great Lakes into three districts. Lake Superior and Lake Huron became part of the the 11th district.

With the creation of the Department of Commerce and Labor in July 1903, the Light-House Service, Coast and Geodetic Survey and several other agencies involved in navigation and coastal safety, were transferred to the new department. From 1903 to 1910, the board form of management, under which the Light-House Establishment had operated for more than 58 years, came under constant criticism. The Secretary of Commerce argued that the Light-House Service had grown so large, that the Board could no longer adequately administer the agency. Finally, in June, 1910, Congress dissolved the Light-House Board and established the Bureau of Lighthouses, with an executive head that had clear authority and responsibility for the management.

The creation of the Bureau of Lighthouses did little to alleviate public criticism of government waste caused by duplication of duties by several agencies. Among those that came under fire were the Light-House Service, Steamboat Inspection Service, and Bureau of Navigation under the Department of Commerce, and the Life Saving Service, collectors of customs, and Revenue Cutter Service under the Department of Treasury. All were involved with navigation safety and had many identical or overlapping responsibilities. Several remedies were proposed including the merger of the Light-House Service with the Life Saving Service and the abolishment of the Revenue Cutter Service. Another proposal called for the consolidation of the three services under Commerce and Labor. A third proposal recommended the blending of the Life Saving Service with the Revenue Cutter Service under Treasury. There was no action taken on any of the proposals until 1914, when Congress finally approved the merger of the Life Saving Service with the Revenue Cutter Service, creating the U.S. Coast Guard.

Another Isle Royale lighthouse was constructed during this tumultuous period. Rock of Ages Lighthouse, off the western end of the island, was completed in 1908. At this time lighthouses continued to be administered by the Bureau of Lighthouses, under the Department of Commerce and Labor. This organizational hierarchy remained unchanged until 1939, when the U.S. Coast Guard and the Light-House Service were merged and the Light-House Service name dropped.

Civilian Conservation Corps: Roosevelt's "New Deal" not only had a widespread effect on the economic stagnation facing the United States in the early 1930s, but some of the legislation enacted ultimately resulted in changing the face of our environment. The Emergency Conservation Work Act, passed by Congress on March 31, 1933, established a voluntary civilian work force. The aim of the Civilian Conservation Corps (CCC) was to provide employment for young men between the ages of 18 and 25 (Adams 1940:393), and thus reduce some of the widespread unemployment plaguing the nation. Salmond summarized the purpose behind the CCC, "... Franklin D. Roosevelt brought together two wasted resources, young men and the land, in an attempt to save both" (1967:4-13.).

Individuals chosen to participate in the CCC received $30 a month, food, clothing, lodging, medical attention, transportation to the work camps and, importantly, both vocational training and academic education (Adams 1940:393). Corps members volunteered for periods of 6 months and were assigned to specific camps scattered around the country.

Public works projects undertaken by the CCC can be found in almost every community across the United States; Michigan was no exception. Fortunately for the fledgling park, Isle Royale was earmarked to receive some attention. CCC work began on the island in 1935.

Not everyone was pleased with the prospect of CCC involvement on Isle Royale. The well-known wildlife expert, Adolph Murie, expressed his concerns regarding the impact of CCC operations on the fragile Isle Royale environment in a report to the Department of the Interior in June 1935 (Murie 1935).

> True wilderness is more marvelous (and harder to retain) than the grandiose ... features of our outstanding parks. [Success in the management of this park would be measured] not by projects accomplished, but projects sidetracked (Murie 1935).

John J. Little (1978:70-93) discussed the specific activities of the CCC on Isle Royale in the administrative history of the park. Much of what follows is summarized from that history, except where otherwise noted.

A National Park Service team, headed by Harold C. Bryant, visited the island in July, 1935, to assess possible CCC projects and to outline a general development plan. The Bryant report supported many of Murie's proposals, recommending the prohibition of roads or trails for mechanized vehicles, the exclusion of motor boats and airplanes from the interior, limitations on visitor access points, an unobtrusive trail system, maintenance of clean shoreline waters, and the eventual elimination of commercial fishermen (Bryant 1935:2-4).

In addition to numerous additional general environmental guidelines, the report recommended several CCC projects, which included the removal of slash, i.e. the residue from lumbering operations, placement of buoys or markers for the identification of offshore shipping lanes and safe entrances to harbors, construction of visitor contact stations and camping shelters, and wildlife management facilities (Bryant 1935:2-14).

In August, 1935, the first CCC volunteers arrived at Isle Royale and set up their base camp at the head of Siskiwit Bay, at Senter Point. The organizational approach used for CCC operations on Isle Royale called for Army officers to run the camp while NPS personnel were in charge of the technical work.

The following year, the CCC established a second camp at Daisy Farm as well as continuing operations at Camp Siskiwit. The second year of activities was plagued by bureaucratic rivalry and organizational difficulties. According to Little:

> The mere organization of the camps, which began in early June, lasted for over a month because of alleged poor leadership. The NPS leaders grew increasingly angry over the failure of the military to release workers for conservation, visitor, and navigation projects. The short work season and a growing threat of forest fires, due to an unusually dry summer, increased their concern. Work began on a few NPS projects in early July, but forest fires soon interfered.

One of the projects delayed by the rivalry between the Army and NPS was the implementation of improved fire prevention. Crews were not released from camp assignments for field duties until July, when the danger of forest fires was at its peak. The fire prevention program had just gotten under way when the most extensive fire in Isle Royale's recorded history began on July 28,1936. It burned nearly 1/3 of the island and required the firefighting efforts of 1200-1600 additional CCC volunteers to bring it under control. In all, 26,000 acres were destroyed and a swath of burned timber, from Rock Harbor on the east to nearly Lake Desor on the west and from Chippewa Harbor on the south to Todd Harbor on north, scarred the interior landscape.

Ben East, an editor of the Grand Rapids Press and strong supporter of the park, spent several days in August investigating the extent of the fire and assessing the effectiveness of CCC crews. Hot temperatures, high winds, the absence of roads, trails and mechanized equipment, coupled with heavy undergrowth and difficult terrain contributed to nearly impossible conditions for the firefighters. East reported that the CCC crews were forced to work 12 hour days, and "were compelled to eat sandwiches containing maggots, endure mess halls crawling with flies ... and suffer an epidemic of dysentery in a mild form" (East in Little 1978:100-101). As a result of the conditions, CCC crew morale and efficiency suffered.

Despite severe hardships, and a decline in morale, once the fire was out and crews were able to return to their respective camps, quite a bit more work was accomplished in the 1936 season. An ice house, warehouse, temporary administrative headquarters, and a utility dock were constructed on Caribou Island. In addition, nearly 100 CCC volunteers stayed on the island through the winter to remove fire damaged trees and fallen logs. The absence of military personnel during the winter, and subsequent efficiency and high morale of the volunteers, prompted a request for the exclusion of the army in future involvement in Isle Royale activities. Unfortunately the request was never followed.

CCC work in 1937 followed the pattern of previous years, with the crews involved in fire-related clean up and various navigational and wildlife projects. The selection of Mott Island as the permanent headquarters for the island resulted in a heavy concentration of effort in that area the following year. Officers' living quarters, temporary office space, a warehouse, and a water storage tank were built in 1938. In addition, work began on a sanitary system and a dock and pier. Fire hazard removal and trail construction continued at Camp Sisikwit that year. A small crew working with the United States Lighthouse Service placed numerous navigation buoys offshore. Crews also developed five "boat" campgrounds, undertook wildlife surveys, and manned two weather stations for fire protection (CCC Report 1939, in Little 1978:80-84).

Work at Mott Island headquarters and Senter Point continued in 1939, following the plans outlined in previous years. The next year, 1940, saw the establishment of another CCC camp at the west end of the island. Camp Windigo was opened in early May and work began on expanded visitor facilities. Windigo Inn was completed by August of that year, supplementing the Rock Harbor center.

Isle Royale's remoteness and the emphasis by NPS officials on maintenance of the island's wilderness required some changes in the usual operation of CCC camps. Most camps had access to nearby towns, held dances, and had fields for baseball and football. The distance to Houghton and unreliable transportation eliminated most social activities and horeseshoe pitching, hiking, and water sports were substituted for other group recreational activities. The absence of large buildings also limited indoor recreational activities. McVey stated that CCC volunteers on Isle Royale lived spartan lives and were fortunate to be able to leave the island once a month (Camp Inspection Reports for 1938-1941, in Little 1978:86-88). Fortunately neither academic nor vocational training were hampered by the island's remote location. The curriculum included mechanical drawing, radio operation, photography, typing, nautical skills, American history, math, English, and even beginning French.

CCC projects on Isle Royale terminated in September 1941, with the seasonal departure of volunteers. The entrance of the United States into World War II, precipitated by the bombing of Pearl Harbor on December 7, 1941, necessitated that the manpower that had been used for conservation projects now be directed toward national defense. Congress abolished the Civilian Conservation Corps in June, 1942.

The tangible results of the work performed by CCC volunteers, during their six seasons on Isle Royale, can be seen today. The construction of trails was held to strict width and length restrictions and the impact of daily CCC operations on the wilderness environment was kept to a minimum (Little 1978:92). The CCC completed badly needed projects and helped to insure the protection of the wilderness environment in the Park's early developmental stages.

Site Specific Investigations

The following discussion focuses on those individual sites that were investigated by the Submerged Cultural Resources Unit on a time-available basis. The level of documentation varied from site to site and was dependent upon strict time limitations imposed by the examination of the primary research targets, the ten shipwrecks ringing the island. No consideration was given in advance to the potential significance of each site as part of the basis for determining the level of documentation or inclusion in this chapter. Rather, individual sites were selected in an effort to represent the major activities that occurred on Isle Royale from the earliest historic exploration period up to the present time. The specific sites selected for study include the following: Cemetery Island Site; American Fur Company Fishery at Checker Point; Wright Island Fishery; Star Island Fishery; Minong Mine Town Site and Docks in McCargoe Cove; Island Mine Town Site, Wharf, and Powder House in Siskiwit Bay; Ghyllbank Mining/Lumbering Wharf in Washington

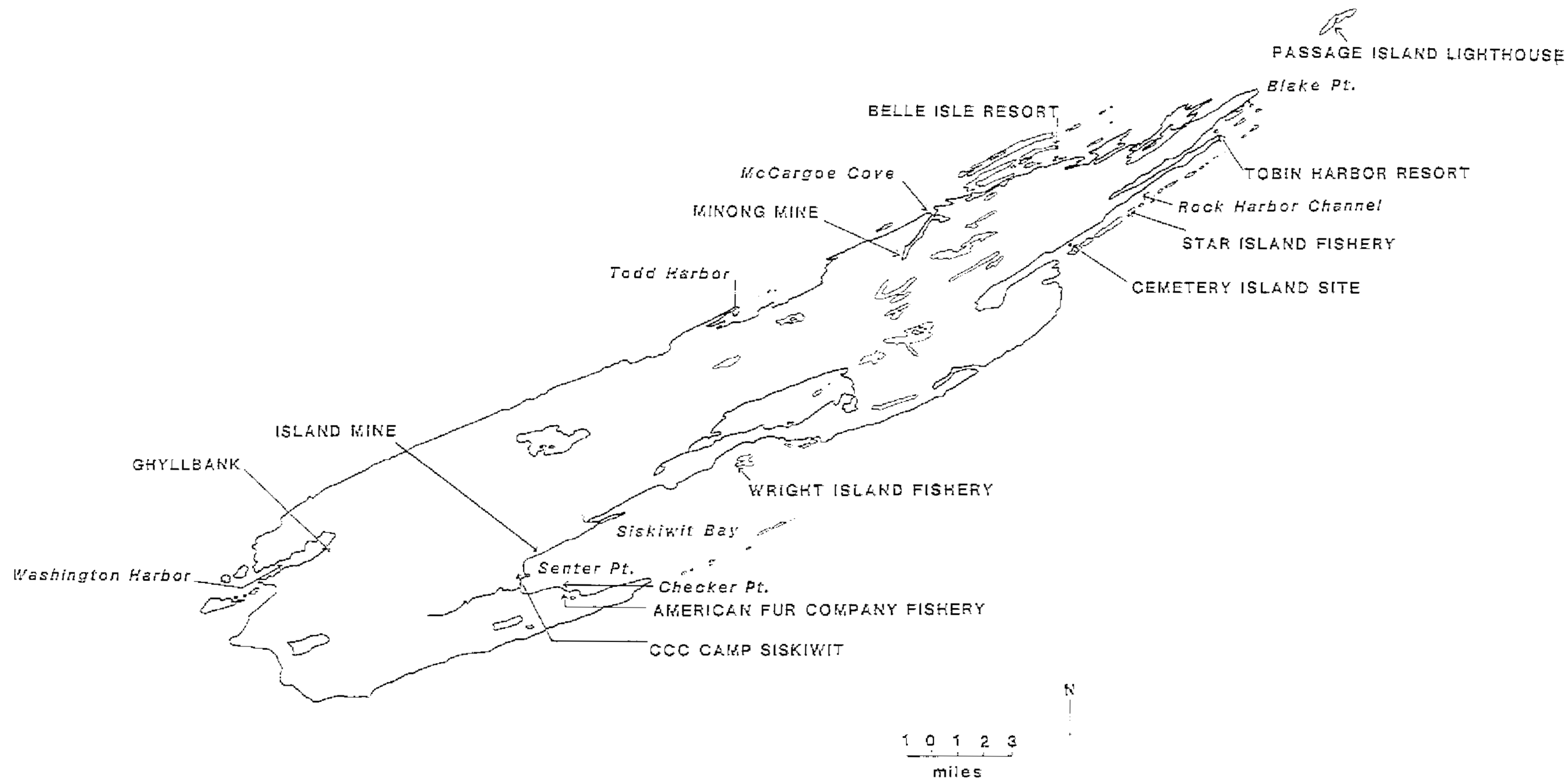


Fig. 6.1. Location Map of Historic Sites with Underwater Components. Drawing by Toni Carrell.

Harbor; Tobin Harbor Resort; Belle Isle Resort; Passage Island Lighthouse; and the Civilian Conservation Corps Camp Siskiwit at Senter Point (Fig. 6.1).

Cemetery Island Site

Historical Background and Description: This island takes its name from local tradition and the small graveyard located on high ground near its center. Almost nothing is known about the early inhabitants of Cemetery Island, although various hypotheses have been proposed regarding the origin of the grave sites and who might have lived in a small cabin once built there.

Eighty-five year old Ingeborg Holte stated in her memoirs, that as a young girl in her 20s she had asked about the "legend of Cemetery Island," and even then received answers that were "evasive and noncommittal" (Holte 1984:93). In her youth the graves were attributed to copper miners and lumberjacks, although the most accepted rumor was that:

> a load of liquor was brought to a nearby mining town, near Ransom Mine ... [and] there was an unbelievable brawl. Pent-up emotions surfaced and hatred among a few was so strong, it became a fight to the finish. ... there were no women or children buried [on the island], so that [rumor] may be true (Holte 1984:94-95).

It has been stated that while "bad blood" existed between Cornish and Irish miners, and fights were frequent between them, all weapons were barred (Hakala 1955:30). Others have speculated that the graves are associated with the Siskowit Mine, which operated from 1846 to 1855 (Dustin 1946:696; Cellar 1975; Maass 1982), and in fact the park has recorded the cemetery as a Euro-American burial ground associated with this mine. The dates on the few remaining grave markers range from 1851 to 1854, corresponding to the period when that mine was functioning. However, Judge William E. Smith in a letter to Albert Stoll, dated October 2, 1932, stated with certainty that some of the graves can be attributed to passengers who died when ALGOMA was lost in 1885. It was further reported that a Captain Robert Ellsworth of the Michigan Department of Conservation Patrol occasionally visited the island in the 1920s or 1930s and decorated the grave sites (Hakala 1955:31).

In the 1950s, the grave sites were described as being surrounded by rocks, with the location of most being indicated by raised ground (Hakala 1955:30). The majority of the sites were either surrounded by individual picket fences or were marked with wooden headboards. One original cross and headboard were still present in the early 1960s (Haber ca. 1962-65). Two of the headboards had the following information on them:

Erected in Memory of
Jeremiah Colbert
of Bonmahon County
Waterford, Ireland
Died Oct 18, 1853 Aged 25 years
Also Infant Daughter of
Maurice and Johanna Mickey
Died October 20, 1854

In the Memory Of
William Hanks of
Coventry who departed
this life on Sept. 11
1851, Aged 24

Historically, a small cabin also existed on Cemetery Island. The cabin was located near the shore, on the southeast side of the island near a small bay. In 1981, remains of the cabin were found by Cultural Resource Specialist Carol Maass and

Park Rangers Ken Vrana and Chuck Dale. Vrana described the remains as consisting of a portion of the corner constructed of hand-hewn notched logs. It is not clear whether the graveyard was contemporaneous with the cabin or whether all the graves are from the same period.

Prior Research: The earliest published reference to Cemetery Island is in Isle Royale Place Names (Dustin 1946:697-698). Dustin associated the grave sites with the 1850s mining operations at Siskowit Mine and alluded to the ALGOMA disaster. The next reference to the cemetery appeared in an unpublished manuscript authored by Park Ranger Robert D. Hakala (1955). Hakala is known to have visited the site at least on one occasion prior to the completion of his manuscript. The cemetery, well-known in the 1950s, even appeared on a USGS map in 1957. Gordon Haber, a seasonal park employee, and Bill Dunmire, then park naturalist, visited the island in the early 1960s. A brief, handwritten report with accompanying photographs of the grave sites were produced at that time. Nearly 20 years later the cemetery was visited again, briefly documented, and given a State of Michigan number during the archeological survey of Isle Royale (Cellar 1975). None of these individuals mentioned the remains of a cabin on the island.

Maass, Vrana, and Dale visited the island in 1981, and at that time recorded the remains of the structure and an offshore refuse area. These features are included in the Park's unclassified sites inventory. Vrana and Resource Management Specialist Craig Axtell visited the island again in October, 1983. During an underwater survey near the existing NPS dock they found additional evidence of a dump on the north side of the island. In 1986 Vrana returned to the site and took photographs of the present condition of the graveyard and made a dive on the southeast side refuse area.

Intrusions and Data Limitations: According to the site report prepared by Cellar in 1975, some excavations had occurred on Cemetery Island about the time the CCC were at Daisy Farm, circa 1936-1941. Examination of park files does not provide any details regarding the nature of the excavations, who conducted them, what artifacts were collected, and what their disposition might have been. The Milwaukee Public Museum is reported to have conducted work on Isle Royale in the 1930s and they may have been involved in the excavations on the island (Hruska 1987).

Hakala removed two engraved headboards in September 1950. These are presently being curated by the park. Haber reported that the original picket fences had been replaced or repaired by the time of his visit in the early 1960s and that modern replica crosses and headboards were also present at that time.

Glen DeSautell, a park maintenance worker, visited the island in July, 1981, and removed an animal shoe and mop head. Both items were turned over to the cultural resource specialist for inclusion in the park collection. In October of that year, Vrana and Dale collected two gin case bottles and one "beer" bottle from the refuse area on the southeast side of the island in approximately six feet of water. These items are also curated in the park museum collection.

Site Location: Cemetery Island is located inside Rock Harbor Channel at its western end. The island can be reached by entering Rock Harbor Channel through Middle Island Passage and traveling northeasterly approximately 1/2 mile (Fig. 6.1). The historic graveyard is situated near the center of the island, on an area of high ground. The historic cabin and dump site are on the southeastern side adjacent to a small bay. Cemetery Island is clearly marked on lake charts. The historic features on the island are in township 64 north, range 34 west, section 23, NE 1/4, SE 1/4 and section 24, NW 1/4, SW 1/4 on the USGS Isle Royale topographic map.

Administrative Status: The historic graveyard on the island is included in the Isle Royale Cultural Sites Inventory and is registered by the State of Michigan as site number 20IR42. The site is not listed on the National Register of Historic Places. A historic refuse area and cabin site, on the southeast side of the island, were not recorded with the graveyard. These features were investigated in 1981 by Carol Maass and were included on the park's undesignated sites inventory as site number U-24. The second dump site, found in 1983 by Vrana and Axtell, has not been inventoried.

Research Methodology: A popular account of the loss of a schooner or fish tug off West Caribou Island was the impetus for the underwater reconnaissance of Cemetery Island. Park divers had previously tried to locate this vessel without success. In 1981, Vrana and Dale, also unsuccessful, made a second dive in the area and, following the natural contours of the channel between West Caribou and Cemetery Islands, eventually stumbled onto the historic refuse area. Vrana's and Axtell's dive in 1983 on the north side of the island was for the purpose of recovering lost property. In the course of their search, they found the second refuse area. A "record of dive" form was filled out by Vrana that detailed the dive plan, underwater conditions, purpose of the dive, and the cultural and natural features encountered (Vrana 1983).

Site Description: The cultural remains on Cemetery Island consist of four major features: the cemetery, the refuse area offshore on the southeast side, the refuse area offshore on the north side, and the remains of a small cabin (Fig. 6.2). Overall, the sites on Cemetery Island appear to have changed little since initial deposition. The most notable changes, based upon written documentation, photographs, and personal observations, have occurred at the cabin. In 1981, the remains were described as consisting of several hand-hewn notched logs forming the corner of the structure. When the site was revisited in 1986 only scattered timbers could be located. In addition, the remains of a small wood-burning stove, in the vicinity of the cabin, existed in 1981; these were not relocated in 1986.

The grave sites are substantially unchanged based upon the descriptions of Halaka that are more than 30 years old. The majority of the 10 grave sites can still be identified by raised ground, rocks, headboards or crosses. Picket fences, covered with moss, encircle several graves that have replica headboards commemorating the deceased (Fig. 6.3).

The refuse area found offshore on the southeast side of the island, not far from the location of the cabin, contains a wide variety of remains. The scatter can be traced approximately 20 linear feet along the shoreline and extends underwater along a sand shallow between Cemetery Island and West Caribou Island out about 50 feet. Bottle glass, white stoneware ceramic sherds, enameled tinware, metal fragments, and broken patent medicine bottles, beer bottles, and cream and blue decorated china are present (Maass 1982).

The dump area located offshore on the north side of the island, near the present NPS dock, is in 10 to 15 feet of water (see Fig. 6.2). Patent medicine bottle fragments, bottle glass, broken brass ship fittings, oar locks, beer bottles, a slag pile, and modern refuse is present. No household items were noted (Vrana 1983).

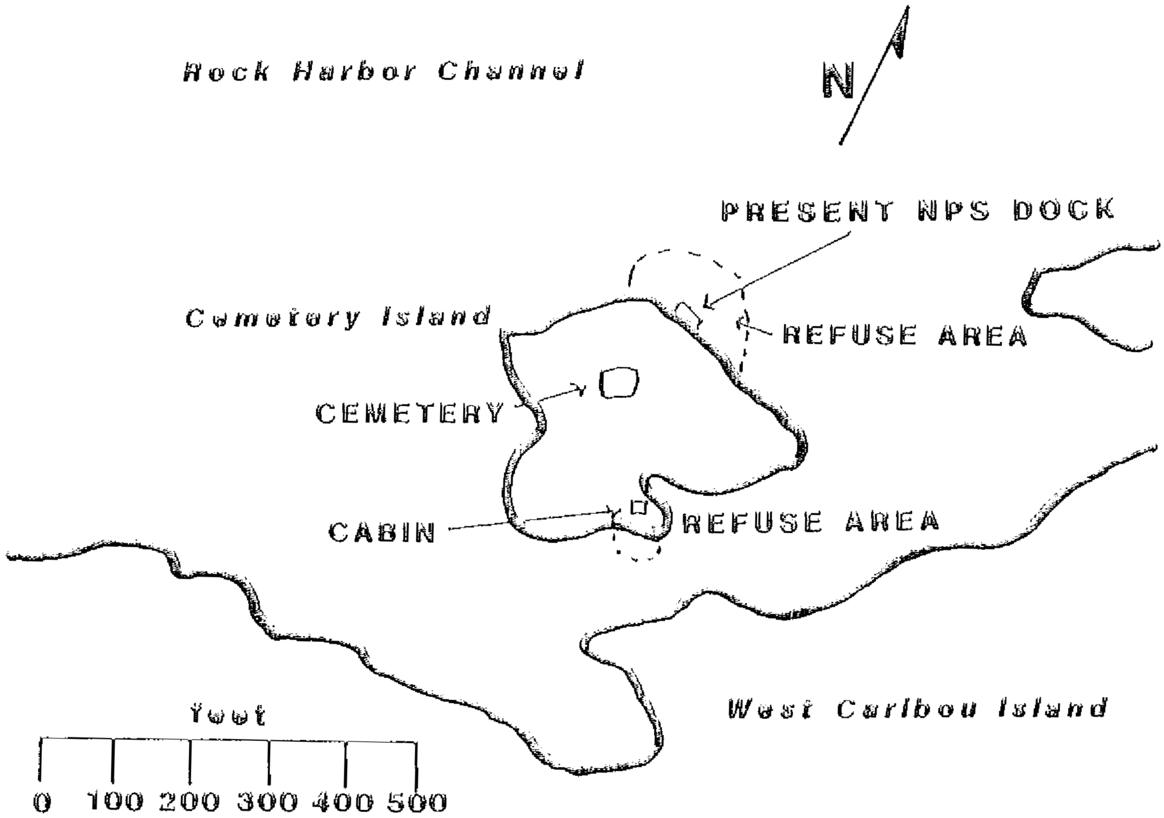


Fig. 6.2. Cemetery Island Site Map. Drawing by Toni Carrell.

Fig. 6.3. Graveyard on Cemetery Island. Replica headboards and picket fences were installed by the National Park Service in the 1950s to commemorate this site. NPS photo by Ann Belleman.

Site Analysis: The picture of Cemetery Island that emerges is one that can be divided into three discrete time periods of primary use. The dates cluster from the 1770s to the early 1800s, from circa 1846 to 1855, and from 1885 through the early 1900s.

The archeological remains found offshore on the southeast side of the island provide the strongest evidence to date for fur trade activities on the island. The presence of several different classes of artifacts supports a post-1770s to early 1800s fur trade contact at this location.

Two intact dark green gin case bottles were collected from the site in 1981 (Fig. 6.4). Bottles of this type first appeared in the mid-1600s and were commonly blown into a square-sided mold, had nearly a flat base, and a short neck with an everted lip. These characteristics are shared with the examples from Cemetery Island. This bottle type varied considerably in size but, because of their flat sides, they could be carried and housed in cases. This bottle style is frequently referred to as the "Dutch gin" bottle, reflecting their primary use in the latter half of the 1700s. By the mid-1700s the square-sided "gin" case bottle tapered toward the base. This style of bottle represented a very large part of the English bottle output of the 1700s (Hume 1969:62). The two examples from Cemetery Island appear to have been blown into a mold; two small circular impressions on the bottom sides providing this evidence. Both are dark green with glass bubbles, imperfections, and irregularities in size and thickness of the collar, neck and orifice (Cotter 1968:34). These characteristics tentatively date the bottles after 1814 but still in the early 1800s.

Examples of a blue transfer-print ware were found off Cemetery Island. Imported Chinese willow pattern porcelain, a ware with underglaze blue decoration, has been found in colonial American sites dating prior to 1725. It became increasingly popular in colonial America, and by 1800 was one of the most common ceramic types. Based on the Chinese export plate, the English adopted both the process and the pattern and began production of similar pieces in the latter half of the 1700s (Hume 1969:127-130, 257-265). English transfer prints were commonly produced by the 1770s, however "willow pattern" creamware was only manufactured for a relatively short period, from 1790 to 1800 (Hume 1969); after that date pearlware dominated the export market until 1820. The origin and typology of the ceramics found offshore have not been determined to date. Preliminary analysis, however, places these ceramics between 1770 and 1820. Another household item observed off the island was enameled tinware; the thicker French variety was popular from the 1750s through the early 1800s.

All of the above examples, which cluster in the very late 1700s to the early 1800s, were found on the southeast side of the island, offshore from the remains of a historic cabin. The location of the cabin, on the southeast side, would provide excellent protection from wind-driven waves and storms. It is common knowledge among Isle Royale residents that locating on one of the many smaller islands away from the main island keeps mosquitos, black flies, and other annoying insects to a minimum. In addition, the small, shallow cove on Cemetery Island's southeast side would have provided an easily accessible, safe landing for a small rowing skiff or canoe, commonly used by trappers.

Cemetery Island is advantageously located near Benson Creek, Forbes Lake, Lake Benson, and Tobin Creek, all potentially good trapping areas. Only slightly farther away are Tobin Harbor, Moskey Basin and Lake Richie. This represents an area that

Fig. 6.4. Historic "gin" case bottles and a "beer" bottle collected by Park employees off shore in 6 to 10 feet of water. Isle Royale National Park Museum collection. NPS photo by Ann Belleman.

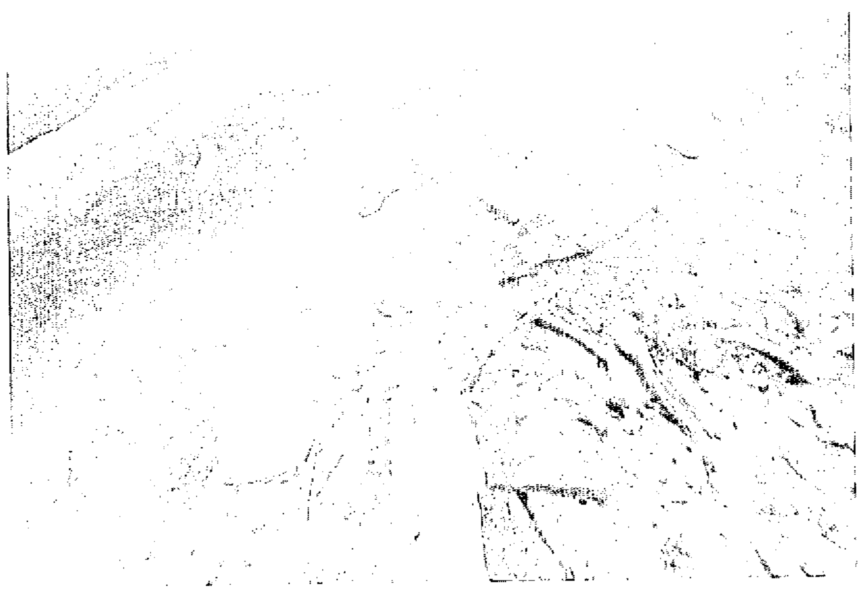


Fig. 6.5. Salt glaze ceramics and patent medicine bottles found off Cemetery Island. NPS photo by Ken Vrana.

could be handled by a limited number of trappers. The quantity and variety of artifacts observed do not support habitation by more than a couple of individuals, or one individual over a few seasons. The presence of the remains of a cabin suggest the latter. From 1763 to 1783 British-owned companies dominated Lake Superior fur trade; these companies employed both French and British trappers. The presence of English and French maufactured goods on Cemetery Island suggests habitation by trappers in the latter third of the 1700s, most likely after 1770.

The cabin may still have been in usable condition when both Ransom Mine and Siskowit Mine were operational (circa 1846 - 1855). The suggestion that the graves on the island are contemporaneous with these mines is well-founded, based not only upon the extant replica headboards but also tentative dating of offshore artifacts. These remains support the hypothesis of at least occasional visits to the island, above and beyond burial services, between 1840 and the early 1900s. The bottle pictured in Figure 6.4 was collected from the southeast refuse area, not far from the gin bottles. This dark brown bottle, bearing a crown insignia, is representative of a type that indicated government ownership. English bottles, from the late 1820s through the early 1850s, made for the army and navy were often identified with a seal (Hume 1969:62). This bottle shows seams from a three-piece mold, which places its date of manufacture after 1815 (Hume 1969:61). Further, the photographic clarity of the crown pattern and the precision of its lines suggests this example was pressed in a mold. Pressed glass became common after the 1820s (Cotter 1968:32).

Both the north and southeast refuse areas contain remnants of patent medicine bottles and vials. These were among the most common products of late Eighteenth and Nineteenth Century glass works. Early types were blown from ordinary bottle glass and appeared in aquamarine, amber, olive-amber, and olive-green. Clear glass was used in the later periods. The use of full-size piece-molds became common in bottle manufacture after 1815. Medicine bottles after that date were often made from two-piece molds and bore the name of the medicine or manufacturer (Cotter 1968:36). The examples observed off Cemetery Island, one bearing the name "Blood Bitters", can be tentatively dated after 1815 and more likely after the 1830s. White stoneware ceramics, tentatively identified as British salt glaze, were found on the southeast side. This ceramic type was common in the mid 1800s. A nearly intact cylindrical flat-bottomed jug, similar in appearance to those used to store 'moonshine', along with fragments of other containers are present offshore (Fig. 6.5). The bottles and jug suggest recreational visitation rather than continual habitation during the Ransom and Siskowit Mining era.

Only circumstantial evidence, however, ties the graves solely to Siskowit Mine. The north side dump provides evidence of later activity, although again not necessarily habitation. Items identified by divers Vrana and Axtell included parts of brass port holes, ship fittings, brass and copper filagree decorative items, and broken blue on white dinnerware. These materials are similar to those observed on the site of the ALGOMA disaster, which occurred in 1885. The presence of these artifacts lends some credence to both Dustin and Smith's suggestions that at least some of the unmarked graves are associated with that disaster.

Reports of fishermen "despoiling" the bodies of disaster victims were circulated in the summer of 1886 (Detroit Free Press, August 12, 1886). This theory was supported, in the press, by the fact that the salvors found the remains of only two bodies, pinned in the wreckage. The presence of scattered mutilated clothing on shore, ship fittings and other "articles of value" were also reported to have been found in local fishermen's cabins (Detroit Free Press, August 2, 1886). The accusations were eventually refuted:

> ... the story about fishermen plundering the bodies off the wrecked steamer ALGOMA is all pure bosh, and no one, who ever knew anything about the habits of the fishermen of Lake Superior, ever believed [it] for a moment. The report was a cruel slander .... (Duluth Daily Tribune, August 8, 1886).

What seems more plausible than "the sinking of bodies out in the lake by fishermen" (Detroit Free Press, August 8, 1886) is the discovery of unidentifiable remains that were mutilated by natural wave and ice action. The Portage Lake Mining Gazette reported that "pieces of bodies were found, showing that the waves were tremendous having dashed them to pieces against the rocks, breaking bones and crushing bodies like egg shells" (November 26, 1885). Under the circumstances the representatives of the Canadian Pacific Railroad, the owners of the vessel, may have chosen to bury these remains on nearby Cemetery Island, in an existing graveyard, rather than ship them to Canada. In fact one of the company officers, H. M. Kersey, instructed four fishermen to continue to search for victims and to bury any bodies they found on the island pending identification in the Spring (Port Arthur Weekly Sentinel, November 20, 1885). Stories from survivors of the wreck also indicated that some of the passengers were washed out to the open lake. On November 23, 1885, a party of fishermen returned to Hancock from Isle Royale with four bodies (Cleveland Leader, November 24, 1885). Of the 60 or so passengers and crew on ALGOMA at the time of the wreck, only 14 survived. The recovery and identification of the bodies of passengers was clearly a priority with the company.

Haber reported that two of the graves were indicated by deep depressions (ca. 1962-65). It is possible that these could have been the temporary resting places of ALGOMA passengers, who were later exhumed for identification.

In any event, there is enough evidence offshore to suggest intermittent use of the island from the late 1800s through the early 1900s, prior to the presence of the National Park Service. A deep water dock, built before the 1950s, still exists on the north side. The informal policy of the National Park Service in the late 1930s, 1940s, and 1950s appears to have been to replace existing (ie., historic) docks in poor condition with new docks whenever feasible. The park's dock files do not provide any information on the presence or absence of a historic dock in that location. What is present just off of the dock are a variety of artifacts from the first half of the 1900s, as well as a variety of containers from unknown time periods (Vrana 1983).

Conclusion: Cemetery Island should receive an in-depth survey, off shore, on land, and in the archives. The cabin and offshore remains are evidence of habitation, possibly as early as 1770. The possible fur trade use of this location is the first to be documented on Isle Royale.

The relationship of the cemetery to the historic mining era on Isle Royale is the most clearly defined archeologically, although it is not without some confusion. The identification of the names of the deceased on the grave markers, if possible, should be tied to either the Ransom or Siskowit Mine, in order to clarify the origin of at least two of the graves.

The evidence presented above regarding the burial of bodies from ALGOMA's passengers on Cemetery Island is circumstantial, and the conclusions purely conjectural. No clear evidence exists, unfortunately, to support or refute the hypothesis that some of the graves are associated with ALGOMA. The question of the origin of the unmarked graves on the island is far from resolved.

The presence offshore of ALGOMA-like ship fittings, however, is irrefutable, and these should be more closely examined and identified. In addition, both submerged refuse areas and the cabin site should be thoroughly documented and given State of Michigan site numbers.

American Fur Company Fishery at Checker Point

Historical Background and Description: The historic era of fishing on Lake Superior moved toward a period of formal organization in 1833 when Ramsay Crooks, the new president of the American Fur Company, began active investigation of the potential use of this resource. By 1835, he had written to Gabriel Franchre that the place where the North West Company had previously obtained fish was "a large Island not far from and directly opposite Port Quiwinan" (Crooks in Nute 1944:174), referring to Isle Royale. The following year Crooks instructed William Aitken to visit Isle Royale and examine it for locations of permanent posts for future fisheries. The American Fur Company explored Lake Superior between the years 1835 and 1837 and during this period established major fisheries at Grand Portage, La Pointe, Sault St. Marie, and Isle Royale.

A total of seven fishery stations were established on Isle Royale. They included locations at Fish Island (now called Belle Isle), Washington Harbor, Rock Harbor, Merritt's Island, Duncan Bay, Siskiwit Bay and the chain of small islands southeast of the bay. The major site on the Island was on Siskiwit Bay at Checker Point. This site was established in 1837 under the direction of Charles Chaboillez. He employed approximately 25 men as coopers, fishermen, and boatmen. In addition, 9 men, employed on a contract basis, fished on their own and sold their catch to the company at a rate of $4 for 200 pounds of fish (Nute 1944:177). During the early years, the men lived on the island year-round, however after 1839 the fishermen were transferred to LaPoint during the winter months.

Trout, siskowit[2], whitefish and herring were caught during the fishing season, which began about the middle of June and continued until mid-November. In 1837, 2,000 barrels of fish were taken from Isle Royale (Nute 1944:177). Fish were salted, packed in barrels, and picked up from the various stations by the schooners, JOHN JACOB ASTOR (built 1835), WILLIAM BREWSTER (built 1838), and SISKOWIT (built ca. 1840).

Fishing on Lake Superior was so successful it was necessary to find new markets for their sale. The Ohio valley, filled with farming communities, and the eastern states were quickly exploited. However, the same year that the Checker Point fishery was established the market collapsed. Farmers in the Ohio valley, faced with an agricultural depression, resisted introduction of a new food. The market did not improve and, by 1842, the American Fur Company was forced to quit the fishing

---

[2]The spelling of this fish and subsequent use of this name has not been standardized. It appears as siscowet, siskeweite, siskowet, siskiwit, and siskawitz.

business. Fishing continued at the various stations on Isle Royale throughout the 1840s, but was drastically reduced.

Charles Jackson, a U.S. Geological Surveyor, reported fishing operations continuing on Isle Royale during his reconnaissance of the Island in 1847. Individual fishermen had occupied former American Fur Company cabins, using them as a base of operations (Jackson in Hakala 1953:23). By 1848 the Checker Point site had been officially abandoned by employees of the American Fur Company. However, continued use of these buildings by independent fishermen was highly likely well beyond 1848.

The American Fur Company Fishery at Checker Point consisted of eight structures. Franchere described them in his 1839 journal of his voyage on BREWSTER to Isle Royale.

> The buildings at this place are very good, and comprise one dwelling house for the resident clerk, one men's house, one coopers shop, one store house for fish barrels, one large store house, with store attached to it, and an additional building at the west gable, a long shed south and continuous to the warehouse, for the storing of salt and lastly, one fish store house (Franchere 1839).

In 1847 and 1848 William Ives conducted his survey of Isle Royale. At that time the American Fur Company buildings in Siskiwit Bay were occupied by independent fishermen. Ives intersected the former AFC fishing station during his survey of the southern boundary of section 35 (township 64 north, range 37 west).

> This place is one of the American Fur Company's trading and fishing posts. There are three old log houses and one is occupied by fishermen, N 63 W, 3 chains to it. SW 30 L [links] to an old stone house. There are about five acres cleared (Ives 1847).

Ives located the buildings 3 chains west along the boundary from the water's edge, i.e. where the boundary intersects the bay (Fig. 6.6). It is not specified what chain measurement Ives was using in his description. A surveyor's chain is equal to 66 feet while an engineer's chain is equal to 100 feet. Ives was sent to Isle Royale to complete a survey of the island, therefore it is reasonable to assume that Ives was using a surveyor's chain of 66 feet in length. Based upon a 66 foot chain, the distance of the settlement from the water's edge would have been approximately 198 feet; the stone house would have been approximately 20 feet southwest of the log houses on the boundary.

There was no need to construct permanent docks or anchorages at the station as fishing was conducted from barges of oak boards with a flat bottom and blunt ends, with a rudder and mast. These versatile boats could be beached directly on shore. Similar, larger boats, were also used to transport barrels of fish from Isle Royale to Grand Portage and to bring back needed supplies and equipment. Franchere describes these boats in a letter to Crooks as:

> ... large flat bottom boats 40 feet in length with a center board, sloop rigger, deck and a four feet hold to contain about 128 barrels. (Franchere, August 30, 1839).

Prior Research: The American Fur Company Fishery was documented by a University of Michigan Museum of Anthropology survey in 1961. At that time the survey team located the remains of a log structure, surrounded by pits,

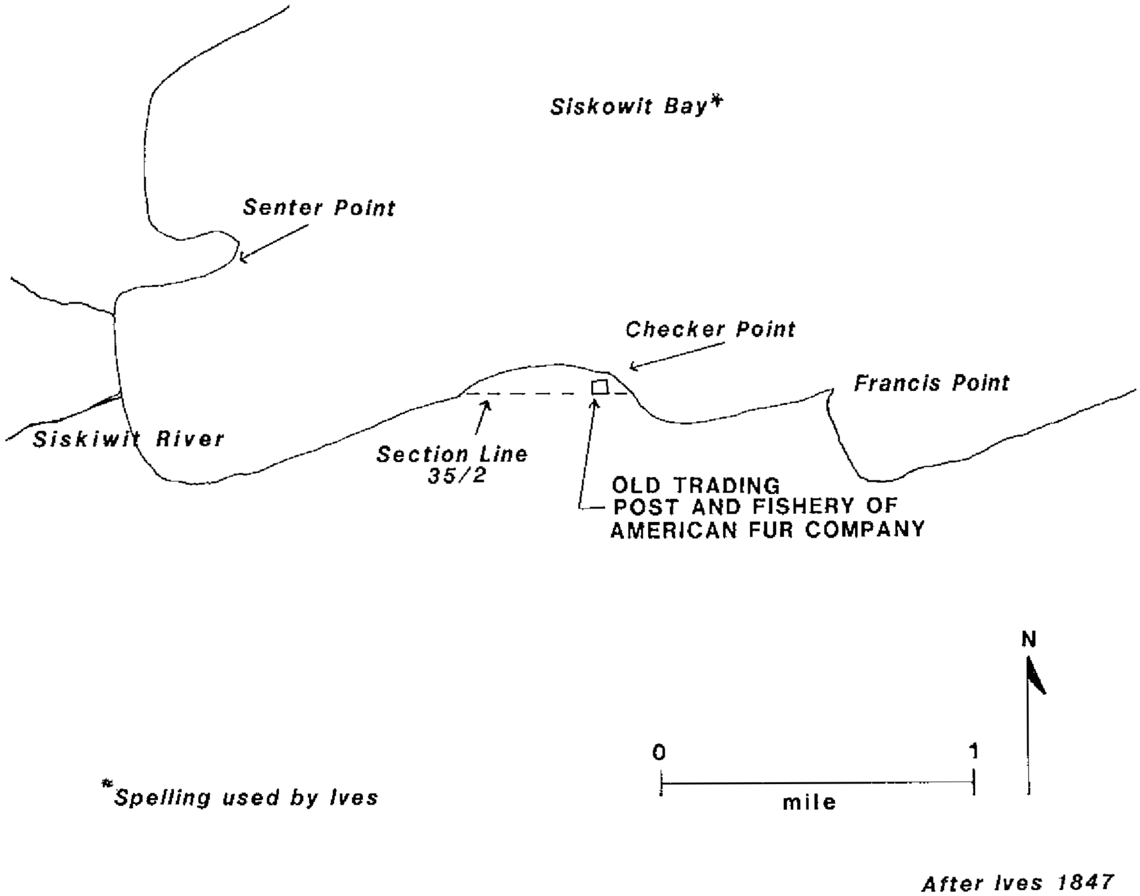


Fig. 6.6. Reproduction of Ives' Survey Plat indicating the location of the "Old Trading Post and Fishery of the American Fur Company" (Ives 1847).

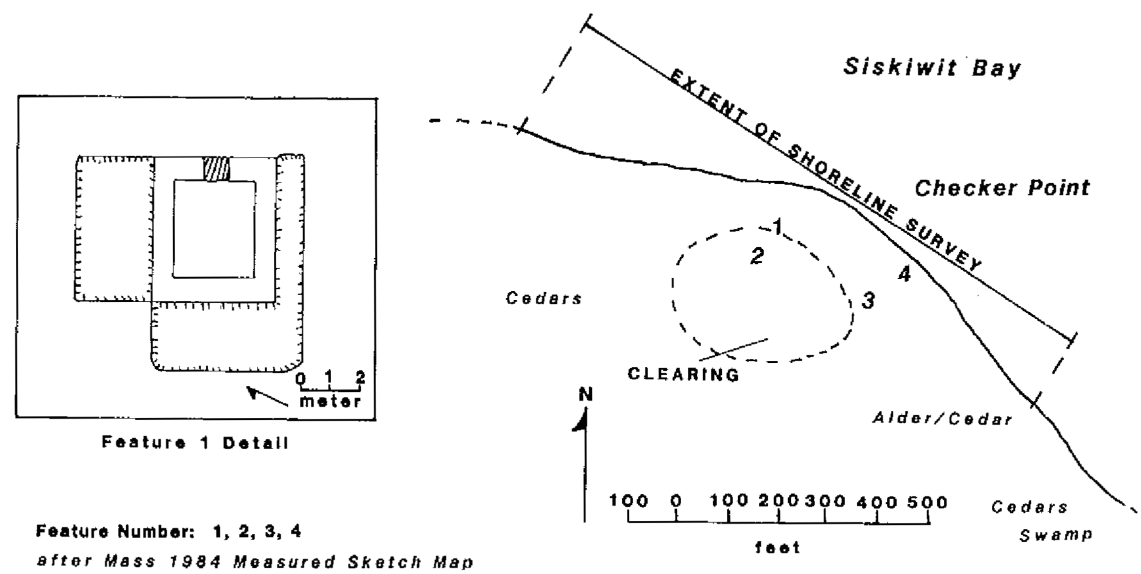


Fig. 6.7. Sketch map of American Fur Company Fishery Site. Feature 1 is a semi-subterranean structure foundation that is probably the same one located by the University of Michigan in 1961. Drawing by Toni Carrell.

approximately 200 feet southwest of Checker Point and 50 feet from the sandstone shoreline. No near shore remains were identified by the survey.

Rakestraw reported in 1967 observing a possible cellar and chimney rubble on the site (1967b:21). No other remains were mentioned.

In 1984 Park Ranger Ken Vrana, Resource Management Specialist Carol Maass and Submerged Cultural Resources Unit Archeologist Toni Carrell, visited the Checker Point location in an effort to relocate the log structure and to survey the offshore area for cultural remains associated with the American Fur Company and subsequent fishing occupations.

Intrusions and Data Limitations: Checker Point has been heavily impacted by historic logging operations. Rakestraw observed some of the results of these impacts:

> ... there is an old logging road, and the area bears every evidence of extensive and destructive logging for white pine. The cutting ... was far beyond that needed for the Island Mine settlement. Since crosscut saws were used, the cutting occurred after 1880; the decayed condition of cull logs left in the woods places the cutting before 1930 (1964:7-8).

The Consolidated Power and Paper Company of Wisconsin owned land at the head of Siskiwit Bay. In 1935, the company began construction of lumbering camps for the purpose of cutting pulpwood and began cutting timber in the swamp lands. The Checker Point fishery is located very close to one such swamp. The logging road that is evident may have been cut by the Wisconsin company.

Mead Lumber Company also had operations in the Checker Point area. Further, the 1936 fire, which destroyed 1/3 of the island's forest, began southwest of the CCC Camp Siskiwit, not far from Checker Point. Either of these lumbering operations along with the fire and clean up could have impacted evidence of the American Fur Company fishery.

Rakestraw asserts (1967b:21) that the sandstone shoreline has receded at least 60 and possibly as much as 100 feet since the 1840s. He goes on to state that if the buildings were close to the 1840s shoreline, they would have been destroyed as the beach receded, and he feels that the site has largely been destroyed by wave action (1967b:21). Rakestraw does not substantiate this hypothesis with any additional data. Rakestraw also fails to take into consideration Ives' statement that he intersected the log structures while surveying the southern boundary of section 35, placing the fishery well away from the shoreline in 1847.

Site Location: The American Fur Company Fishery is located on Checker Point, at the west end of Siskiwit Bay (Fig. 6.1). It can be reached by traveling west in the bay, passing the daybeacon on Point Houghton on the port side i.e., south, paralleling Houghton Ridge, passing the first point after Houghton (Francis Point) and traveling a distance of approximately 5/8 of a mile to Checker Point. The overall distance from Houghton Point to Checker Point is approximately 3 3/8 miles. William Ives, in his 1847 survey of Isle Royale, intersected a log building from the station on the southern boundary of section 35. The location of the fishery given by Ives is T64N, R37W, Section 35, S 1/2, SW 1/4, SE 1/4, SW 1/4.

Administrative Status: The American Fur Company fishery is included in the Isle Royale National Park Cultural Sites Inventory and is recorded by the State of Michigan as site number 20IR13. While a lumbering site on Checker Point is listed as U-44 on a Park maintained list of undesignated sites (Maass 1984). Neither site is included on the National Register of Historic Places.

Research Methodology: Visual walking reconnaissance of the presumed fishery site location was undertaken by Vrana, Maass and Carrell in June 1984. Remains of a structure (Feature 1) were located approximately 30 meters (98.4 feet) south of the sandstone shoreline and approximately 75 meters (246 feet) west of Checker Point (Fig. 6.7). Swimmer survey of the offshore area was undertaken by Vrana and Carrell. The survey began at the shore and continued outward to a water depth of 15 feet, approximately 200 feet from the shoreline. An overall distance of 1/4 mile of offshore area was examined along and around Checker Point.

The surface survey closely corresponded in coverage to the underwater reconnaissance extending along the edge of the eroded sandstone rock beach, west of Checker Point, until the beach curves southwest (approximately 1/8 mile) (Fig. 6.8) and southeast along the pebble beach shoreline, south of Checker Point, to the edge of a cedar swamp (approximately 1/8 mile). The open area southwest of Feature 1 was examined to the edge of a cedar swamp on the east side and to a stand of cedars on the west.

Present Site Description: Rakestraw (1967b:21) states he found what "appeared to be a cellar hole and chimney rubble" approximately 3 chains (198 feet based upon a surveyor's chain) in from the shoreline. The 1961 survey by the University of Michigan Museum located the remains of a "log structure" approximately 200 feet southwest of Checker Point and 50 feet in from Siskiwit Bay.

The 1984 surface reconnaissance by Maass, Vrana and Carrell located 3 features. The location of Feature 1 (Fig. 6.7) closely corresponds to the location of both the Michigan Museum and Rakestraw finds, and is probably the same structure.

Feature 1 consists of a 3 meter by 3 meter (9 1/2 feet by 9 1/2 feet) rectangular pit surrounded by a flat-topped mound (Fig. 6.7). Outside the mound the soil had been excavated out to a depth of 1 meter (39 inches) to form the surrounding mound. The northeast wall of the pit is broken by an opening or doorway 80 cm (32 inches) wide. The distance from the doorway to the sandstone beach is approximately 30 meters (98 feet) on a bearing of 30°. This feature is also approximately 70 meters (230 feet) west of Checker Point. White spruce are growing on the mound walls and woody vegetation is growing the 80 cm (32 inch) deep pit. The pit walls are dark humus and show no evidence of the local sandstone pebbles, chimney rubble or wall logs.

South of Feature 1 is a large, relatively flat, open area approximately 100 meters (328 feet) long by 75 meters (246 feet) wide. Heavily browsed aspen suckers, a scattering of 20-30 year old white spruce and a few 60-80 year old aspens are present (Fig. 6.9). The sizes of the suckers, spruce and older aspens are similar within each species, suggesting a similar age for each group.

Feature 2, a large depression, was located southeast of Feature 1 on a bearing of 225° approximately, 9 meters (29 feet) away. The surrounding terrain is generally flat, while this feature is an irregular square 8 meters (26 feet) on a side by 1.3 meters (4 feet 3 inches) deep.

Fig. 6.8. Probable American Fur Company Fishery landing site on the east side of Checker Point (view to west). This protected location would have afforded easy access to the fishery buildings. NPS photo by Carol Maass.

Fig. 6.9. View to the south of the large clearing at the location of the American Fur Company Trading Fishery Post. NPS photo by Carol Maass.

Feature 3 is located 50 meters (164 feet) southwest of the pebble beach at Checker Point, on a bearing of 25°. It consists of a 50 cm (19 inches) high pile of 1 inch diameter rocks. On the west side of the rock pile is a depression 25 cm (10 inches) deep by 50 cm square. The rocks in this feature appear to be fire cracked. Due to the extensive windfall in this area, the full extent of Feature 3 was not determined.

One artifact was located during the walking reconnaissance of the pebble beach southeast of the point. It is a light aqua blue piece of glass of indeterminate age. No other artifacts, features, or other remains were located during the offshore, shoreline, and inland survey.

Site Analysis: The scanty descriptions of the American Fur Company fishery buildings provide little information as to structure size or inter-relationship, however some speculation can be made regarding the various features located during the surface survey.

Feature 1 showed no evidence of a chimney during the 1984 reconnaissance, and may have been the store house for the filled fish barrels. Its semi-subterranean configuration would limit fluctuations in temperature and aid in storage of the salted fish. This structure is probably the same one located by Ives, Rakestraw and the Michigan survey team.

Feature 2 was probably a dwelling or store house. Franchere describes several houses, in particular a "large store house with shed attached to it" (Franchere 1839). The 8 by 8 meter (26 x 26 foot) depression would certainly have qualified as a large store house.

The large clearing south of Feature 1, within which Feature 2 is located, could have been the site for the remaining buildings, with the exception of the fish house, which was normally located at the shoreline. In order to construct several buildings for the fishery, a large clearing would have been required. The clearing observed in 1984, approximately 100 meters (328 feet) long by 75 meters (246 feet) wide, an area of nearly 2 acres, could have been been the former building sites of the majority of the fishery buildings. Furthermore, Ives describes the station as being located in a clearing of 5 acres, not covering an area of 5 acres (1847).

The nearly 2 acre clearing observed in 1984 was very probably the location of the fishery. The presence of Aspen suckers, intermediate aged Spruce and the 60 to 80 year old Aspen follows a normal species succession for this area, which progresses from Aspen to Spruce to White Pine. The absence of the White Pine in this location is explained by the Mead Lumber Company operations in this area around the turn of the century.

Feature 3, the fire cracked rocks, could be recent and not necessarily associated with the American Fur Company site.

Conclusion: While no remains of the American Fur Company Fishery activity were located offshore, there is a good deal of information yet to be gathered from the land site itself. Several possible building sites were located and it appears that the site is more intact than Rakestaw surmised in 1967. Further, the location where SISKOWIT, one of the schooners used by the American Fur Company to transport fish, moored off Checker Point and eventually lost an anchor while waiting out a storm, is yet to be located. At minimum the fishery should be considered for nomination to the National Register of Historic Places.

Wright Island Fishery

Historical Background and Description: Historic fishing around Isle Royale, particularly in Siskiwit Bay, by first the Northwest Fur Company and later the American Fur Company has been well documented:

> ... It is the place where the N West Co used to make their fishing for Fort William. There is an excellent harbor for the vessels and it is there where the largest Whitefish are caught in Lake Superior .... (American Fur Company Letters, Lyman W. Warren to Ramsey Crooks, February 16, 1834).

The entire Siskiwit Bay region was a highly sought after fishing location. The location of the American Fur Company's main fishery at Checker Point is further evidence of the excellent fishing in this area.

Within Siskiwit Bay, Wright Island was a very desirable fish camp; its harbor was safe with sufficient water depth and its gently sloping silt and gravel bottom made it easy to both beach small craft and later to build and maintain crib docks. The two points of land on its west side provided generally level ground upon which to build seasonal structures and to lay out nets for drying. Most importantly, the island was close to excellent fishing grounds, with the exception of herring.

The American Fur Company actively sought after and hired Metis and Ojibwa former employees of the North West Fur Company for their Isle Royale base of operations (American Fur Company Letters 1834-1835, New York Historical Society Collection). Cornelius Shaw mentions the continual movement of Indians around Isle Royale looking for employment as fishermen in the late 1840s (July 13, 1847). Knowledge of Wright Island's favorable conditions was, undoubtedly, known to both the Metis and Ojibwa.

The first mining boom on Isle Royale, from 1843 to 1855, brought the first surge in the population on the island. Among those was Cornelius G. Shaw. Shaw's diary also makes frequent reference to a Doctor Wright, who was on the island exploring for copper deposits (Shaw diary 1847). While no direct evidence has been uncovered to unquestionably tie Dr. Wright to the island, it is a reasonable assumption that some connection exists. Dustin also suggests a connection between the English prospector and the island (1946:722).

Fishing activity out of Wright Island is known to have occurred as early as the 1850s. Henry LeSage [a Grand Portage Ojibwa or Metis] had a job stoking the fires under vats cooking the oil out of siskowits. Ships came once a month to pick up the barrels of oil, which was then made into a paint base (Ed Holte oral history, from Cochrane, personal communication 1986). Roy Oberg reported knowing men who saw the "trypots" used in this operation (Rakestraw 1967b:24). A Captain Rogers is also reported to have fished out of Wright Island in the 1860s (Rakestraw 1967b:49).

Seasonal residency on the island was taking place by the 1870s (Duluth News Tribune 1931). Godfrey Vodrey came to Isle Royale in his teens as a part of the early mining operations at McCargoe Cove, however by 1879 he was fishing out of Siskiwit Bay. During the summer Vodrey fished out of Wright Island and wintered in Chippewa Harbor. He continued to fish out of the Wright Island location on a seasonal basis during the 1880s. His rig consisted of "30 boxes, 1,000 hooks" (Lake Superior Interviews, 1894, National Archives, Washington, D.C.). About this same period a small enclave of fishermen, and possibly their families and hired hands, were rendering siskowit and possibly sturgeon on the point of land directly north of the present-day fishery (Cochrane 1983:7). Frank Vodrey and Rassmuss Loening are also reported to have fished out of Wright Island during the 1880s (Rakestraw 1967b:49). By 1893 Vodrey is reported to have moved permanently to Chippewa Harbor, abandoning the Wright Island site, after he became the fish inspector for the Booth Fishery operation (Glenn Merritt oral history tape, September 25, 1965). In the 1890s both Mike and Sam Johnson were fishing out of Wright Island (Rakestraw 1967b:49).

In 1903 or 1904, the Merritts of Rock Harbor purchased Wright Island. While they chose not to live on the island, they arranged to lease the island to Sam Johnson. The terms of the lease provided that Sam Johnson would have sole use of the island for fishing operations. According to Ingeborg Holte, a fish rendering station was still located on the northern point when she arrived with her family in 1903 (Timothy Cochrane personal communication, December 1986). The other fishermen on the island were compelled to move to other locations, abandoning their residences and associated buildings.

While Sam Johnson may have held the fishing rights, a number of relations joined him in fishing from Wright Island. Mike Johnson, Sam's brother fished out of this location until the early 1920s. Mike's sons, Milford and Arnold, followed in the family tradition and were fishermen on Isle Royale (see Star Island Fishery, elsewhere in this chapter). Holger Johnson, another of Mike's sons, fished for 40 years out of Chippewa Harbor. Sam's sons, Steve and John S., fished with their father for a time at various locations. Steve worked with his father until the late 1920s or early 1930s, when he moved to Duluth to help John S. run their father's fish business, Sam Johnson and Sons (Timothy Cochrane personal communcication, December 1986). Sam Johnson's daughters, Alice and Ingeborg, married Charlie Purdy and Ed Holte, respectively. When Ed Holte arrived in 1929, he joined Sam, Steve, and Charlie Purdy. Purdy fished out of Wright Island until the late 1930s. Sam Johnson fished out of this location between 1903 and 1941. Ed Holte fished with his father-in-law until Sam's death in 1941; Holte continued with the help of hired hands until the lamprey took their toll on the fishing. After the invasion of the lamprey in the late 1950s, Ingeborg assisted her husband with the fishing. Finally, Holte worked alone until 1971, when he too died.

Ingeborg continued to run her husband's fishing business with the help of extended family and hired hands until 1980, when she too stopped. Ingeborg stayed on Wright Island during the summer months until 1984; since that time her visits have been shorter and occur irregularly.

Just after the turn of the century, when Sam and Mike Johnson arrived, the present fishery location looked quite different than it does today. The known buildings at the site included a residence for Sam Johnson and his family, approximately 200 feet northwest of the present Holte residence; a one-room semi-subterranean dwelling for Mike Johnson and his family; a fish house and a net house. Other miscellaneous buildings built by former inhabitants and recently abandoned dwellings, probably also dotted this area as well as the point on the opposite shore. The Johnson families, and later the Holte's, built, added on, and tore down various structures, recycling the lumber into "new" buildings. Some of the lumber used in Wright Island structures "recycled" from the Island Mine town site (Timothy Cochrane personal communication, December 1986).

Prior Research: The Wright Island Fishery was discussed by Rakestraw in the manuscript "Post-Columbian History of Isle Royale" (1967b:12-47). Ingeborg Holte wrote about her life on Wright Island in Ingeborg's Isle Royale (1984). The book is filled with reminiscences and bits and pieces about the early fishing around Isle Royale.

In 1984 members of the Submerged Cultural Resources Unit briefly visited the fishery in an effort to document both the remaining buildings and to survey the offshore area for cultural remains associated with the recent occupation and previous fishing occupations dating from the middle 1860s.

Intrusions and Data Limitations: Wright Island has been occupied, just about continuously, by fishermen since the middle 1860s. Various log or frame cottages, store houses, net houses, fish houses, racks for drying nets, and wharfs or landings, were likely constructed, destroyed, and their lumber hauled off for other fishing stations prior to Sam and Mike Johnson's arrival at the turn of the century. The reuse of building materials was common among the fishermen of Isle Royale.

While Rakestraw stated at the time of his investigations in 1967, that the site did not look much different than when William Shiras III photographed it in 1920, there has been considerable change in the buildings and their locations. Sam Johnson burned the meadow to the northwest of the present buildings on a semi-regular basis. This burning has destroyed much of the wooden remains of early buildings (Timothy Cochrane personal communication, December 1986). Two former structures, a fish house and net house, were torn down by Holte in the 1950s. Flower and vegetable gardens were put in by the Johnsons and later continued by the Holtes (Holte 1984). The National Park Service built the existing dock and put in the grill in the 1950s in exchange for services performed for the Park by the Holte family.

Site Location: Wright Island is one of a chain of small islands that separates Malone and Siskiwit Bays on the south side of Isle Royale (Fig. 6.1). The fishery station is located on a small point of land at the mouth of Hopkins Harbor on the southwest side of Wright Island (Fig. 6.10). Both the island and the site can be reached by entering Siskiwit Bay, east of Isle Royale Lighthouse on Menagerie Island, and traveling toward Malone Bay. The largest island in the chain of islands that run northeast to southwest across the mouth of Malone Bay is Wright Island; it is also the westernmost island. Wright Island and Hopkins Harbor are clearly marked on lake charts. The fishery buildings are located at T64N, R36W, Section 2, NW 1/4, SE 1/4 on the USGS 15 minute Isle Royale topographical map

Administrative Status: The Wright Island Fishery is included in the Isle Royale National Park interim Cultural Sites Inventory as an undesignated site, number U-36 (Maass 1984). It does not have a State of Michigan number and is not included on the National Register of Historic Places.

Research Methodology: Visual walking reconnaissance of the fishery site was undertaken in conjunction with a swimming survey offshore. Four hundred linear feet of shoreline, directly offshore of the present fishery site, was visually examined by divers. The shoreline in the bay was also examined approximately 1/8 mile

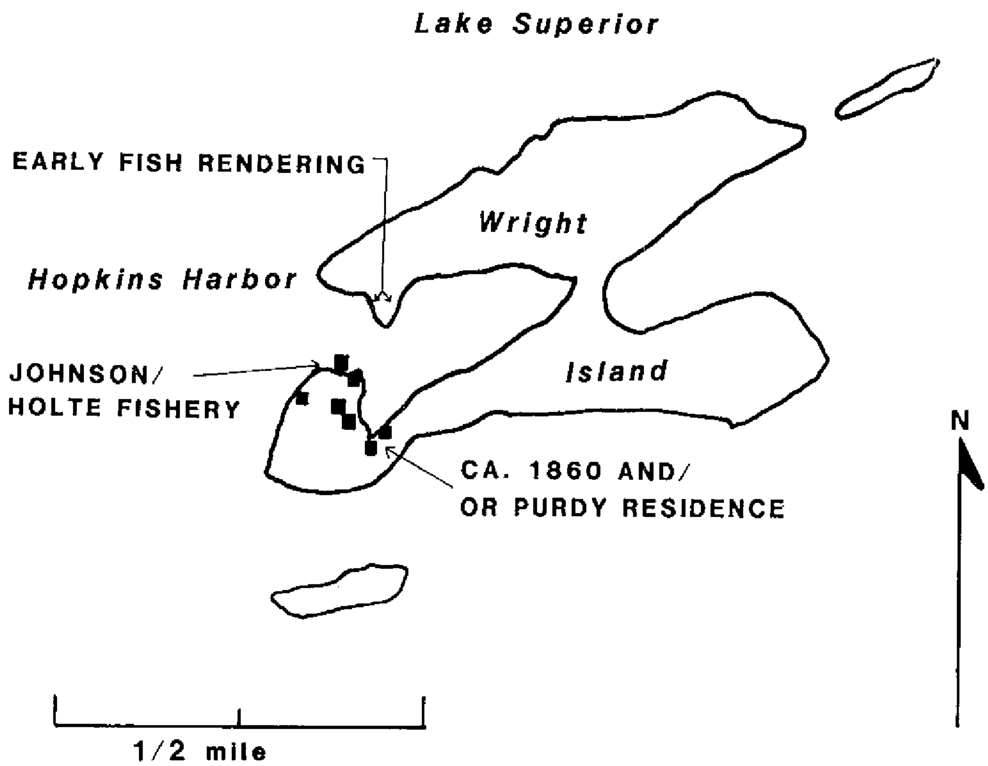


Fig. 6.10. Overview of Wright Island with the locations of the present fishery and historic fishing operations. Drawing by Toni Carrell.

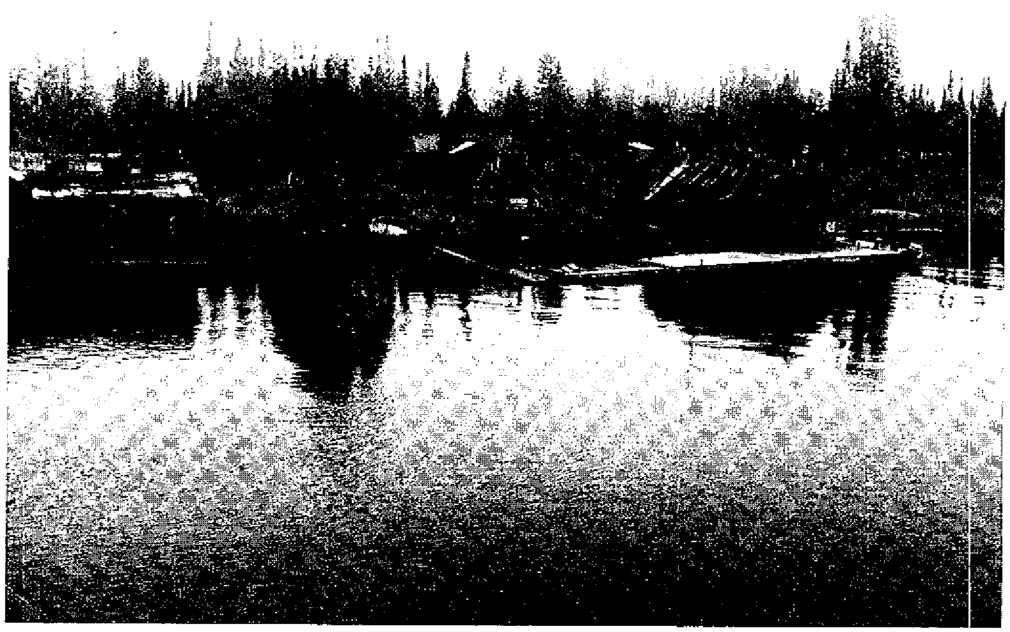


Fig. 6.11. The Johnson/Holte Fishery consists of six structures, including a fish house and dock (right) and a net house (left) on the shoreline. NPS photo by James Bradford.

beyond the present fishery site, to an area adjacent to an 1860s habitation. In all, a little better than 1/4 mile of shoreline was examined by divers.

Site Description: The present fishery covers approximately 3/4 of an acre. The site consists of six structures including the present Holte residence, an early Johnson dwelling circa 1903, a generator house (formerly a cold smoker), net house, fish house and outhouse (Fig. 6.11). An existing crib dock in front of the fish house has been recently repaired. Two additional crib docks, one in front of the net house, and one around the bay behind the net house, are in deteriorated condition. A trash dumping area is located immediately behind the Holte residence.

Two small fishing boats remain onshore at the site, a herring skiff and a double-ended gas boat. Numerous miscellaneous items are scattered around the fishery. They include net floats, a small winch, an engine block, benches, lumber, tables, a saw, a grill, 55-gallon drums, a bird house, a net reel, fish boxes, canning jars and bed frames.

Site Analysis: The extended Johnson families are responsible for the construction of all of the buildings on the site today (Fig. 6.12). They also constructed other buildings that were torn down, burned or recycled into existing structures (Cochrane 1983:9).

The earliest extant Johnson-built family structure is 35 feet north and west of the present Holte residence (Fig. 6.13). This dwelling dates from ca. 1903 when Mike and Sam Johnson moved their families to Wright Island. Built by Mike Johnson for his family, the original portion of this semi-subterranean building is constructed of notched logs. The addition of a kitchen on the eastern side, sometime between 1920 and 1930, created an L-shaped dwelling (Cochrane 1983:18). Unlike the original room, the addition is of frame construction. Cochrane hypothesized that the irregularity in sizes of the milled lumber suggested that much of it was recycled from other buildings (1983:18). The entire dwelling is covered with a tarpaper-covered pitched roof. At some point in the past, possibly when the kitchen was added, the doorway on the northwest corner was boarded up. This building shows signs of deterioration and has not been used since 1973 (Timothy Cochrane personal communication, December 1986).

Immediately behind the Mike Johnson residence is an area of leveled ground where Sam Johnson had built sleeping cabins sometime prior to 1941. These were torn down by Holte in the 1950s (Cochrane 1983:16). No evidence of the structures exists today.

One of the two fishing boats found on the site is lying on shore upside down 20 feet east of the Johnson building (Fig. 6.12). This small fishing vessel, locally referred to as a herring skiff, is in good condition. The vessel is approximately 16 feet long by 5 feet broad and has a flat transom and pointed bow. The skiff is 8 feet west of a marine railway. The railway, extending 4 feet out into the water and an additional 15 feet up onto the shore, was used in conjunction with a small winch to haul the boat up onto the shore. The winch is 5 feet south of the skiff.

Miscellaneous items consisting of two tables, a saw, lumber, benches, net floats, an engine block, fuel tanks, a grill, a wringer washer and tub, and a water heater are scattered east of the herring skiff and in front of the Johnson residence. Examination offshore of the marine railway area revealed a quantity of broken china, tin cans, and wire rope.

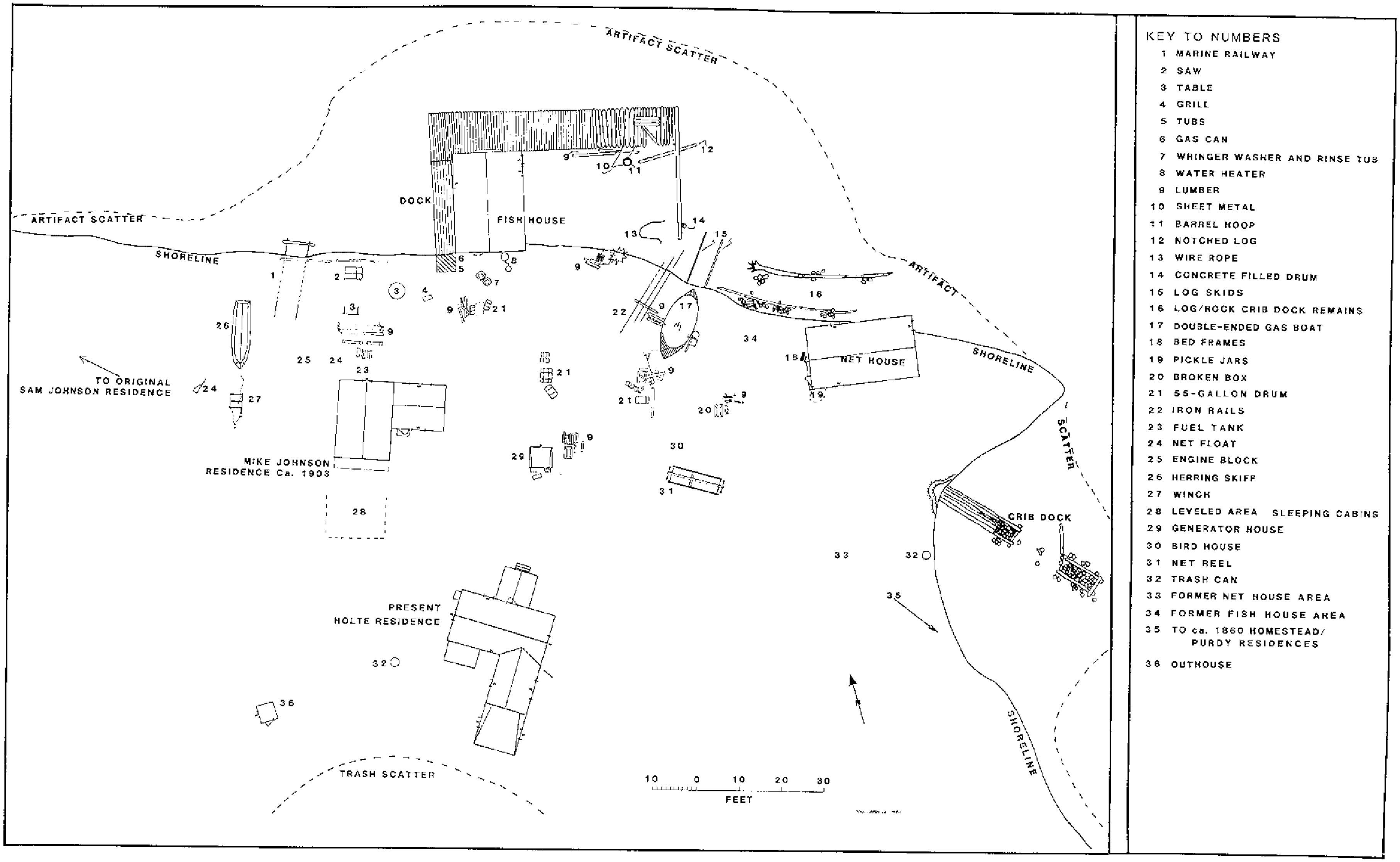


Fig. 6.12. Wright Island Fishery Base Map. Drawing by Toni Carrell.

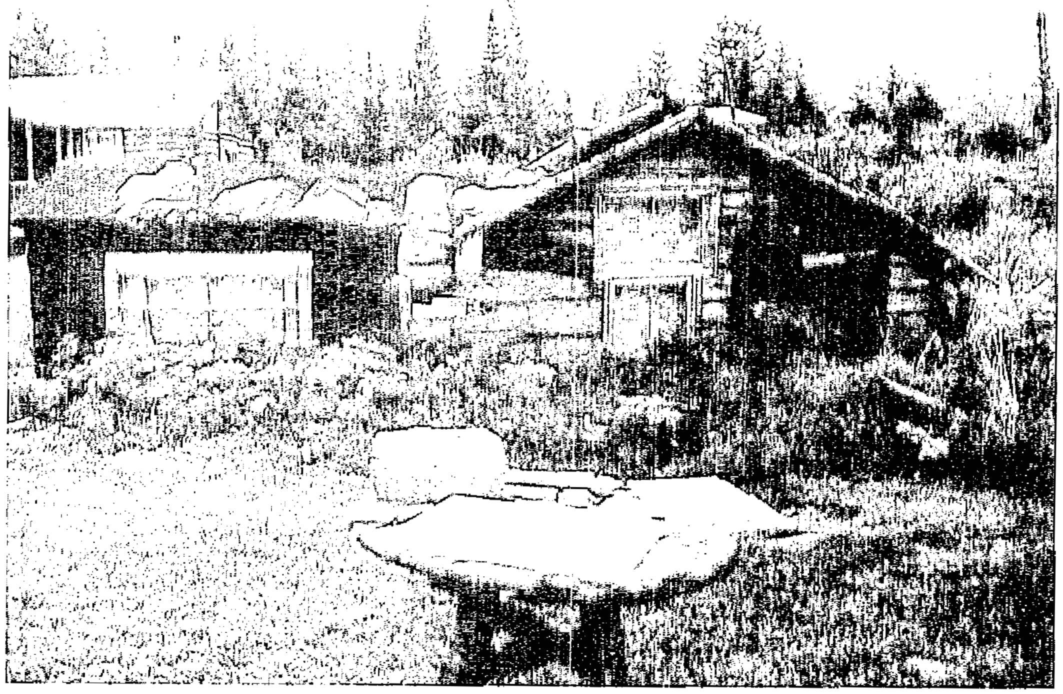


Fig. 6.13. Original Mike Johnson dwelling built in 1903. The use of saddle-notched logs rather than milled lumber is typical of first generation Swedish-American construction on Isle Royale. NPS photo by James Bradford.

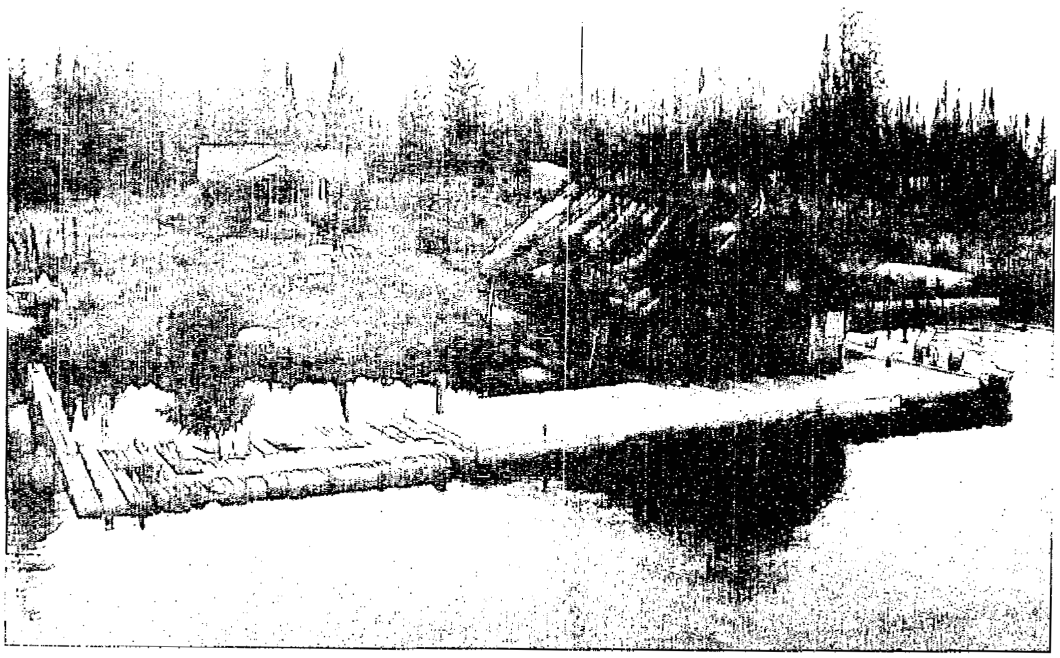


Fig. 6.14. The present Holte residence, located in the center of the site, has a commanding view of the bay. The fish house and dock were built in the late 1940s. NPS photo by James Bradford.

The original Sam Johnson and family residence was approximately 200 feet northwest of the Mike Johnson dwelling (Fig. 6.12). Its former location is indicated only by a roughly square depression. This building may have been burned by Sam in the course of his irregular burning of the meadow. Later, the Sam Johnson family abandoned this building and moved into the "little house" that Mike Johnson had built for his family.

The present Holte residence is approximately 80 feet from the shoreline in the center of the fishery (Fig. 6.14). It was built by Steve Johnson, Ingeborg's brother, in the mid-1920s for him and his wife to live in. The elder Sam Johnson moved into the house with his son and daughter-in-law, which was partitioned into three rooms separated by curtains (Cochrane 1983:9).

This dwelling was remodeled twice, first in the late 1920s adding a wing perpendicular to the original building, and again in the early 1930s, adding a shed-roofed bedroom room at the rear of the wing (Fig. 6.12). The front porch was added in 1935 by Ed Holte for his daughter Karan to play in (Cochrane 1983:15). The pitch-roofed dwelling, wing, and front porch are all constructed of notched logs. The shed-roofed rear room is nailed. The roofs are covered with tarpaper. This structure is in good condition and, at the time of investigation in 1984, was still used on a seasonal basis by Ingeborg Holte.

The existing fish house is located at the water's edge just over 30 feet in front of the Mike Johnson house (Fig. 6.14). The fish house, built in the late 1940s, is frame and plank construction with a pitched roof. This building is built out over the water and has a U-shaped crib dock immediately in front of it. The building is in deteriorated condition with the east wall foundation permitting sagging of that side of the structure, and the roof on the east side having a large hole. The crib dock in front of the fish house has been partially repaired by the National Park Service for continued use by government and private vessels. The submerged area inside the dock contained a variety of remains including paint cans, a barrel hoop, sheet metal, nylon rope, roofing paper, boards, rails, wooden posts, and an engine piston, items clearly associated with commercial fishing activity.

The second boat found on shore at the site, a double-ended gas boat, is approximately 38 feet east of the fish house (Fig. 6.12). This vessel is 17 feet 6 inches long by 7 feet broad and was equipped with a motor amidships; the propeller drive shaft is still articulated with the motor mount. Named SKIPPER SAM, she was built in the late 1920s or early 1930s by Charles J. Hill (Reubin Hill's father) of Larsmont, Minnesota, for Sam Johnson. This gas boat is unusual because it was built so recently; by the time of its construction double-enders had lost out in favor of vessels with a flat transom to more readily accommodate outboard motors (Timothy Cochrane personal communication, December 1986).

Immediately forward of the skiff is another version of a marine railway, two 12 foot log skids are in place underwater to facilitate beaching the boat. On the vessel's port side three iron or steel rails, similar to the ones used in the herring boat railway, are partially buried.

The pitched-roofed net house is located twenty-eight feet beyond the double-ender. This structure was built at about the same time as the present fish house, in the late 1940s. The net house is constructed of vertically-laid logs up to the tops of the windows and doorways (Fig. 6.15). Above that, vertically-laid flat

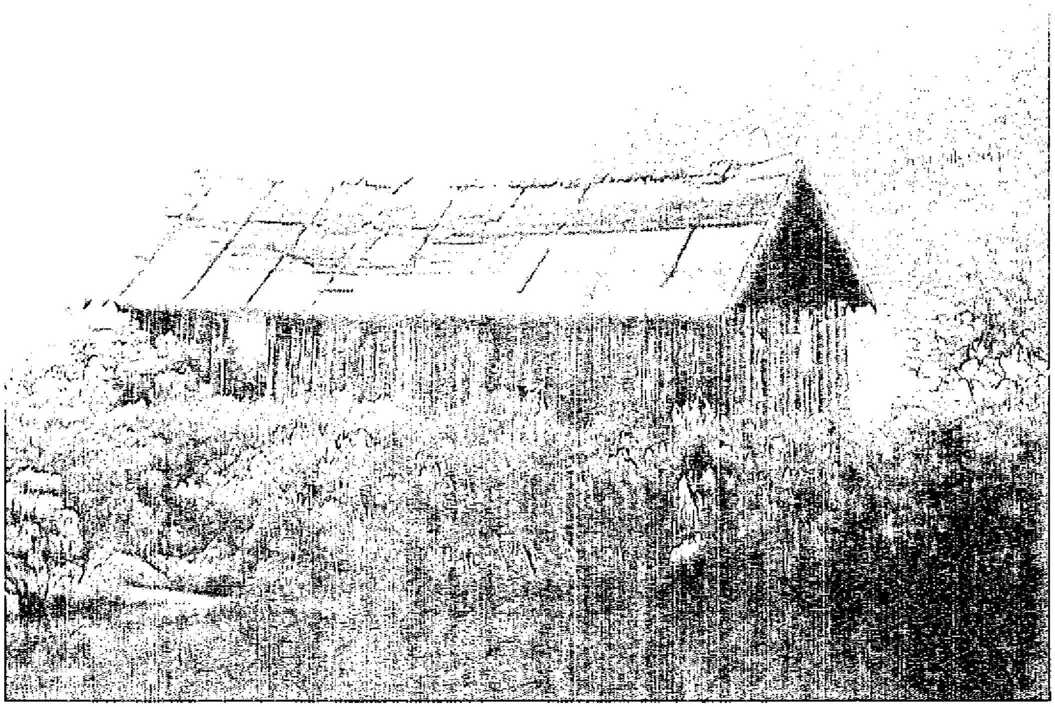


Fig. 6.15. View of the net house from the inner harbor. NPS photo by James Bradford.

Fig. 6.16. Artifact scatter off shore partially obscured by thick organic silt deposits. NPS photo by Toni Carrell.

boards are used. The structure is in deteriorated condition; the northwest corner has slumped off its vertical post footing and the north side of the roof has a hole in it. The northwest corner is now extending out over the water, which suggests that some erosion of the shoreline has occurred in this area. Two bed frames and several canning jars were found scattered around the net house.

Immediately in front of the existing net house are the remains of one of the two deteriorated crib docks. The dock consists of two, nearly 30 foot logs laying parallel to shore (Fig. 6.12). Both logs show evidence of rope wear, presumably from being lashed to other logs in the crib, as well as ax-cut grooves. A number of small boulders are adjacent to the logs. Offshore the artifact scatter in the area of this dock included broken crockery, wire rope, flat boards, and tin cans. This dock serviced a former fish house, torn down by Holte in the late 1940s or early 1950s (Cochrane 1983:19). Like the former net house, this structure was probably built in the early 1900s by the Johnson family. No evidence of this former structure was identified.

Two additional small buildings exist at the fishery site. A generator house is located between the present Holte residence and the fish house (Fig. 6.12). The frame and plank structure is shed-roofed and is in generally poor condition with the roof slipping off of the supporting walls. The structure is 5 feet by 4 feet overall with the low side of the roof on the north side and the high side on the south. The second building, an outhouse, is located approximately 40 feet southwest of the Holte residence.

The third crib dock is located in the inner harbor around the point southeast of the net house (Fig. 6.12). This dock, in deteriorated condition, consists of two rock-filled cribs. One of the crib-sections is adjacent to the shore, while the second section is approximately 35 feet offshore. The crib-sections are 20 feet long by 4 feet 6 inches wide and 9 feet 8 inches long by 4 feet 6 inches wide, respectively. The offshore crib, completely submerged in three to four feet of water, is without walkway planks, while the near-shore crib planks are in very poor condition.

Reconnaissance of the offshore area by divers revealed, among other items, the presence of a quantity of broken crockery, tin cans, leather shoes, a wooden net float, and enamel cooking utensils and a coffee pot. The artifact scatter in this area reflecting domestic activities to a greater degree than those artifacts found in the vicinity of the main dock. The artifact scatter around this dock extends, uninterrupted, approximately 30 feet beyond the end of the second crib-section and 60 feet to either side of the dock.

Examination of the entire offshore area for cultural remains associated with the fishery was hampered by the presence of a thick deposit of organically-rich silt. All observed artifacts were at least partially covered by the silt and hand probing of the bottom suggested that the deposit is at least 12 inches deep (Fig. 6.16).

An earlier net house was located just east of the crib dock in the inner harbor (Fig. 6.12). This log building, probably built in the early 1900s, was demolished by Holte in the 1950s (Cochrane 1983:19). No structural remains of this building exist. The ground surface in the general vicinity of it former location is uniformly flat, with no obvious elevation changes to indicate the building's precise location.

The small bay on the southwest side of Hopkins Harbor, locally referred to as the inner harbor, may have also provided refuge for other fisheries. During an offshore reconnaissance of an area approximately 1/8 of a mile beyond the small deteriorated crib dock the possible remains of another dock were located. A 10 inch diameter cut log, well planted into the deep silt, and a few small boulders were found in approximately 4 feet of water directly offshore. Rakestraw associates a dwelling in this area with Captain Rogers "... who boiled down Siskowit for oil ...." (Rakestraw 1967:24). Cochrane reports that this same location was where Charlie and Alice Purdy had a residence (Cocharane 1983:8). No remains of any dwellings, other than a deep pit, presently exist. No other artifacts were located offshore in the vicinity of this site (Fig. 6.10).

At the time of the Johnson family arrival on Wright Island (circa 1902), other fishermen had well-established seasonal camps there. These were located northwest of the present fishery, on the opposite point (Fig. 6.10). This area was not examined during the survey in 1984. No standing structures from this occupation presently exist on this point.

Conclusion: Wright Island has been occupied by various fishermen since the 1850s, and the present fishery location has extant structures that date from the turn of the century. This long period of occupation presents a unique opportunity for archeologists to study changes in fishing technology that span more than 130 years of nearly continuous activity. In 1984, Carol Maass quite appropriately observed that this site may contain some of the earliest fishing operation information on Isle Royale, other than the American Fur Company sites. Dr. Tim Cochrane stated that in addition to its long period of use, Wright Island has been the site of a variety of types of fishing. Siskowits were rendered there, trout and whitefish salted and put in barrels there, fish were smoked there, and fresh fish were put on ice there for shipment. Wright Island fishermen have used hook lines, gill nets, pound nets and even experimented with seines (Timothy Cochrane personal communication, December 1986). These operations are representative of the most significant historic fishing activities on the island. Not surprisingly, the site contains materials that reflect the dual nature of the activites occurring there, both domestic and commercial fishing. Analysis of these items can provide insights into the lives and priorities of fishermen and their families in an isolated location and in a solitary occupation. It is recommended that the present fishery be added to the State of Michigan archeological site files and that it be considered for nomination to the National Register of Historic Places.

Further research at the site may also lead to the discovery of NORTHERN BELLE, a wooden schooner, reported to have been lost in Hopkins Harbor in 1885 or 1886. The vessel was built at LaPointe, Wisconsin, in 1877 and was owned by James L. Malone, assistant keeper at Isle Royale Lighthouse. NORTHERN BELLE may be one of the oldest documented vessels lost in the Siskiwit Bay area (Holden 1974:106).

Star Island Fishery

Historical Background and Description: Prior to the turn of the century, Two Harbors attorney Gilbert Jelly purchased Star Island on speculation. Evidently finding that his investment would not reap anticipated rewards, Jelly sold the island to Fritz and John E. Johnson (Milford Johnson, Jr. 1986). The half-brothers moved to Star Island in 1918 and set up their fishery. John and his wife, Lorraine Sawyer, had two adopted sons, Hugo and Sigfried, while Fritz and his wife, Ida, had two daughters and a son. The two families lived and worked together at the fishery until 1926, when Fritz and Ida's son drowned; Fritz left Star Island permanently that year, moving to Split Rock. John continued to fish from the island until 1936, when he and his family moved to Duluth. Sale of the island to the National Park Service may have prompted that move.

For two years the fishery sat vacant. After arranging to lease the island from the Park, in the Spring of 1938 brothers Arnold and Milford Johnson[3] moved to Star Island. When Milford and his wife, Myrtle, moved to Star Island they had two sons, Milford Jr. and Frank. Over the next several years five more children were born, Kenny, Arthur, Mary, Bob, and Norman. Arnold and Olga had a son Ronnie, and a daughter, Yvonne.

The brothers worked together fishing for herring, trout and whitefish. During the summer months they took siskowits for eating and smoking. At that time siskowit was half the price of lean trout and the market for them strong (Myrtle Johnson 1986). In the 1940s, with the boom in tourism at the various resorts, Milford and Arnold opened a small fishing and rowboat concession. It was advertised as a:

> Complete motor launch, rowboat and guide service for guests at Rock Harbor Lodge, Belle Isle Camp, and Windigo Inn for fishing parties and trips to scenic points. ... guide leaves boat and accompanies party as guide on hike .... Fishing tackle is furnished for fishing trips (Johnson Brothers brochure, ca. 1940).

When Milford Jr. was old enough, he too took parties out trolling. Pete Edison used his boat and also took fishing parties out for the Johnson's (Milford Johnson, Jr., 1986). The fishing and rowboat business operated until 1949; closure of the resorts and decreasing fish catches made continuing impractical.

At points during this time Arnold fished only in the spring and fall, in the summer he worked for one of the lodges, repaired boats, and ran the concession. Milford, his son Milford Jr., and hired hand Olli Runnig, ran the fish tug JEFFERY for siskowits. By 1951, however, decreasing fish catches had forced Arnold Johnson into another occupation and a move to Two Harbors.

Milford and Myrtle Johnson continued to actively fish out of the Star Island location for several more years. Sometime in 1955, the Johnsons went to Crystal Cove to help Emil Anderson pull in his nets when he became ill, Myrtle relates:

> I liked it, when I got over here. I said I'd like to be here. And he [Milford] kinda rode around with it [for a while], then he asked [Superintendent] Gibbs if we could move over here. And he said, "yeah, any time you want to" (Myrtle Johnson 1986).

With approval from the Park and the knowledge that the Crystal Cove location would provide better fishing grounds, in 1956 Milford and Myrtle moved from Star Island. Following their move, Bob Janke occupied the Star Island location for the 1956 season.

The historical description of the fishery is based upon photographs, interviews, and site investigations. Almost nothing is known of the appearance of the island prior to the arrival of Fritz and John. Milford Johson, Jr., identified foundations on the north side of the island as the remains of an old log cabin, presumably predating

---

[3]Milford and Arnold Johson are not related to Fritz and John E. Johnson. Milford and Arnold's father, Mike was not related to Fritz and John's father Ed, although they were contemporaries.

Fritz and John, and possibly belonging to the island's former owner Gilbert Jelly (Milford Johnson Jr. 1986).

During the Fritz and John occupation, the number of buildings on the island increased dramatically, as borne out by a photograph of the fishery taken in the early 1930s (Fig. 6.17). The fishery was concentrated on the southwest side of the island and several buildings, at least two docks, and a couple of activity areas, can be identified in the photograph. These include: the fish house and small dock (center), an unidentified structure and small dock (right), the fish tug STANLEY partially sunk (far right), net reels for drying nets (behind unidentified structure), log net house (center, behind fish house), residence (left, and behind covered fish tug), boat pull out (far left), and a tool shed (far left, behind boat pull out).

In 1949, a number of the fishery buildings were photographed by the National Park Service. The fish house had changed little, with the possible exception of an addition to the rear of the fish house (Fig. 6.18). The original structure, built of split logs is markedly different in construction from the rear portion of the building, constructed using milled lumber. Additionally, the dock had been improved and raised at least a couple of feet above the level of the lake. The notched log net house appeared unchanged (Fig. 6.19). Arnold Johnson's residence (Fig. 6.20) was located on a small point east of the fish house. If present in the Fritz and John days, this building would have been to the right and just out of the photograph reproduced as Figure 6.17. The construction date of this structure is unknown, although it was there by 1949 when it was photographed by NPS personnel.

Milford and Myrtle Johson's residence (Fig. 6.21), present in the 1935 photograph behind the covered fish tug (left), was remodeled at least once and possibly twice, eventually taking on a "T" shape (Milford Johnson Jr. 1986). This house is on the west side of the island, approximately 60 feet behind the concentration of fishery buildings, and was undoubtedly the residence of either Fritz or John, or both. In 1940 Milford Jr. helped to build a shallow water dock on the west side of the island, in front of their residence. By 1949, a small storage shed was also present north of Milford and Myrtle's residence.

During the 1940's, the fishing and rowboat concession was established on the east side of the island. No buildings are reported to have been built in this area, although a boat pull out and work area were present (Milford Johnson, Jr. 1986). A gas dock, present on the north side of the island in Rock Harbor Channel, was probably built during the 1940s to service the concession launches and the fishery tugs. Both DETROIT and WINYAH used this dock to off load gas.

Olli Runnig, a hired hand during the 1940s, cleared a small point on the northeast side of the island. According to Milford Johnson, Jr., Olli used to go there "to get drunk". The family referred to this area as Olli's Point (Milford Johnson Jr. 1986).

When the fishery was photographed in 1952, one notable change is obvious (Fig. 6.22). Sleeping (tent) cabins are present, behind the fish house and to the east of the net house. The boat pull out area is more clearly shown in this photo. All other buildings remain substantially unchanged.

Other features, not specifically identified through photographs or interviews, include a flower and vegetable garden and a possible outhouse, both in the southwestern half of the island. Finally, a path circumnavigated the entire island.

Fig. 6.17. Star Island Fishery in the early 1930s during the John Johnson occupation (view looking north-northeast). The fish tug STANLEY is partially submerged at the far right. NPS photo by E. C. Greyer.

Fig. 6.18. Rear of fish house showing addition. The original structure, built of split logs is markedly different in construction than the rear portion using milled lumber. NPS photo by C. R. Humberger, 1949.

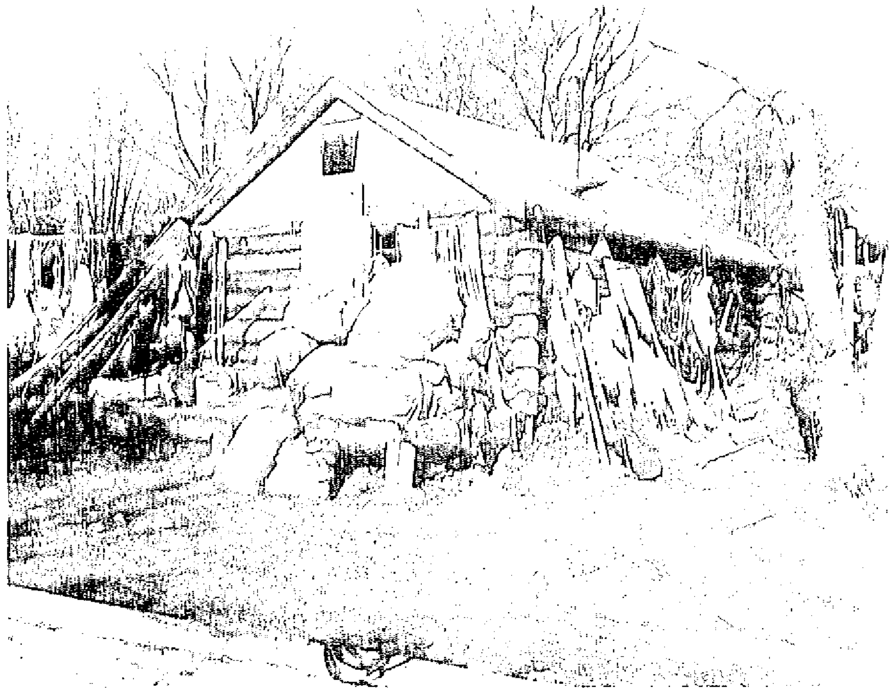


Fig. 6.19. The net house is constructed using simple and expedient saddle-notched logs, rather than elaborate corner notching techniques that typify traditional Scandinavian building. The use of logs, rather than milled lumber, is typical of first generation Swedish-Americans on the northshore. NPS photo by C. R. Humberger, 1949.

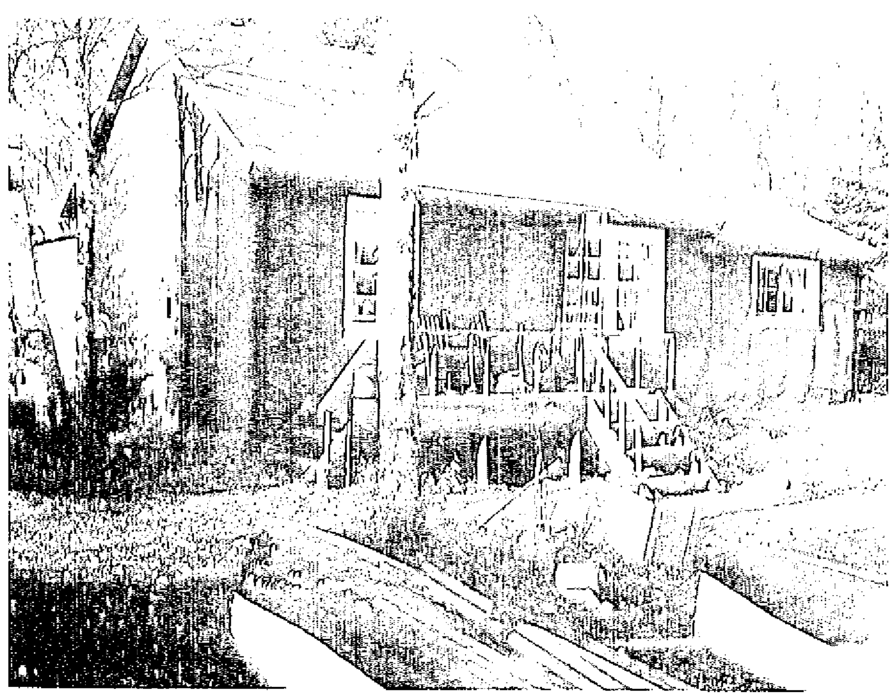


Fig. 6.20. Arnold and Olga Johnson residence was located on a small point east of the fish house. Its date of construction is unknown although it was at the site by 1949 when it was photographed. NPS photo by C. R. Humberger, 1949.

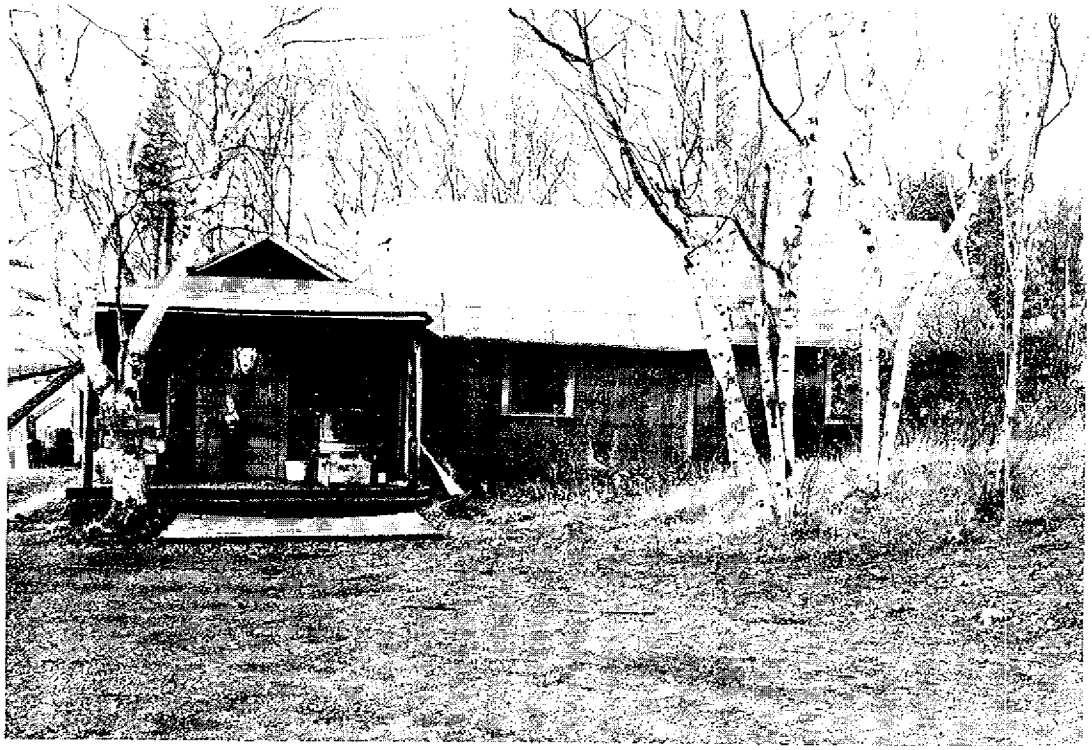


Fig. 6.21. Milford and Myrtle Johnson residence was built sometime during the Fritz and John Johnson occupation (1918-1936). Milford remodeled the structure at least twice, eventually taking on a "T" shape. NPS photo by C. R. Humberger, 1949.

Fig. 6.22. Star Island Fishery in 1952. The only obvious building addition to the fishery, from this view, is the addition of sleeping (tent) cabins behind the fish house. NPS photo by Beaubin, 1952.

Prior Research: The fishery was photographed prior to 1936, and more thoroughly documented in the late 1940s by various park personnel. The Park building files contain historic photographs of the buildings and the Johnson family at the site. In the mid-1950s the Johnson family and the fishery in Rock Harbor were reported on by Hakala (1955:35). Rakestraw inventoried the site in 1967 and briefly discussed it in his unpublished manuscript (1967b:27, 50).

In 1982 participants in a submerged cultural resources workshop visited the site as part of a practical training exercise. The island and offshore areas were examined for cultural remains associated with the Johnson family occupations and the fish tug STANLEY. A base map of the site and nearshore remains was completed (Arthurs 1982). Photographic documentation of the vessel was undertaken, preliminary measurements taken and a rough sketch of STANLEY produced (Labadie 1982).

In 1986 Milford Johnson, Jr. and Ken Vrana visited Star Island and, during a walk and interview, discussed the fishery, its operation, and the former location of buildings and various features. In 1987 a preliminary analysis of the artifact clusters and spatial distribution of features was completed (Nordby 1987).

Intrusions and Data Limitations: After the departure of Johnsons and Bob Janke, who lived at the site for the 1956 season following the move of Milford and Myrtle to Crystal Cove, the National Park Service burned the fishery buildings. In June, 1963, the park removed two docks; those materials with other debris were burned. Non-burnables were buried and top soil was spread over the location to cover the scar. Three men with a tractor were employed for 10 days razing the fishery (National Park Service work order and completion report, June 1963). Rakestraw stated that no trace of the fishery operation remained on Star Island (Rakestraw 1967b:27).

Site Location: Star Island is one of the small islands in an archipelago running southwest to northeast on the southeast side of Isle Royale. The chain, a natural barrier to the open Lake, forms a long protected channel that offers safe refuge against high winds and storm-driven waves coming out of the southeast.

Star Island is located between Inner Hill Island and Davidson Island on topographic maps and nautical charts of the area (Fig. 6.1). The island can be reached by entering Rock Harbor from the west, through Middle Islands Passage, and traveling in a northeasterly direction passing West and East Caribou Islands, Mott Island and Inner Hill Island. The fishery was located on the south side of Star Island and its recorded location is township 66 north, range 33 west, section 8, SE 1/4, SW 1/4 on the USGS Isle Royale 15 minute topographic sheet.

Administrative Status: The Star Island Fishery is included in the Isle Royale Interim Cultural Sites Inventory as an undesignated site, number U-19. It does not have a State of Michigan number and is not included on the National Register of Historic Places.

Research Methodology: A portion of the land area of the fishery site was visually examined through a controlled transect survey and by spot checks around known building sites. The transects, spaced 4 meters apart and 2 meters wide, were concentrated on the western end of the island. The estimated total island area actually covered by transects is about 13 percent; the remainder of the island is forested and covered by dense brush. The "spot checking" consisted of finding archeological features, plotting their locations, and preparing a brief description; when possible, feature function was identified in the field.

Divers conducted 180 degree controlled circle searches, from an established baseline, immediately offshore of the fishery. The baseline was run adjacent to a historic dock visible from the surface. As artifacts or features were found, depth, distance to the baseline, and description were recorded by topside tenders via hardline communications. A rough inventory of the objects in the vicinity of the baseline was also completed by divers, in order to develop an impression of the variety of artifacts in the water for a portion of the site. Divers and snorkelers swam randomly across this area, simply noting objects they saw on slates, but without making an underwater map. The area covered extended to the end of the baseline from shore (approximately 30 meters offshore) and included the lake bottom for about 15 meters on either side of the baseline. Approximate coverage below the water ranged between 800 and 900 square meters.

The fish tug STANLEY, located in the channel between Inner Hill Island and Star Island, was photographed and preliminary measurements and a sketch completed. A cursory survey of the area adjacent to the wreck site was made to determine the extent of wreckage scatter and the nature of associated debris observed. STANLEY, discussed elsewhere in this chapter, will not be addressed here except insofar as some debris from the fishery is present in the vicinity of the wreck.

Site Description: The southwestern end of Star Island still shows evidence of clearing and construction in association with fishery activities. Much of the remainder of the island remains covered by dense trees and brush.

A clearing on the northeast side, known as Olli's Point, is still evident. The fishing and rowboat concession area, on the east side, can still be identified. The foundations of the log cabin and the remains of the gas dock can still be found on the north side of the island. The cribs from the gas dock extend approximately 20 feet offshore.

The former location of Milford and Myrtle Johnson's residence was bulldozed and covered over with topsoil. Milford Jr's. small dock is no longer visible from the surface. Scars along the shoreline for boat pull outs are present, and the clearing that encompassed the Johnson family residences, the fish house, net house, sleeping cabins, tool sheds, and out house is still evident. Foundations or leveled ground from many of these structures are present. Iris and lilacs still bloom in the old flower and vegetable garden.

The dock that serviced the fish house is in deteriorated condition, but cribs are still visible just off shore. Scattered artifacts extend into Loreli Lane, nearly 100 feet from shore.

Site Analysis: A total of 48 features, or clusters of artifacts, were identified and mapped during the site examination. Two additional features were added following the interview with Milford Johnson, Jr., bringing the total to 50. All features and artifact clusters are identified in a base map of the site (Fig. 6.23). A combination key and table (Fig. 6.24) accompanies the base map and is a listing and brief description of all features noted, along with sizes and miscellaneous observations. One column summarizes information from Milford Johnson, Jr., during an on-site interview in 1986. Another column includes comments that link together historic photographs, interview comments, proximity of features, and feature character or

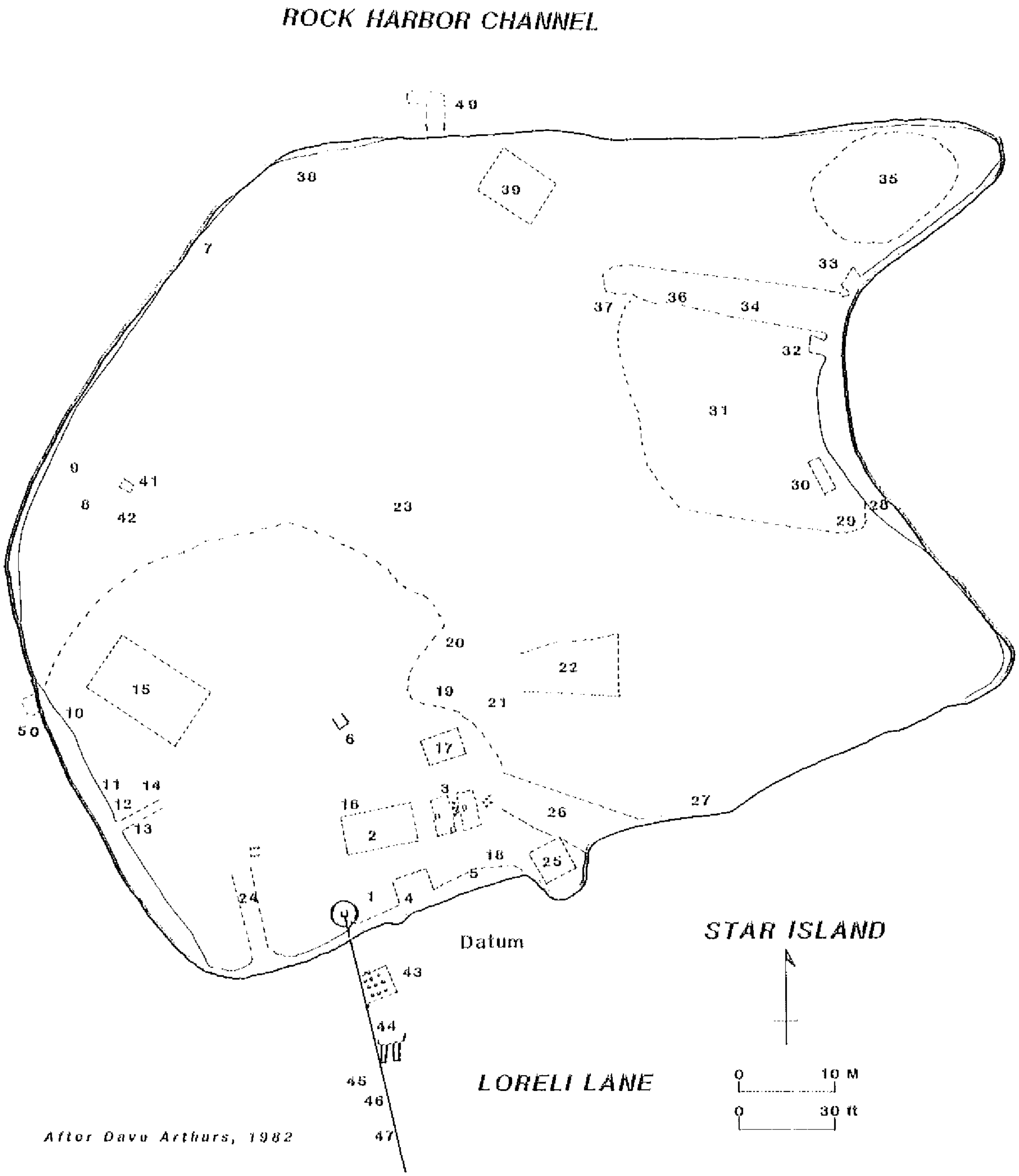


Fig. 6.23. Base map of the Star Island Fishery, after Dave Arthurs 1982.

Fea. No.	Feature Description*	Approx. Size*	Milford Johnson Jr. Remarks 8/23/86	Comments	Functional Association**
1.	Dock footings		L-shaped in plan		Commercial fishing
2.	Building foundations (3m x 8m)	$32m^2$		Net house for fishery based on photographs	Commercial fishing
3.	Two linked cleared areas with poured concrete foundations and rock piles (2m x 3m each)	$16m^2$	Sleeping "cabins"	Tent frames shown in photographs	Domestic
4.	Cut into edge of bank (3m x 4m)	$12m^2$		Backside of fishhouse storage area	Commercial fishing
5.	Aggregate of rocks, perhaps removed from Feature 4 area				Unknown
6.	Rectangular cobble construct $1m^2$ set into north side of low natural ridge marking the highest elevation on the island	$1m^2$		Possible outhouse	Unknown
7.	Assortment of: pipe with threaded end, 1-inch diameter, 6 feet long; large iron rod; 11 18-inch spikes; several notched timbers			Isolated location; prob. cribwork materials	Building materials
8.	Skeg with propeller shaft support 2.5m long, for a 6-inch iron prop, with 6-inch bolts. Propeller bearing diam. is 13/16"		Net house area?	Identified in photos as storage shed ca. 1949; Poss. location of net house in early years?	Mixed
9.	Cut timber (18 feet long, 10 inches wide and 2 inches thick)			Near "net house" (storage shed)	Unknown
10.	Deposit containing: 3 loose hand-made cylidrical net sinkers;wire nails; burned bone; burned glass.			Adjacent to the Milford Johnson residence	Mixed
11.	Bits of wood and wire nails			Adjacent to Milford Johnson residence	Building materials
12.	Concrete pad or block (3 x 4 feet)	$1.25m^2$		Adjacent to Milford Johnson residence	Unknown
13.	Deposit containing: iron; heated glass; bed fitting (?), in cleared area on cobble slope (2mx2m)	$4m^2$		Adjacent to Milford Johnson residence	Domestic

Fig. 6.24. Key to features identified during terrestrial and submerged survey at Star Island.

Fea. No.	Feature Description*	Approx. Size*	Milford Johnson Jr. Remarks 8/23/86	Comments	Functional Association**
14.	Woodpile of 18" lengths			Adjacent to Milford Johnson residence	Probably domestic
15.	Disturbed ground (8 x 11m) (field identification poss. garden)	$88m^2$	Milford and Myrtle Johnson residence	Bull dozed by NPS in 1963	Domestic
16.	Iron belt pulley, 12 inches in diam. with 3 1/2 inch band			Adjacent to log net house	Commercial fishing
17.	Clearing with plastic and wooden, floats, and bits of rope (3m x 2m)	$6m^2$			Commercial fishing
18.	Deposit containing glass, wood, wheel frame, cotton gill net with floats, plastic scraps, ceramics, window glass, fragments of wood stove, lead sinker			Between fish house and Arnold Johnson residence	Mixed domestic & commercial fishing
19.	Fragments of net reels			Near ca. 1935 net reel area, based on photos	Commercial fishing
20.	3-inch diameter pipe, 4 feet long			Behind ca. 1935 net reel area	Unknown
21.	Peaked "roof-like" structure sheathed w/ metal (1.5m x 1m x 1m); cauldron with heavy tar residue			Structure possibly used to treat nets with blue vitreol; on east-facing slope of ridge	Mixed building & commercial fishing
22.	Garden bed containing iris and lilac (6m x 8m)	$48m^2$			Domestic
23.	Area of disturbed ground			Done by bulldozer?	
24.	Elongate depression with large flattened log along edge (2m x 8m)	$16m^2$	Area also had tool shed	Boat pullout based on photographs of ca. 1935 and ca. 1952 fishery	Commercial fishing
25.	Cleared area with concrete block and rock foundation (3m x 5m)	$15m^2$	Arnold Johnson residence	Based on photographs	Domestic
26.	Elongate depression (18m long x 9m to 4m wide); wire netting (dipnet?)	$117m^2$		Boat pull out adjacent to Arnold Johnson residence, based on photographs	Commercial fishing

Fig. 6.24. (con't).

Fea. No.	Feature Description*	Approx. Size*	Milford Johnson Jr. Remarks 8/23/86	Comments	Functional Association**
27.	Assortment of wood planking (4' x 5" by 1" thick) with round wire nails, loose wire nails, brown paper, stove pipe section, can, roofing paper				Building materials
28.	Plywood fish box fragments		Area of rowboat & fishing concession	Recycled?	Mixed tourism and commercial fishing
29.	Assortment of: metal fragments/ sheathing; bits of rubber; brown bottle fragments; wood with metal fragments; stove lid; fragments of firebrick; small foundation stones; ringer washer with roller; crown top soda or beer cans; possible boat fragments; all are associated with a small (2.5m x 1.75m) depression		Area of rowboat & fishing concession	Behind embankment along beach	Mixed domestic, commercial fishing, domestic
30.	Bottle and linear ridge 3.5m by 1m wide	$3.5m^2$	Area of rowboat & fishing concession		Tourism
31.	Clearing containing small piles of rocks, erosion of ridge line		Area of rowboat & fishing concession	Bull dozed area?	Tourism
32.	Rectangular cut in bank edge above cobble beach (1.0m x .5m)	$.5m^2$	Area of rowboat & fishing concession	Associated with boat pullout	Tourism
33.	Irregular cut in bank (erosional remnant? or eroded cut like Fea. 32)		Area of rowboat & fishing concession	Associated with boat pullout	Tourism
34.	Elongate depression (25m x 5m) with internal ridges and grooves. Two transverse logs cross the short axis. In the depression are: one green and one white metal strip with closely spaced tacks; wooden boat (?) fragment with green paint; bow or stern boat skeg fragment	$125m^2$	Area of rowboat & fishing concession	Boat pullout and repair	Tourism
35.	Clearing with light scatter of miscellaneous debris (16m x 12m)	$192m^2$	Olie's Point		Domestic/recreation
36.	Deposit containing: Copenhagen snuff tin; boat patch w/green paint; copper nails		Area of rowboat & fishing concession	Edge of boat pull out; boat repair	Tourism

Fig. 6.24. (con't).

Fea No.	Feature Description*	Approx. Size*	Milford Johnson Jr. Remarks 8/23/86	Comments	Functional Association**
37.	5/8" inch diameter steel cable		Area of rowboat & fishing concession	Far end of boat pull out; used to winch boats out?	Tourism
38.	Rectangular pit (1m x 1m) with paint can	$1.0m^2$		Near gasoline storage dock	Unknown
39.	Foundation (7m x 4m)	$28m^2$	Old log cabin	Near gasoline storage dock	Domestic?
40.	Assortment of: two 1-inch diameter half round iron rods 6 feet long screws at intervals; partially buried tongue-and-groove wood slat 1" wide			Near area identified in photos as storage shed	Unknown
41.	Depression (1m x 1m)	$1.0m^2$	Possible location of early net house	Area identified as storage shed in ca. 1949 photos	Mixed domesitc & commercial fishing?
42.	5/8" diam. rod 9 feet long with threaded end			Possibly a prop. shaft near storage shed ca. 1949	Commercial fishing?
43.	Dock supports; 13 logs forming a rock-filled crib			Submerged dock remains below fish house	Commercial fishing
44.	Posts, 8-12 inches in diameter embedded in lake bottom drop-off			Possible end of dock	Commercial fishing
45.	Unidentified feature			Submerged	Unknown
46.	Assortment of pots, pans, ceramics, and other artifacts			Submerged	Domestic
47.	Barrel hoops			Submerged; lying on channel bottom	Commerical fishing
48.	Clearing			Contains most of fishery buildings and debris	Mixed
49.	Rock-filled cribs		Old gas dock		Mixed tourism & commercial fishing?
50.	Rock-filled cribs		Shallow water dock built by Milford Jr	Near Milford Johnson residence	Domestic

*After Dave Arthurs, 1982

**After L. Nordby 1987

Fig. 6.24. (con't).

contents, when possible. Assignment of a functional association of the object or feature with one of six general categories was attempted in the last column. The categories include: domestic, commercial fishing, rowboat and fishing concession (tourism), building or repair materials (potentially related to any of the first three categories), mixed, and unknown.

In order to simplify analysis, Figure 6.25 indicates the several activity areas discussed above and identified during the survey. Specific feature numbers are included in the text only for identification on the base map and key.

Rowboat and Fishing Concession. Located in a clearing on the east side of the island, it is approximately 20 by 20 meters (feature 31). The area includes: a large boat pullout (feature 34) that contains skids or slides and steel cable; two roughly rectangular cuts in the bank that may be where boats were beached, as opposed to pulled from the water (features 32 and 33); an elongate man-made ridge (feature 30); and an assortment of trash or debris including metal sheathing fragments, wood, beer bottle fragments, stove lid, firebrick, foundation stones, soda can, boat fragments, and a ringer washer with roller. All of the debris is in a small depression.

Both Arnold and Milford Johnson, Sr. maintained and ran boats for their small business. The debris associated with this area, not surprisingly, reflects this activity. The steel cable is located where it may have been used with a winch for hauling concession boats. Building materials are limited to scraps of wood, firebrick, and foundation stones. The small depression near these items is probably a dump. The only items present that are anomalous to boat maintenance and possibly related to tourism, or to Olli Runnig, are the beer and soda bottles and Copenhagen snuff tins. Their identified absence elsewhere suggests that, if this debris is from tourist excursions and was not simply dumped into the lake, it was deposited near the southeast side of the area.

Also present at the periphery of the site are the remains of several fish boxes (feature 28). These may have been used to hold the catches of the vacationers who took advantage of the Johnson Brothers business.

Olli's Point. This is a cleared area (feature 35) with a light scatter of unidentified artifacts on the island's northeast point. With nothing further known about Olli Running, it is difficult to observe much about activities. Based upon Milford Johnson, Jr's. remarks that this location was used by Olli as a place to get drunk, liquor bottles, either on land or offshore should be present.

Old Log Cabin. The 4 by 7 meter foundations (feature 39) are the only evidence of the former cabin. No artifacts were noted in this immediate area. According to Milford Jr., the cabin was either never finished or already deteriorating by the time of their move to the island in 1938.

Gas Storage Dock. The remains of an L-shaped dock (feature 49) consisting of rock-filled cribs was identified in 1986 by Milford Jr. and later visually examined by Submerged Cultural Resources Unit personnel. The narrow shelf on the north side of the island provided an excellent location for a deep water dock, and cribs were found offshore approximately 30 to 40 feet in 10 to 15 feet of water. Miscellaneous, unidentified artifacts, were observed in this location. Based upon the artifacts observed around other cribs at this location, and the proximity of this dock to the rowboat and fishing concession, it can be hypothesized that the artifacts in

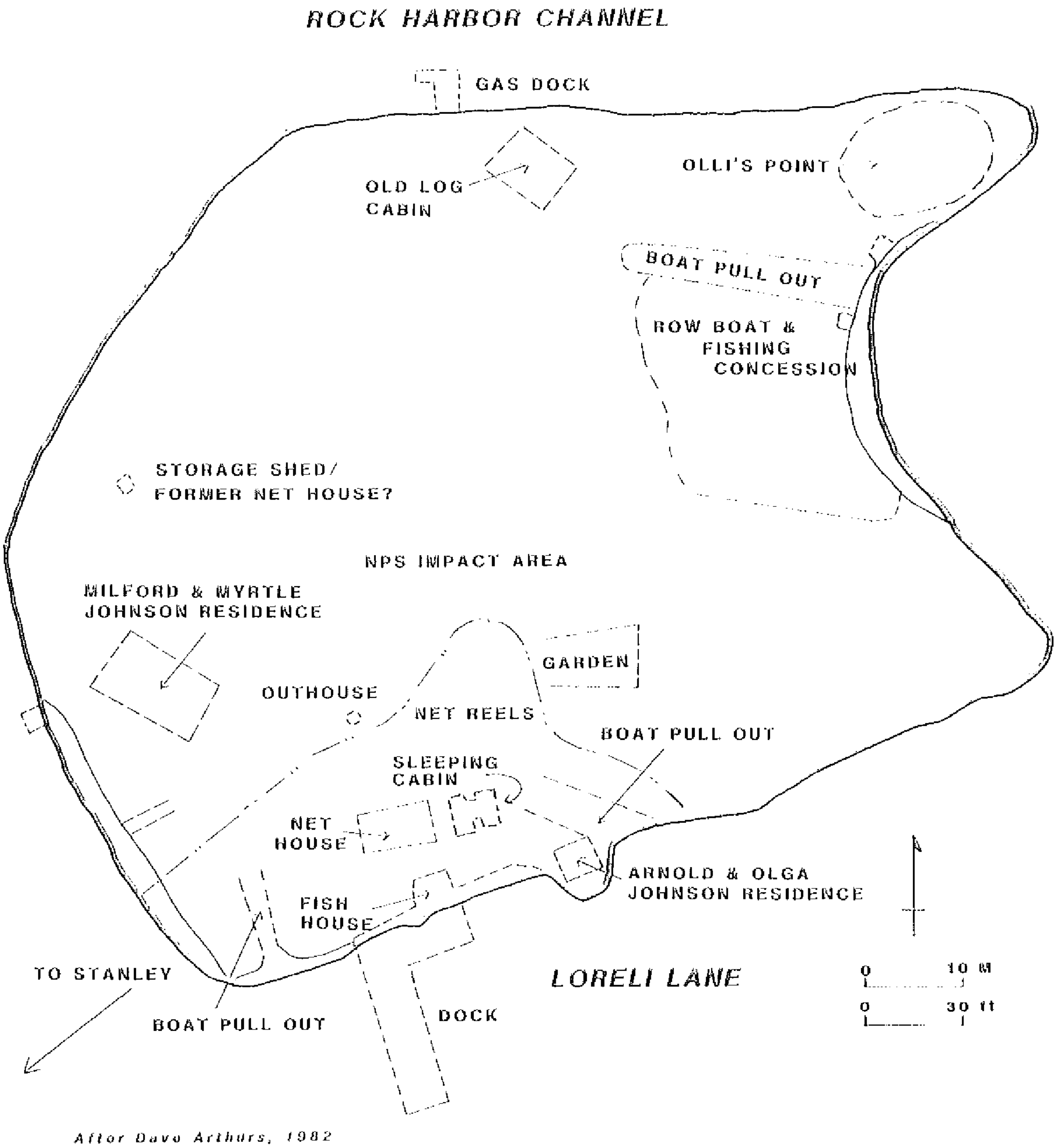


Fig. 6.25. Spatial distribution of activity areas on Star Island. Drawing by Toni Carrell.

this area should reflect commercial fishing and some tourism. A small pit with a paint can (feature 38) may be a trash dump and an assortment of pipe, iron rods, spikes, and notched timbers (feature 7) may be either building materials for or salvaged materials from a crib dock.

Milford and Myrtle Johnson Residence. This general area is more complex and includes a mixture of fishery and domestic features. The Milford Johson residence, the fishery buildings, and the Arnold Johnson residence are tied together in a 50 by 40 meter clearing (feature 48). For purposes of this discussion however, it is separated from the fishery buildings and the Arnold Johnson residence simply on the basis of domestic use.

The major focus of this area is the residence of Milford Johnson, Sr. and his wife, Myrtle (feature 15 on base map, Figure 6.23). The scar observed on site and shown on the base map is rectangular in shape, but Milford Jr. states that the house was T-shaped. This area was bulldozed by the National Park Service and covered over with top soil, effectively removing foundations. Adjacent to the house is a deposit of mixed fishing and domestic debris including net sinkers, wire nails, burned bone and burned glass (feature 10). A second debris area is just south of the house and includes bits of wood and wire nails, a concrete pad or block, iron fragments, heated glass and a bed fitting (features 11, 12, 13). A woodpile of 18" logs is in the same area (feature 14). East of the residence is a 1 meter by 1 meter area that is the possible location of an outhouse (feature 6).

Immediately west of the residence, Milford Jr. identified the location of a small, shallow water dock, built in 1940 (feature 50). This dock, used for non-fishery activities, is no longer visible from the surface, and no underwater reconnaissance was made in this area.

Simply identified as a "storage shed" in National Park Service photographs (feature 41), remains of this small structure are northwest of the Milford Johnson, Sr. residence. Milford Jr. identified this as a former net house area, however the 1949 photograph of the structure does not support this. In addition, the items found in association with this feature, cut timber, rudder skeg with propeller shaft support, tongue-and-groove wood slats, and iron rods, support a storage area identification. The presence of the rudder skeg suggests this may have been a mixed domestic and commercial fishing storage area.

A flower and vegetable garden (feature 22) is removed from the main residence area, but should be included with it. Its obvious tie to domestic use precludes its inclusion with the main fishery area.

Fishery Buildings. This area contains the fish house, net house, dock, sleeping cabins, the residence of Arnold and Olga Johnson, and the offshore dock remains. It is the most complex area, both in terms of the number of features and the scope of identified submerged resources.

The fish house and log net house locations (features 4, 2) are identifiable by a cut into the edge of the bank and foundations. East of the net house, and behind the former fish house location, two poured cement pads are the remains of the sleeping cabins (feature 3). Behind the sleeping cabins is a clearing containing plastic and wooden floats (feature 17). Nearby are bits of rope, fragments of net reels, a peaked roof structure with a heavy cast iron pot filled with "tar" residue and a section of pipe (features 19, 20, 21). These are obviously related to the repair and drying of nets.

All that remains of the Arnold Johnson residence is a cleared area with a concrete block and rock foundation (feature 25). Nearby is a debris deposit containing glass, wood, a wheel frame, plastic scraps, ceramics, window glass, fragments of a wood stove and a lead sinker. With the exception of the lead sinker, all of the remains are obviously related to domestic activities. Another debris area is further east from the house and contains an assortment of wood planking, round wire nails, brown paint cans, a section of stove pipe, and roofing paper. These items are probably of mixed use.

Two boat pull out areas exist, one just to the east of Arnold Johnson's residence (feature 26) and the second west of the main dock (feature 24). Milford Johson Jr. also identified the second pull out area as once containing a tool shed. This shed is visible in photographs of the site (Fig. 6.17).

The remains of the dock consist of dock footings on shore (feature 1) and rock-filled cribs offshore (features 43, 44). Artifacts found in association with the dock included broken dinnerware, white/blue enamel cookware, bottles and jars, toy sailboat, 2 barrels, barrel hoops, engine parts, boat battery, fishing lure, milled lumber, and an unidentified piece of wood. Not surprisingly, these items reflect domestic, commercial fishing and building activities.

NPS Impact. This is an area of disturbed ground (Feature 23) that was probably impacted by National Park Service efforts to "clean up" Star Island in 1963.

STANLEY. The wreck site is linked to Star Island by a light scatter of trash and debris. Artifacts in the vicinity of the wreck are a mixture of remains that can be associated with domestic, commercial fishing, and building debris. It is known that the vessel was abandoned at the edge of the dock by 1935. When asked about the loss of STANLEY, Milford Johnson, Jr. suggested that it was a purposeful scuttle by John E. Johnson just to "clean up" before abandoning the fishery (Milford Johnson Jr. 1986). The scattered materials found in the vicinity of the wreck could have been inside the vessel at one time or been randomly thrown into the channel by the various Johnson families. Rocks and a water tank were observed inside the wreck.

Conclusion: The Johnson fishery at Star Island contains a diverse assemblage of artifactual remains both on land and underwater. The site, occupied continuously for more than 40 years, spanned the period from sail to gas propulsion of fishing vessels and even included an involvement in the tourist industry on Isle Royale. Remains reflect this diversity and additional identification of functional classes of artifacts located during the terrestrial survey may be useful as a reference tool for investigations of other fisheries. This site should be added to the State of Michigan cultural sites inventory.

Minong Mine Town Site and Docks

Historical Background and Description: The Detroit-based Minong Mining Company was organized in December, 1874. This company was one of three organized at the same time by the same backers. The other two companies, the Cove Land Company and the Ancient Land Company, appear to have been involved only in the holding of land for the actual mining arm, the Minong Mining Company. The officers and backers of the companies included S. G. Wright, John Belknof, C. M. Garrison, Charles Root, George W. Gilbert, I. B. Wayne, and Hiram Walker, the well-known distiller (Swinford 1876:62).

At the time the Minong Mining Company, and its sister companies, were organized, nearly all of the land on Isle Royale was owned by the North American Mineral Land Company. Renewed interest in copper mining and better prices prompted the mining company backers to purchase 1,455 acres from North American in 1874. A year later they obtained title to an additional 1,190 acres. By 1875 the Minong Mining Company had title to all of the land in sections 22, 23, 26, 27, 34, and 35 (township 66 north), plus much of the remaining lands west to Todd Harbor (Swinford 1876:61).

The lands purchased were described as being:

> ... traversed by heavy metalliferous belts and transverse veins, carrying copper, elevated one hundred and fifty feet above the lake, and distant but an average of half a mile from the cove .... The exploration of the company was induced by the discovery of a very large amount of ancient mine work, which had been done at some remote period in the past the date of which was antecedent to the traditions of the Indians, and by a race who worked only with stone hammers and fire (Swinford 1876:62).

When the area was explored by mining engineers and geologists prior to setting up the mining operations in McCargoe Cove, a large mass of copper was found in an open pit that had been worked by the prehistoric Indian population. Swinford estimated its weight at 5,720 pounds and described it as showing signs of "ancient hammer marks"(1876:62).

Mining operations began in June, 1875, and were, by all accounts, immediately profitable.

> They have worked from that time [June] to the middle of November a daily average of forty men, and have shipped to Detroit 54,287 pounds of mass and barrel copper, and adding to this the 5,720 pound mass, spoken of above, which came from the same open cut, they have 60,007 pounds, producing 88 percent ingot, leaving at the mine over three hundred tons of very rich stamp rock (Swinford 1876:62).

When Emmett Hoyt Scott arrived at the mine in 1876 the operation had expanded considerably.

> I visited the location again a year later, and Mr. Davis had continued his work in the ancient workings and had probably worked over two acres and had deepened it in several places (Scott ca. 1924:164).

The mining operation was successful for a few years; however, by the late 1870s production began to fall off. The quality of stamp rock being produced was yielding only 1-1/2 percent copper. This was too low a percentage to be mined, stamped and transported profitably. A reference to Isle Royale's prehistoric mines was found in a contemporary newspaper account, "the ancients got the juice and left us moderns little but the acrid rind to nibble at" (Ontonagon Herald 1879).

Jacob Houghton, the well-known Michigan geologist, later remarked in a letter that the:

> mining work done at the Minong was of the very worst. The incline which was sunk ran off the bed and then resort was had to gophering the surface with pits of all sizes ... Something over two hundred tons of ingot copper was produced. [However] too little capital was provided and those who furnished it became tired and quit (Houghton 1896).

At its peak of operations, the mining settlement of Cove had approximately 300 residents (Johns 1965). Two shafts were put down to nearly 300 hundred feet and several open pit quarry mines were worked. Formal operations at the settlement came to an end in 1880, although some people continued to live at the location and the the mine was leased to John F. Johns from 1881 to 1883 (Johns 1965). Finally, in 1885, the mine was shut down completely.

The first year of activity at the mining settlement required considerable preparation and building in the immediate area. Swinford states that "they had to construct everything to work with, having but the dense thicket of brush and timber at their first landing"(1876:61). A warehouse and wharf were built at the mouth of McCargoe Cove so that lake schooners could take on the copper ore without having to actually enter the narrow cove and travel the two miles to the town of Cove. This wharf also served as the debarkation point for passengers and freight, which was then transported to the settlement via small tug.

Work at the mining operation that first year included building a wagon road from the shoreline to the mines, the construction of an ore dock, a start on the railroad to connect the ore dock and mines, the construction of a store, office, boarding house, and cabins to accommodate 70 men with their families for that first winter (Swinford 1876:62).

A visitor to the location the following year later wrote:

> [By 1876] ... they had twelve nice comfortable log houses erected at the foot of the hill and had commenced to erect a small stamp mill upon a little stream close by. [Mine Superintendent Davis] had a good dock of sufficiently large ... size for the location, a good store building and had a good frame house for himself (Scott ca. 1924:169).

In addition, a blacksmith shop was built near the mine shafts and a dam was constructed on a tributary of Chickenbone Creek. The pond created by the log dam was used as a source of water for the steam powered stamp mill.

Prior Research: Among the earliest references to the Minong Mining operations is the Mineral Resources of Lake Superior (Swinford 1876:61-63). Unpublished references include Houghton's letter to George A. Newett in 1896, Emmett Hoyt Scott's memoirs written between 1916 and 1924, and an undated article in the Mining Gazette, circa 1900.

Rakestraw visited the site in 1964 and reported his findings in an unpublished manuscript in 1965, and again in 1967. He stated at the time of his visit to the town site of Cove, that there were no signs of previous habitation (1967a:45).

The area was examined again in 1976 by a Michigan State University researcher prior to the preparation of a national register historic district nomination. At that time, the blacksmith's shop as well as numerous features and machinery related to the operation of the mine were located (McLuckie 1976:3). McLuckie was unable to locate any physical remains of the town or the ore dock found by Rakestraw.

The entrance to McCargoe Cove was examined by Park Ranger Ken Vrana on several occasions between 1982 and 1984. In 1984, Vrana and park volunteer Scott McWilliam conducted underwater reconnaissance surveys in the area adjacent to the present National Park Service dock.

Intrusions and Data Limitations: Edgar Johns reported that a few years after the site was abandoned by his father and his associates in 1885, there was a forest fire that burned the area of the town, the cemetery and much of the surrounding wooded land (Johns 1965). The only building reported to have escaped was the blacksmith shop. The McCargoe Cove area was not affected by the 1939 burn, which destroyed nearly 1/3 of the forested land on the Island.

The present NPS dock was installed in 1957. Dredging operations accompanied these activities and damage to the general landing area occurred. Since that date prop wash from boats arriving and departing from the McCargoe Cove campground using the present NPS dock have caused surficial erosion of the soft silty bottom, impacting cultural deposits associated with this area. Further damage to the area occurred in 1983 when the it was again dredged.

In 1964, Oshkosh Public Museum divers examined a portion of the mouth of McCargoe Cove. They discovered, and later as private individuals, removed a "hand forged" iron folding stock anchor approximately 4 feet in height circa early 1800s. The anchor was donated to the Oshkosh Public Museum. These divers also collected a variety of historic artifacts from around Birch Island, possibly from the Captain Francis Fishery site (Robert Hruska personal communication, November 1986). An unsuccessful effort was made by the National Park Service to have the artifacts returned to the park.

Site Location: McCargoe Cove is located on the northeastern side of Isle Royale (Fig. 6.1). The entrance to the cove can be reached by traveling from the northeast end of Todd Harbor, passing Hawk Island, a distance of approximately 6 miles, or by traveling southwest through Amygdaloid Channel, approximately 2 miles beyond the National Park Service Ranger Station. Todd Harbor, Hawk Island, Amygdaloid Channel, and McCargoe Cove are all geographic place names that are clearly marked on both USGS topographic maps and NOAA nautical charts.

McCargoe Cove is a narrow inlet approximately 2 miles long that is, on average, 300 yards wide. The site of the town of Cove, the Minong Mine features, and the present NPS campground and dock are all located at the southwestern end of the inlet.

Administrative Status: Minong Mine and all of its associated features are included in the Isle Royale Cultural Sites Inventory and are recorded by the State of Michigan as site number 20IR24. The historic town site, called Cove, and the ore dock associated with the town are included in the Minong Mine Historic District, nominated to the National Register of Historic Places in May, 1976. A wharf located at the mouth of McCargoe Cove, referred to as the Minong Mine wharf, is included only in the Park's interim Cultural Sites Inventory as an undesignated site, number U-3 (Maass 1984).

Research Methodology: The McCargoe Cove area was dived intermittently by NPS Ranger Ken Vrana. A "record of dive" form was filled out by Vrana, or others accompanying him, following each dive. This form detailed the dive plan, underwater conditions, purpose of the dive, and any cultural or natural features encountered.

Site Description: The Minong Mine National Register Historic District encompasses 275 acres and includes all of the known prehistoric and historic open pits and vertical mine shafts associated with prehistoric and historic mining in the Minong Mine area. The nomination includes a complete description of all of the known features, as they existed in 1976. The condition of the various features, except for natural deterioration, has changed little since that time. That description is paraphrased below and accompanies Figure 6.26, a generalized site map.

> The district is comprised of a large area of open pits, several vertical mine shafts, piles of rock tailings, a former wagon road, the ruins of a log dam, stamp mill and blacksmith shop, and the sites of a small village settlement [Cove], [the roadbed from] a cog railroad [Figure 6.27], and ore dock, and several horizontal shafts, all dating from the decade between 1875 and 1884.
>
> ... A wooden National Park Service marker identifies the former wagon road which travels .8 mile ... to the copper mine site. Approximately 500 feet north and parallel to the wagon road is the Minong Ridge, the site of prehistoric Indian pits .... The dirt wagon road ... terminates at a large (approximately 6 acres) area of rock tailings and open pits .... About 500 feet west are several vertical shafts ... with no cribbing remaining. Also within this area are the scattered remains of ore cars and the ruins of the former blacksmith shop.
>
> The blacksmith shop ... is of double dove-tailed pine log construction. It is approximately 18 feet across its west elevation and 25 feet deep. A section of each wall remains ... [and] a foundation of a forge, six feet square is still present.
>
> ... Along the tributary [of Chickenbone Creek] approximately halfway between the mining site and McCargoe Cove, is a former log dam. Built in the 1870s, the dam is constructed of both full cedar logs and some lap-jointed log sections. Until the spring of 1974 when a beaver dam built on top of it caused ... it to break, the dam remained almost intact.
>
> Approximately 750 feet east of the log dam are the ruins of the foundation of a steam-powered stamp mill .... Across from the stamp mill is a large area of bare ground. It is possible that this is the site of horse stables ....
>
> At McCargoe Cove, approximately 200 feet south of the present National Park Service dock, Rakestraw located the remains of an ore dock, which were not visible in 1975 .... There are not visible ruins of the settlement, which consisted of a warehouse, office building, store and numerous dwellings (McLuckie 1976).

The large wharf at the mouth of McCargoe Cove is not included in the boundary of the historic district.

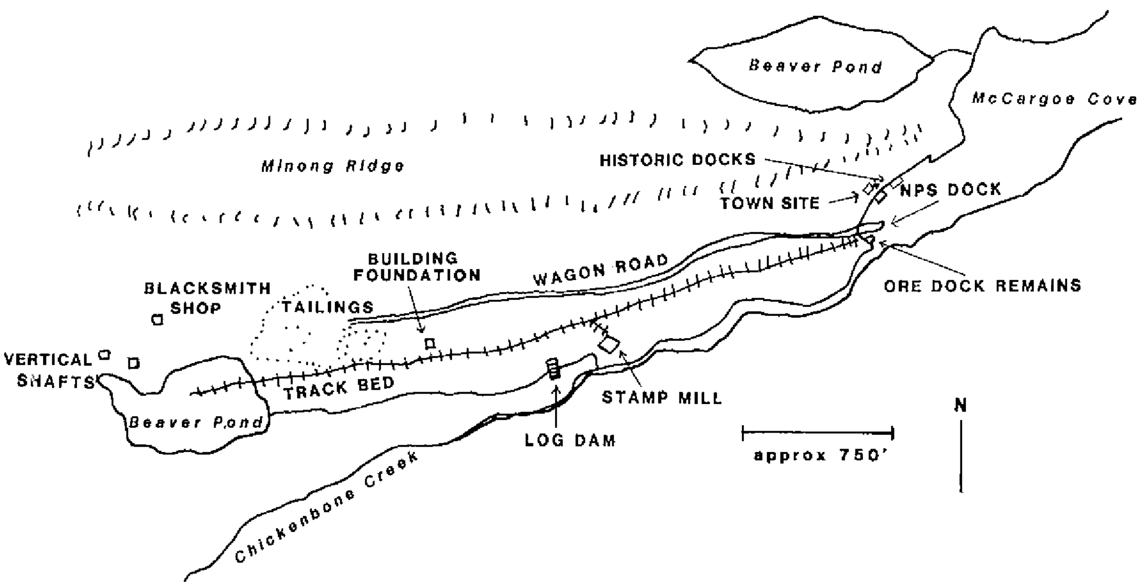


Fig. 6.26. Generalized site map of Minong Mine operation. Drawing by Toni Carrell.

Fig. 6.27. The cog railroad bed is still clearly evident at the Minong Mine site. NPS photo.

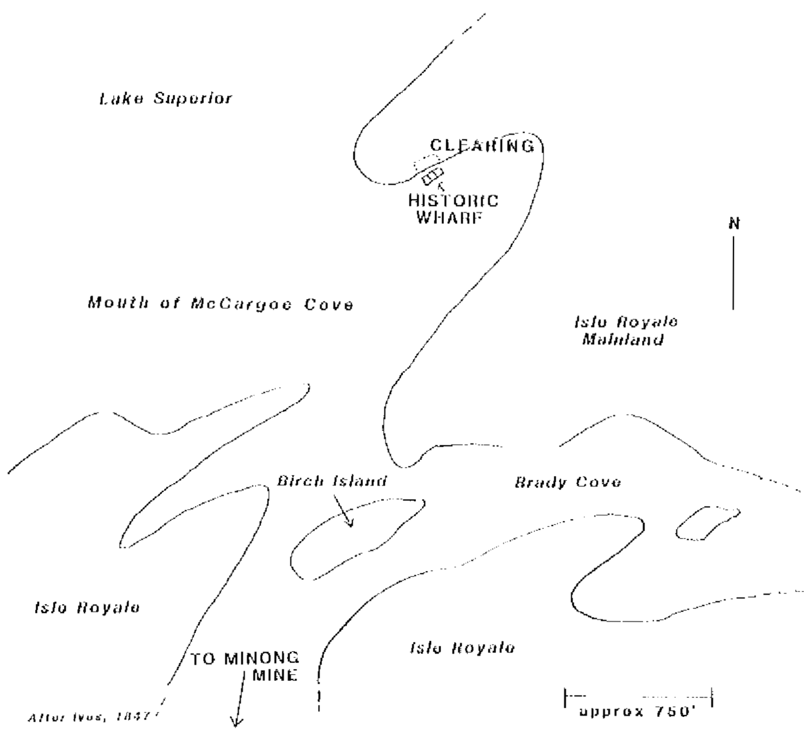


Fig. 6.28. Location of historic wharf and warehouse built in 1870 at the mouth of McCargoe Cove. Drawing by Toni Carrell.

Site Analysis: The most prominent features inside the mouth of McCargoe Cove, and one that has been recorded by the park as an undesignated site, are the remains of a large wharf (Fig. 6.28). The wharf, along with a large warehouse, were built in connection with the Minong mining operations in 1875. Photographed by F. W. Childs, the wharf was readily apparent and still partially planked over in 1937. While it is impossible to determine whether this was original planking, or a later repair job done by local fishermen, the materials used for the job were quite surprising; old freighter hatch covers (Fig. 6.29).

The cribs associated with this wharf were still protruding above the surface of the water as recently as the 1950s (Fig. 6.30). The cribs for the wharf are about 30 to 40 feet off shore, and each crib is approximately 12 feet square. The original size of the wharf was probably close to 60 feet wide and extended 40 feet from the shoreline to the deepwater side. When Maass recorded this site in March, 1984, she noted that while the cribs no longer broke the surface, they were still visible.

Rakestraw reported that the Oshkosh Public Museum divers found a cargo of machinery in the narrow entrance to the bay in 1964 (1967:45). On three separate occasions between 1983 and 1984 Park Ranger Ken Vrana, accompanied by another NPS diver, conducted reconnaissance surveys at the mouth of McCargoe Cove; the purpose of these dives was maintenance-related. Vrana observed some of the same materials reported to by the Oshksoh divers 20 years earlier. Iron machinery, pieces of wheels, broken china or other utility ware, plus a kedge anchor dating from the period of the mine are present (Vrana 1983). There was no evidence to suggest that the remains represented a cargo of machinery, rather they may have been discards or, in the case of the wheels, used to attach markers to indicate reefs in the entrance.

Investigation of the area offshore from the historic town site revealed the presence of two previously unrecorded docks (Fig. 6.31). The larger of the two docks, 30 to 35 feet in length, runs parallel to the shoreline and was constructed of rock-filled cribs 8 to 10 feet on a side. The timbers used in the construction of the cribs are fastened by wooden dowels, both round and square spikes and large steel drifts. The deepwater side of the cribs are approximately 20 feet from the shore in 10 feet of water (McWilliam 1984).

This dock was probably the utility dock used by the town for loading and unloading passengers and miscellaneous freight. Scott (1924:69) refers to a dock "of sufficiently large size" at the town site; the dock described by McWilliam is probably the dock that Scott mentioned. The presence of a historic dock in the location of the present NPS dock has been confirmed by Bob Janke. The long time maintenance worker at the Park observed the remains of a dock in 1954, prior to the 1957-58 construction of the present NPS dock (Janke personal communication, March 1987).

A second, smaller, dock was found just north of the utility dock. Located in water that is not deep enough to accommodate any but very shallow draft craft, this may have been a secondary docking site. Cribs, constructed of dove-tailed logs pinned by spikes similar to the utility dock, are in deteriorated condition.

The town of Cove consisted of at least a warehouse, store, boarding house, office and more than a dozen log cabins, was reported to have burned sometime between 1880 and 1891 (Rakestraw 1967a:45). During Rakestraw's reconnaissance in 1967

Fig. 6.29. Old freighter hatch covers were used in either the construction or repair of the Minong Mine wharf at the mouth of the cove. NPS photo by F. W. Childs, 1937.

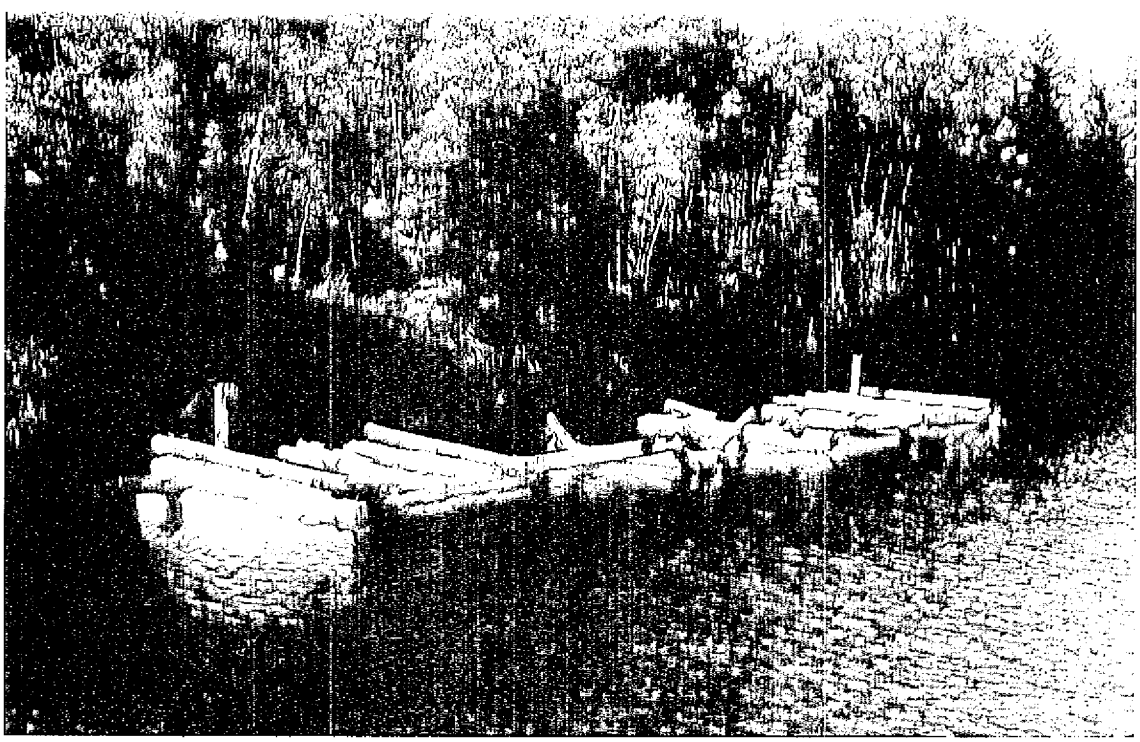


Fig. 6.30. The cribs associated with the wharf were still protruding above the water in the 1950s. NPS photo.

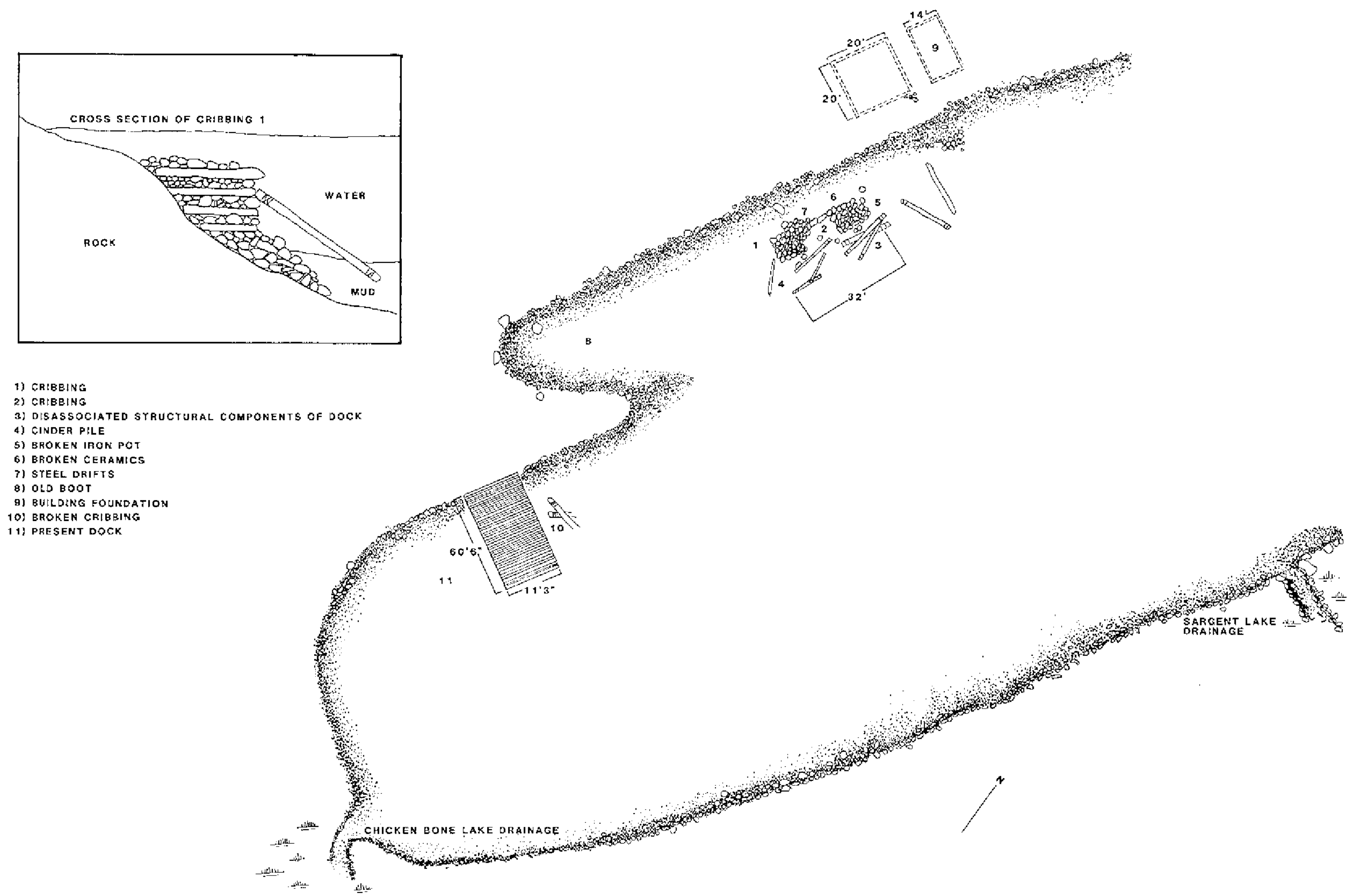


Fig. 6.31. McCargoe Cove town site and dock sketch map. Drawing by Toni Carrell.

and later during the survey by McLukie in 1976, no remains or foundations from the town were located. In 1984 McWilliam and Vrana discovered several foundations on shore in the same area as the docks. Two structure foundations, 14 feet by 20 feet and 20 feet by 20 feet were documented in a sketch map.

The ore dock that Rakestraw reported in 1967 as being 200 feet south of the present NPS dock was not relocated by McLukie in 1976, nor were the remains of a dock in that location found by Vrana and McWilliam. The reported location of the ore dock may be erroneous as McWilliam and Vrana found the remains of an early dock just a few feet northeast of the present NPS dock. The prop wash from the visits of the large ferry VOYAGER II have created a natural test pit adjacent to the present dock. In that "test pit", McWilliam and Vrana found dove-tailed timbers and pins (McWilliam 1984). When the present NPS dock was constructed in 1957, the dredging and site preparation activities destroyed much of the old ore dock. The silt from Chickenbone Creek fans outward from its mouth, creating a small delta. In order to create and maintain sufficient water depth around the present NPS dock, removal of the silt build-up was necessary. Despite dredging in 1957 and again in 1983, a wide variety of historic materials associated with the mine remain in the very silty bottom.

Conclusion: The area at the mouth of McCargoe Cove would benefit from additional research regarding the 'wheels' reported by Rakestraw. Were the wheels simply anchors for buoys to guide schooners or steamers into the mouth of the cove and to the main wharf, or were they, as Rakestraw suggests, part of a lost shipment of machinery? The cribs located just inside the bay, presently listed by the park as U-3, should be documented and added to the existing Minong Mine Historic District.

The cribs located just offshore of the town site, possibly referred to by Scott, should be investigated. The nature of the settlement would have required the construction of both a utility and an ore dock. The presence of the cribs reinforces the need to extend examination of cultural sites to include offshore components. In this case, the remains of the structure foundations for the town were discovered only after divers located the cribs.

The known foundations from the town site should be documented and a thorough survey conducted for additional structural remains. Presently the trail from the campground to the lake passes directly through the foundations of the larger building; re-routing traffic to a second, currently unmaintained scenic lakeshore trail in front of both buildings, is recommended to reduce further impacts to this site.

The remains of the old ore dock along with the area surrounding the present NPS dock, should be documented. Dredging in this location should be prohibited until the site is investigated. Impacts from the prop wash from VOYAGER II will have to be reduced as much as possible. Limiting the amount of time the prop is actually turning while the vessel is at the dock is one alternative.

All of the offshore remains and the associated docks at the southwestern end of the cove are presently located within the Minong Mine Historic District. Further, the underwater components of this site are closed to all diving activities.

The land portion of the Minong Mine Historic District is clearly significant, based upon National Register of Historic Places criteria. What is not as clear, is that the underwater areas associated with this district are equally significant. The mining operation was established at the location of prehistoric copper mines. The possibility of remains, from the prehistoric period through the late 1880s, could prove to be among the most significant to be found on the Island. Their scope potentially includes prehistoric pottery and hammerstones, late Nineteenth Century mining equipment and tools, as well as the 'refuse' from the town of Cove. The majority of the discards found offshore are from a population of 300 men, women, and children, whose lives revolved around mining and survival in a wilderness frontier. Those remains can provide us insights into a lifestyle and an era that would not otherwise be available through examination of similar land sites. The historic district is a strong candidate for the development of an interpretive brochure to guide interested visitors.

Island Mine Town Site, Powder House, and Wharf

Historical Background and Description: In the early 1870s, the North American Mineral Land Company sponsored several copper explorations to Isle Royale. Samuel W. Hill, an experienced surveyor, was hired by the company to examine high probability areas and report his findings. As a result of his discovery of prehistoric Indian pits and copper bearing rock near Siskiwit Bay, the company set up an operation in that vicinity. This company may have been backed by Quincy Mining Company capital, because the president of Quincy Mining served as both as secretary and treasurer of the subsidiary of American Mineral Land Corporation, the Island Mining Company (Daily Mining Gazette 1969).

The new operations on Isle Royale evoked a great deal of interest in the region, as evidenced by a newspaper account at that time:

> [Headline] Explorations for copper will be conducted in Isle Royale Island and strong financial backing is assured -- Concern has just been incorporated and papers have been filed in Lansing.
>
> Of great interest to Keweenaw County residents is the news from Lansing, which says that the Island Copper Company [sic], a $1,000,000 corporation, has filed articles of incorporation with the secretary of the State of Michigan. The offices of the company are at Houghton and Duluth, and it's operations will be confined to Houghton and Keweenaw Counties, Michigan. ... The company is capitalized at $1,000,000 divided into 40,000 shares at $25 each. ... It is believed that the majority of the incorporators are temporary directors. When the organization of the company is perfected, the real backers of the enterprise will come out (Keweenaw Miner, March 19, 1872).

In the fall of 1873, a town was laid out by the Island Mining Company, and work began in earnest for the construction of roads, dwellings, shops, a warehouse, powder house, stamp mill, tramway, sawmill, and a large wharf. It was reported that nearly half of the annual production of the Ashland, Wisconsin lumber mills, approximately 400,000 board feet of lumber, was purchased by the Island Mining Company and taken to Isle Royale for the ambitious construction project (Rakestraw 1967a:40).

Glenn Merritt recounts how his father, Alf Merritt, was involved in the construction of roads and exploration for copper around the island at this time:

> ... the next time [my father] went to Isle Royale was in 1873, when he had taken the contract to build about two miles of road from the head of Siskiwit Bay up to what was known as the Island Copper Mine. This took him almost 'till snowfall ... to complete as much as they

could .... I think it was right around Thanksgiving time when they decided they'd have to get out of there .... They couldn't complete the road so they had to leave in 1873, that fall, and sail back to Duluth in a Mackinaw boat with his eleven men. Then he came back the next year, in 1874, to complete this road so they could haul the machinery up to the location or claim where they were going to prospect for copper.

After he completed the road, he stayed that summer and worked with Captain Samuel W. Hill ... who was famous for his name because he was probably one of the most profane men that ever stepped on the island. They put down test pits in various places around the island that summer, looking for copper (Merritt 1965).

In the spring of 1874, a letter was received at the Portage Lake Mining Gazette, a small local newspaper, from two Island Mine residents:

> ... Our people are all well and in good spirits. There has not been a single case of sickness, nor one injured at the mine. Four men met with an accident while quarrying rock at the dock last fall, but they are all out now. Everybody seems to be contented, and there has not been a single breach of peace since close of navigation. This is not bad for a population of 130 people. Yours truly, Pick and Gad (Rakestraw 1965:13).

In addition to the summer explorations in 1874, the winter of 1874-75 was devoted to intensive prospecting for veins of copper (Christian 1932:10).

The mine flourished for a few years under Island Mining Company proprietorship. Three shafts were eventually laid down going to depths of 250, 150, and 50 feet, respectively. Overall, the mining operation was the second largest producer of copper on the island. Between 1874 and 1878 the claim produced 213,245 pounds of refined copper (Butler and Birbank 1929).

In 1873, at the same time that the Island Copper Company was gearing up for production at Isle Royale, the copper mining industry was weakening. The price of copper began a steady decline. In 1876, a fire destroyed much of the wharf, above the water line, and swept up the road toward the settlement. Sarah Christian, the young wife of the mine superintendent, reported on the extent of the fire in a privately published reminiscence of her life at the mine during 1874 and 1875.

> ... While we were at service in our little church, one of the men came in ... and said, "The dock is on fire and every man here is asked to go to the rescue." All with one accord responded. ... When we arrived what an appalling picture we found. Men black with smoke and sweat, eyes bloodshot, breath coming in gasps. It was awful! ... All of our officials were there directing, working by the side of the men. They were fighting to keep the flames away from the powder magazine. ... The men in command, realizing this was to be a big fight of indefinite length, organized the men into shifts and sent home for a few hours of rest, sleep, and food those who were most exhausted.
>
> It was two days and nights of hardship and terror ... for the men who had to make the physical effort to fight the fire and hope against hope they might stop its further progress .... The only road out was at the wharf and the fire was roaring up the road through the woods right

toward our Location. The only [other] way out was a trail to the north, a mere footpath winding through the pine forest ....

> By this time the roar of the fire was warning us of its nearness and blazing embers blown by the wind fell on our roofs and into our woodpiles .... Small boys helped ... keep the roofs cleared and pulled [the embers] off the woodpile all over the Location. ... We knew we must very soon start on our march [into the woods] or the flames would overtake us .... This was Tuesday afternoon. ... then the only thing that could save us came -- rain. ... The rain came down in torrents and lasted all through the night and the next day, and ended all menace of fire (Christian 1932:36-41).

The combination of the fire, the downward trend in copper prices, and declining quality of copper being mined from the settlement, resulted in a loss of confidence by investors in the mine. The Portage Lake Mining Gazette reported that all work at the mine had ceased as of September 23, 1875. The Island Mining Company cancelled contracts for supplies, materials, machinery, and even offered their tug, MAYTHEN, for sale (Rakestraw 1965:14).

Ironically, a legislative act creating the new county of Isle Royale, with the town site at Island Mine being the county seat, was enacted on March 4, 1875, just 6 months before the company ceased operations (Dustin 1946:699).

The following year, 1876, the mine was leased to the Island Tribute Company who set up a small stamp mill. This company stamped rock that had already been mined and did not engage in further excavation. This operation was short-lived and was also put out of business as a result of a fire. In 1879 all operations at Island Mine ended.

While little or no physical remains exist at the town site, both Sarah Christian and Kate Eliza Knowels-Conary have provided first-hand information about the site.

> [Our] house was a story and a half frame house. It had, along with the boarding house, the distinction of being the only frame house on the mine, though I had rather hoped for a log house. ... The company store was very abundantly stocked with all in the way of salt meats, fish, and such canned vegetables as were available so many years ago. [In addition beef] was hung in a cold shed.
>
> We had a little building used for school weekdays and for worship on Sundays, and for the midweek prayer meeting. ... [and the doctor's] abode was in rooms back of his office, which was a comfortable log cabin (Christian 1932:6-17).
>
> At the foot of the hill was what was called "officer's row." ... Then there was another row nearer the mine called "miner's row." The little houses were there. ... There was a little school with about 25 children attending. ... [Once] there was a big explosion at the mine. And in this little cemetery these men were laid to rest. A rickety fence was made around the little plot. ... There might have been about six or seven men killed. ... When we left Chicago, we came over on the MANISTEE. We were nine days on the Great Lakes. ... It was a big one [wharf] at Siskiwit Bay (Conary 1939).

The historic description of both the powder house and wharf is conjectural and is based upon information gathered in 1982 during examination of the sites. The powder house is constructed of locally available sandstone. The dimensions of the structure were approximately 40 feet 6 inches by 20 feet 8 inches and the walls stood at least 12 feet high. It has only one door, on the north side, which is 3 feet wide and 6 feet 5 inches high, made of cast iron. No physical remains at the site could be absolutely attributed to the roof.

The large wharf below the town was laid out in the shape of an "L". It was between 410 and 420 feet in length, on the long side, and is 155 in length on the short side of the "L". The width of the wharf varies from 36 feet on the long side to 35 feet on the short side. None of the extant cribs reaches the surface of the water, so it is not clear how high the wharf was. It is estimated that it stood at least 14 feet high, at its highest point. The present-day water depth is 14 feet; however, lower lake levels in the past prevailed, and the wharf may have been 14 feet or less.

Prior Research: The earliest published reference to Island Mine is Alfred C. Lane's Geological Survey of Isle Royale (1898). Other references include Sarah Barr Christian's published narrative of her life at the mining settlement during the years 1874-1875 (Christian 1932). Mrs. Kate Eliza Knowels-Conary, a childhood resident at the mine, was interviewed in 1939 by a Daily Mining Gazette staff reporter; a short article appeared in June of that year on her remembrances about the town and the mine. Both Fox (1911) and Dustin (1932:5 and 1957:10) referenced the mining operations, while Hakala focused on the development of the Island Copper Mining Company (1955:27, 31).

The site was visited by Rakestraw in 1964 as part of the background and documentation for the historical base map of Isle Royale. At that time he examined the powder house on Senter Point, the mine, its directly associated machinery, and features including the stamp mill, the rail line, and the tramway. Rakestraw followed up on the 1964 work at Island Mine in 1966, when he examined and briefly reported on the town site, cemetery, and historic wharf (Rakestraw 1967a:2, 39-43).

The site was visited again in 1975 by archeologists from the National Park Service Mid-West Archeological Center who recorded the mine, town site, and cemetery for the State of Michigan archeological sites inventory.

In 1984 Isle Royale cultural resources specialist Carol Maass, park rangers Ken Vrana and Craig Axtell, and Submerged Cultural Resources Unit archeologist Toni Carrell, visited the site in order to document the historic wharf and examine the offshore area for additional cultural resources.

Intrusions and Data Limitations: The powder house and town site survived the 1874-75 fire that swept through the area. That fire, which began below the town, eventually destroyed much of the wharf above the water line. Contemporary reports of the fire indicated that it was confined to the wharf and the area from the wharf up the road toward the town (Christian 1939:35-39). A second fire at the stamp mill in 1879 effectively ended operations at the mine.

Rakestraw reports that building remains from the town were visible until the early 1930s. Civilian Conservation Corps veterans told Rakestraw that they were still able to "trace out the streets" in the 1930s and contemporary photographs in the National Park Service files show the presence of buildings (Rakestraw 1967a:41). It is also reported that much of the structural lumber from the town was removed during the 1920s and 1930s by local fishermen, a common practice on Isle Royale (Rakestraw 1967a:41).

The 1936 fire, which destroyed nearly one-third of the island, may have also swept through the area of the town. Reports of the exact path of the fire are confusing. If the fire did come through this area the resulting destruction, when combined with the removal of lumber by fishermen, would have effectively eliminated most of the surface structural remains of the town.

Site Location: Island Mine and its associated features are located in the northwest corner of Siskiwit Bay (Fig. 6.1). The powder house can be reached by traveling in a westerly direction from Point Houghton toward Senter Point, a geographic place name clearly marked on USGS 15 minute topographic maps and NOAA nautical charts. The powder house is on the northeast corner of the point and is recorded as being within Township 64 North, Range 37 West, Section 34, NW 1/4, SW 1/4 (Fig. 6.32).

A small cove, locally known as Carnelian Beach, separates the location of the powder house from the mine, town site, cemetery and wharf. These latter features can be reached by traveling northeasterly across the bay from Senter Point, a distance of approximately 1 mile. The mine is recorded in Section 29, N 1/2, NW 1/4, NE 1/4, and the cemetery is recorded in Section 28, S 1/2, SW 1/4, NW 1/4. The town site is recorded as being within T64N, R37W, Section 27, S 1/2, SE 1/4, NW 1/4. The historic wharf is clearly visible just beneath the surface of the water below the town site. The town site can be reached by walking up a well-defined road, a distance of approximately 350 feet, to a broad flat terrace.

Administrative Status: Several of the cultural features associated with the operation of Island Mine have been identified and recorded by the Park and the State of Michigan. Island Mine, the town site, and the cemetery are all included on the Isle Royale Cultural Sites Inventory. They are are recorded as archeological sites numbered 20IR11, 20IR8, and 20IR12, respectively. The powder house at Senter Point is listed as U-42 on a park maintained list of undesignated sites (Maass 1984). The historic wharf associated with the town is not specifically included in the archeological survey form, nor is it included on the classified structure field survey or historic structure work sheet; the latter two are internal park documents (Cellar 1975). None of the sites are included on the National Register of Historic Places.

Research Methodology: NPS divers examined an 80 foot wide corridor, down to a water depth of 10 feet, immediately offshore of Senter Point. Coverage extended from the extreme northwest side of the point, around the tip, to the southwest side.

A diver survey was also conducted immediately offshore of, and directly adjacent to, the historic wharf below the town site. The shape of the wharf determined the area of diver coverage that extended out 15 feet beyond the extant remains and down to a water depth of nearly 20 feet.

Site Description: The remains of the Island Mine powder house are on a small peninsula, surrounded by a dense undergrowth of shrubs and small trees (Fig. 6.33). The sandstone structure covers approximately 840 square feet and is the only building at the site. No other features or artifacts were found on shore.

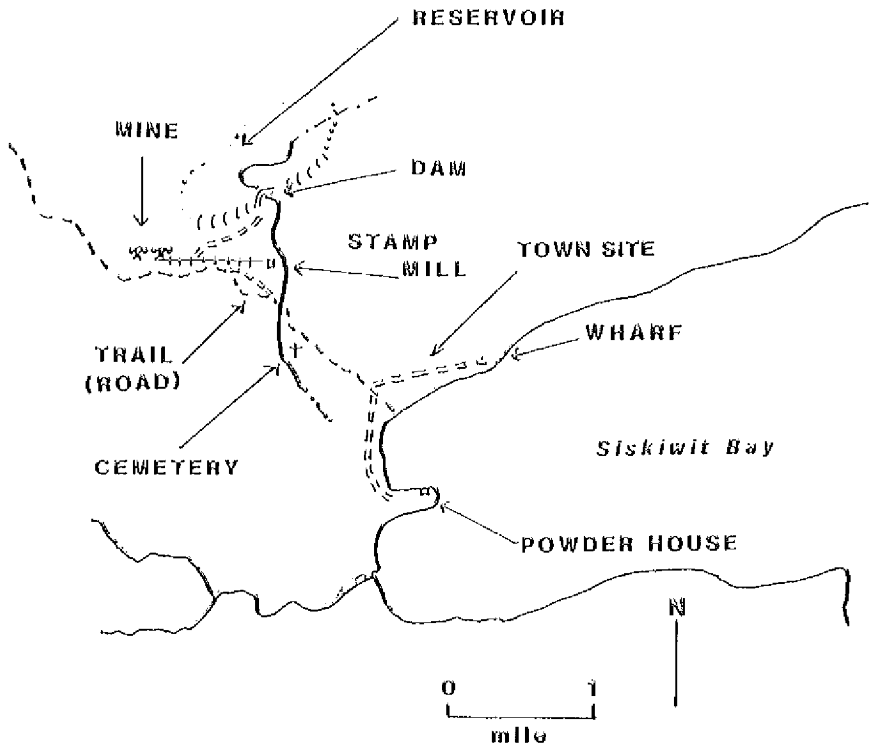


Fig. 6.32. Island Mine town site, wharf, powder house and associated features. Drawing by Toni Carrell.

Fig. 6.33. Remains of the powder house on Senter Point. NPS photo by Carol Maass.

The extant remains of the historic Island Mine wharf consists of 32 cribs in the shape of an "L". The overall dimensions of the remaining cribs are 360 feet by 36 feet on the long side and 155 feet by 35 feet on the short side. The extant cribs begin approximately 55 feet offshore in 5 feet of water. The long side of the crib is on a true bearing of 155 degrees.

The only evidence of the former location of the town is a large broad flat terrace.

Site Analysis: The powder house is in poor condition, with no roof and the walls in various states of deterioration. The 40-foot 6-inch by 20-foot 8-inch structure is constructed of native sandstone. The 2/3 of the east facing wall is missing; it stands only 4 feet 9 inches high at its highest point. The north wall is in good condition and is a full 12 feet high along most of its length. The south and west walls are also in good condition, reaching a full 12 feet in height along most of their lengths. The building has only one door, which is on the north wall. It is 4 feet wide and 7 feet tall. The original door and frame, made of cast iron, is still on its hinges. The 3 foot by 6-foot 5-inch door is in an excellent state of condition.

A road from the historic Island Mine wharf serviced the powder house location (Fig. 6.32). It appears, however, that the road was only a secondary access route from the mine and town. The primary access was by boat, less than one mile across Carnelian Bay. Evidence for the water route being the primary access is provided by the powder house structure. The only door faces north, toward the shoreline and Carnelian Bay, rather than west, toward the road. Water transport of the unstable explosives used at that time would have been safer than carrying it several miles over a bumpy dirt road. Further, examination of the rocky offshore area immediately in front of the powder house door resulted in the location of numerous iron spikes similar to those used to pin logs together to form cribs for docks. The presence of these spikes strongly suggests that a small dock was built on the north side of the peninsula to facilitate loading and unloading of explosives.

The offshore survey of the north side of Senter Point resulted in the discovery of numerous artifacts. As previously mentioned, several 11 inch iron spikes were found widely scattered north of the powder house door. In addition pieces of broken crockery and two small aluminum bowls were found in the same general location. The five-inch diameter bowls have a rolled lip and the word "Kellog's" embossed in the bottom. The crockery and bowls do not appear to be from the Island Mine era, rather they probably date from the early 1930s, when the Civilian Conservation Corps had a camp nearby. That camp is discussed in greater detail elsewhere in this chapter. In addition to the spikes, crockery, and bowls, several pieces of sheet metal, 1 to 1 1/2" wide and 1/2" thick, were found wedged into the rocky bottom. There were no markings or other identifying features on the pieces of metal that would suggest their function or purpose.

The wharf cribs across the small bay, below the town site, are in various states of deterioration. Arranged in double rows in the shape of an "L", the wharf cribs consist of 30 11-foot by 11-foot sections and 2 35-foot by 15-foot sections. The double sections are at the foot of the "L" and at the end of the short side, respectively (Fig. 6.34). The width of the historic wharf was 36 feet on the long axis of the "L" and 35 feet on the short axis. This measurement is based upon the overall width of extant crib rows.

The cribs are constructed of white pine logs, notched on the ends, and pinned together with 11 inch iron spikes (Fig. 6.35). These spikes are identical in size and

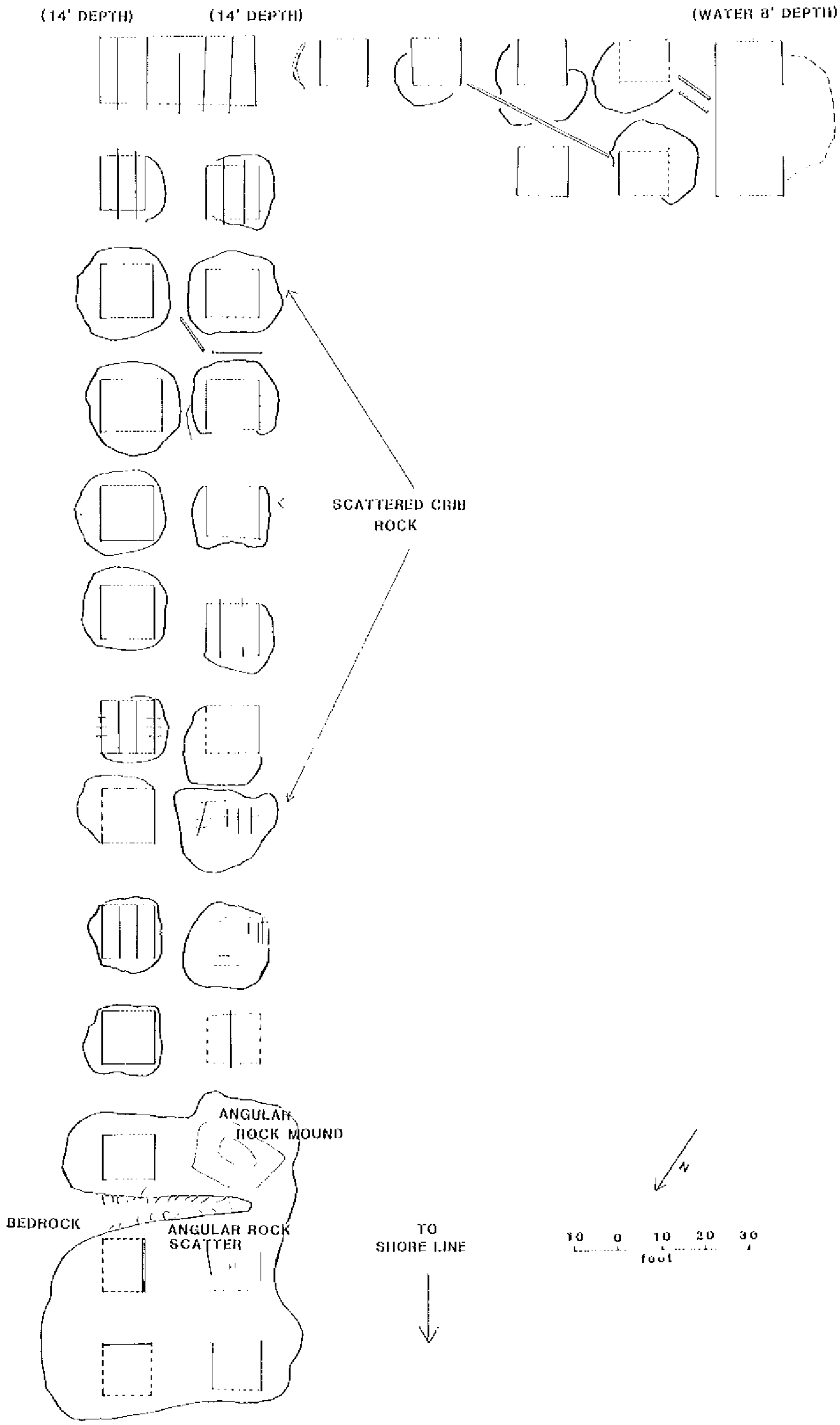


Fig. 6.34. Island Mine wharf base map. Drawing by Toni Carrell.

Fig. 6.35. Rock-filled cribs used in the wharf were constructed of notched white pine logs pinned together with iron spikes. NPS photo by Toni Carrell.

Fig. 6.36. Buoys mark the outline of the extant cribs. The NPS boat is anchored on the deepwater side of the wharf. NPS photo by Carol Maass.

shape to those found offshore of the powder house across the bay. The cribbing logs range in size from 12 inches to 24 inches in diameter. None of the cribs reach the surface of the water, although they vary in height from one course of logs, i.e. 12 to 24 inches, up to just over 8 feet 6 inches high. The cribs are filled with rounded boulders, and some have spilled out and are resting upon the bottom.

The cribs do not extend from the shore line, but start 55 feet offshore in 5 feet of water. Natural deterioration of the cribs most likely accounts for their absence closer in-shore. It is estimated that the overall length of the wharf when it was built in 1872-73 was between 410 and 420 feet (Fig. 6.36). This estimate is based upon the distance of the extant cribs from the present-day shore line. The overall height of the wharf, at the deep water side, is estimated to have been 14 feet.

The diver survey of the area around the extant cribs did not result in the location of any notable artifacts that would have been associated with historic occupation of the area. Rakestraw reports finding machinery associated with the mine along the shore line during his 1966 survey. No historic period machinery or tools were found around the wharf in 1982, although crib pins were found scattered around the rocks. Recent beer bottles and aluminum soda cans were found in the general vicinity.

Conclusion: The town site, powder house, and wharf areas contain material remains that are representative of the period from 1871 to 1880, as well as some remains representative of the early 1930s. Mining activities resulted in major impacts to the ecology and economic development of Isle Royale. The remoteness and intermittent nature of both communications and transportation forced these early miners to be completely self-sufficient. Their discards, as well as other material remains, may be able to provide additional information about their daily lives and what was considered important for survival in what was essentially a "frontier" town.

It is recommended that the powder house, its off-shore component, and the wharf below the town site be listed with the State of Michigan in the statewide archeological sites inventory. Unless extensive additional research is conducted at both the powder house and wharf to prove otherwise, it does not appear these sites individually contain sufficient intrinsic significance to warrant their nomination to the National Register. These sites, together with the other remains associated with Island Mine, can contribute to the significance of a historic district. This area should be considered for nomination to the National Register of Historic Places as the Island Mine Historic District.

This area is also an excellent candidate for self-directed interpretation. A simple brochure outlining the history of the mine and all of its associated features, including the powder house and dock, coupled with a sketch map with the various features indicated, would provide the visitor insights into an important part of Isle Royale's history.

Ghyllbank Mining/Lumbering Wharf

Historical Background and Description: Following the closure of the last of the copper mines in the early 1880s, the North American Mineral Land Company decided to sell off its holdings on Isle Royale. In the latter half of the 1880s the British were making substantial investments in American mines and the holdings of the North American Mineral Land Company came to the attention of a British syndicate. The syndicate eventually purchased not only the North American holdings, but the

Minong interests as well, a total of approximately 84,000 acres for $3 an acre (Rakestraw 1965:15). The charter of the Isle Royale Land Corporation permitted them to explore for copper, but not to mine it. A subsidiary company, the Wendigo Copper Company was founded by the parent syndicate and 8,000 acres were set aside for it in the Washington Harbor area.

Edgar John's recalled some of the history of the development during an interview in 1965:

> ... it was 1889, there was some surveyors came from the south shore, and they were from the English syndicate ... and they owned about two-thirds of Isle Royale, or half of it, the west end. They came over and got [my father] to go with them, and they surveyed ... all over the west end of Isle Royale. Then they went back, nothing was done that year. But then the next year they came over and started to mine, and they hired [my father] right away to be in the mine ....

The Wendigo Copper Company conducted extensive explorations at the head of Washington Harbor. Shafts and prospects were dotted along Washington Creek. At the same time the headquarters settlement of the Ghyllbank Copper Company was developed. It consisted of a huge log office building, store houses, sheds, boarding houses, log cabins and a large wharf (Fig. 6.37). In addition at the mining location, approximately 2 miles inland on Washington Creek, the settlement of Wendigo was developed. It consisted of a number of log cabins for the workers on location plus two boarding houses for the single men.

> ... they built two big boarding houses, because half of the men wasn't married, and part of them was married, you see. And all those single men; [my mother] had about 50 or 60 of them in that boarding house, and she ran that boarding house all the time that the mine was working, and took care of the miners (Johns, 1965).

The entire community numbered approximately 135; less than half were men and there were at least 20 children. Regular passenger and mail service was provided by the steamer TAYLOR on a twice weekly schedule (Johns 1965).

Between 1890 and 1892, a number of roads were built as far inland as Lake Desor. Trenches and diamond drill cores were dotted across the west end of the island. No active mines resulted from all this activity however, and in 1892 the mining operations were shut down and members of the camp were transported back to the mainland.

Speculation about the ultimate success of the Isle Royale Land Corporation was at its height despite the discovery that the ore was too poor to profitably mined.

> How does this strike one for a visionary scheme, if carried out what a paradise Isle Royale will be. It comes from ... Messrs. May and Feldtmann, connected with the Isle Royale Land Corporation of London. ... The [Washington Harbor] area is well timbered with maple, birch, cedar, poplar and other woods indigenous to that latitude. The purpose of the company is to [harvest] timber in the line of manufacture for the market. The grand purpose of the company, however, is to convert the holding into a great water-bound game preserve and sportmen's and pleasure seeker's resort (<u>Lake Mining Gazette</u>, July 28, 1892).

While no specific information is available to indicate whether much or any commercial lumbering occurred at Ghyllbank after closure of the mine, evidence of

Fig. 6.37. Ghyllbank was established in Washington Harbor in 1889. The town site included store houses, sheds, boarding houses, log cabins, an office and a large wharf (center). Photo by A. C. Lane, circa 1890s.

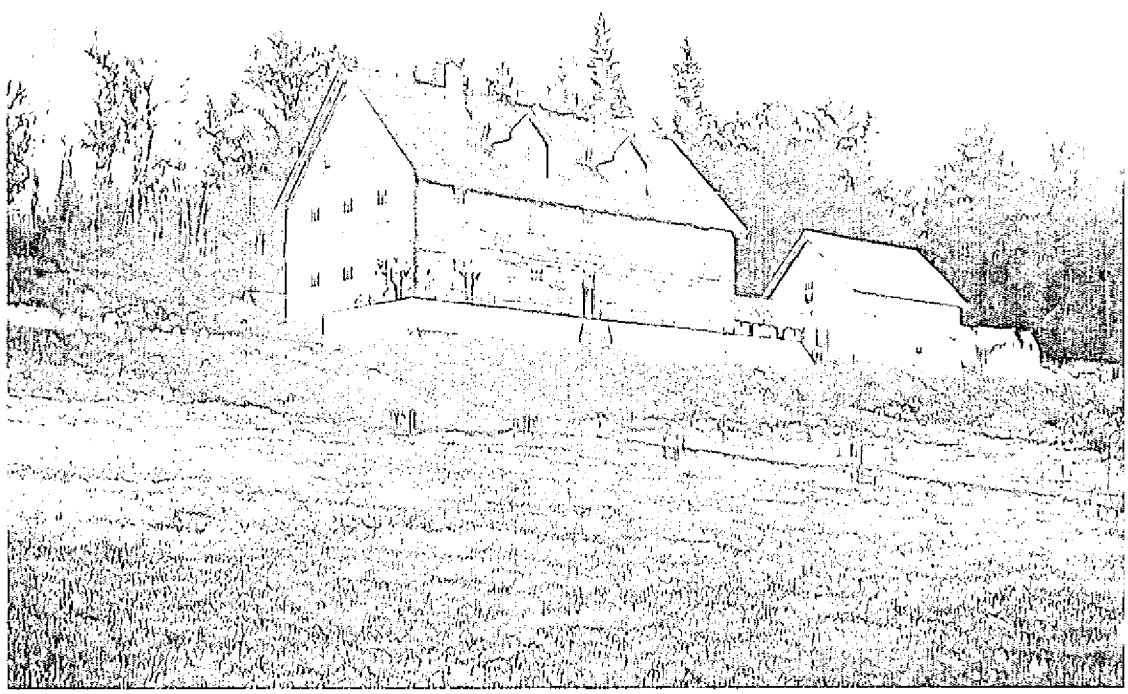


Fig. 6.38. The Wendigo Copper Company headquarters building was 100 feet long and 60 feet wide. Later it became the headquarters of the Washington Club. Photo by A. C. Lane, circa 1890s.

limited lumbering in support of the establishment and construction of Ghyllbank and the mine is obvious in historical photographs. Just the main headquarters building, built of hewn logs, was 100 feet long, 60 feet wide and two stories high (Fig. 6.38). In addition, numerous one and two story log buildings were constructed at the site.

After the Wendigo Copper Company went out of existence, the parent corporation began selling off parcels of land to tourists for summer residences and for resorts. In 1902 a group of prominent businessmen from Duluth, headed by Colonel Charles Graves, purchased the Ghyllbank headquarters building, several service buildings, and 20 acres of land (Detroit News, January 14, 1923). The Washington Club was formed, and was used as a private fishing and boating resort by its members until the establishment of the park.

Prior Research: One of the earliest published references to Ghyllbank is found in Dustin (1946:702). Hakala briefly discussed the mining operations and the establishment of the Washington Club (1953:28) and Rakestraw outlined the short-lived operation of the Wendigo Copper Company (1965:15-17). In 1976 the Wendigo Mines site, which included all of the explorations for copper conducted by several affiliated companies, was surveyed and added to the State of Michigan cultural sites inventory. The locations of the former headquarters building and the wharf were examined by Cultural Resources Specialist Maass in 1983 and added to the park-maintained list of undesignated sites.

In August 1983, a diver inspection of the remains of the Ghyllbank wharf was conducted by Ranger Ken Vrana, at Maass' request. No other research has been conducted at the site.

Intrusions and Data Limitations: In 1931, the Washington Club building burned. Other buildings associated with Ghyllbank were either allowed to deteriorate on their own, or were removed in the early years of the park. The Ghyllbank wharf was partially destroyed in 1983, and the area dredged by the park as part of site preparation for a new gas dock.

Site Location: Ghyllbank was located on the southeast side of Washington Harbor north east of Beaver Island. The present location of the Windigo Ranger Station, park housing, and concession store generally occupy the former town site. Windigo is located in range 38 west, township 64 north, section 29, SE 1/4, SW and SE 1/4. It is clearly marked on USGS topographic charts and on NOAA lake charts.

Windigo can be reached by entering Washington Harbor, traveling in a northeasterly direction approximately 3 miles, passing Beaver Island, and traveling an additional 1/2 mile to the only large deepwater dock in the bay. The historic Ghyllbank wharf was located approximately 250 feet north of the present NPS deepwater dock (Fig. 6.39).

Administrative Status: The Ghyllbank wharf site is included in the Isle Royale interim Cultural Sites Inventory as an undesignated site, number U-49. It does not have a State of Michigan number and is not included on the National Register of Historic Places.

Research Methodology: NPS divers examined an area approximately 100 feet wide out from the present shoreline to a depth of 20 feet. Coverage was determined by the extant remains of historic cribbing from the wharf.

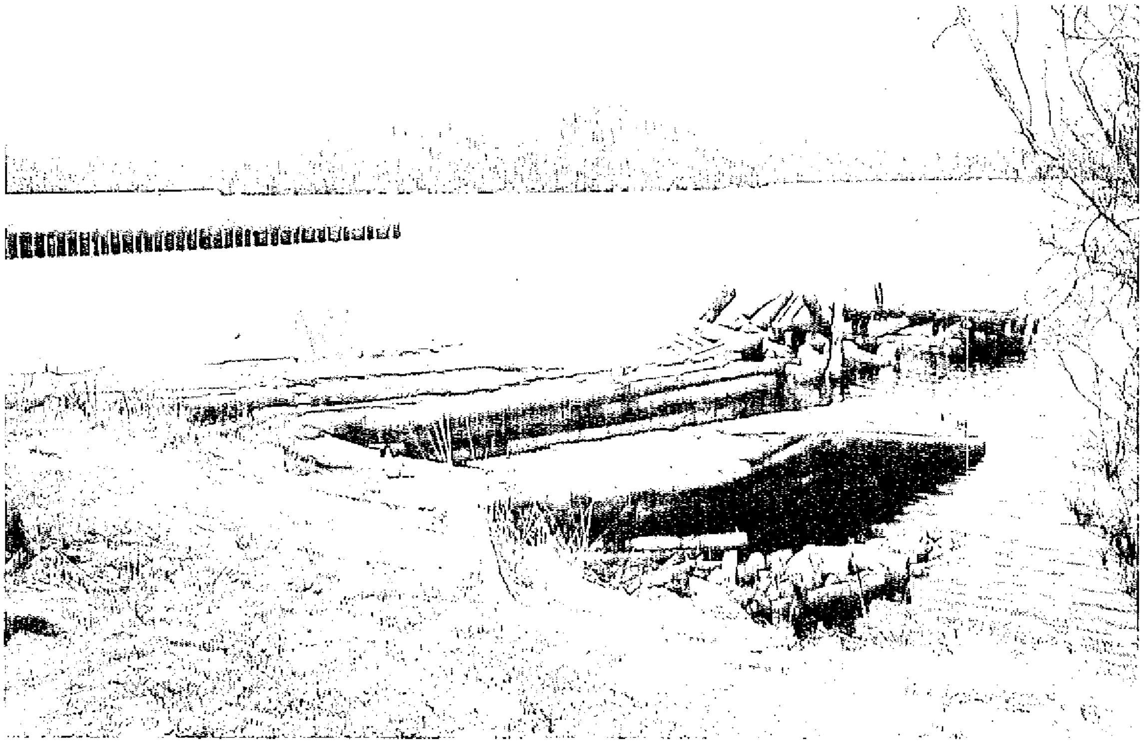


Fig. 6.39. Remains of the Ghyllbank wharf (center) were still visible in 1952. The notched log and pin construction evident in this photograph matched the remains found underwater in 1983. NPS photo by Robert Hakala, 1952.

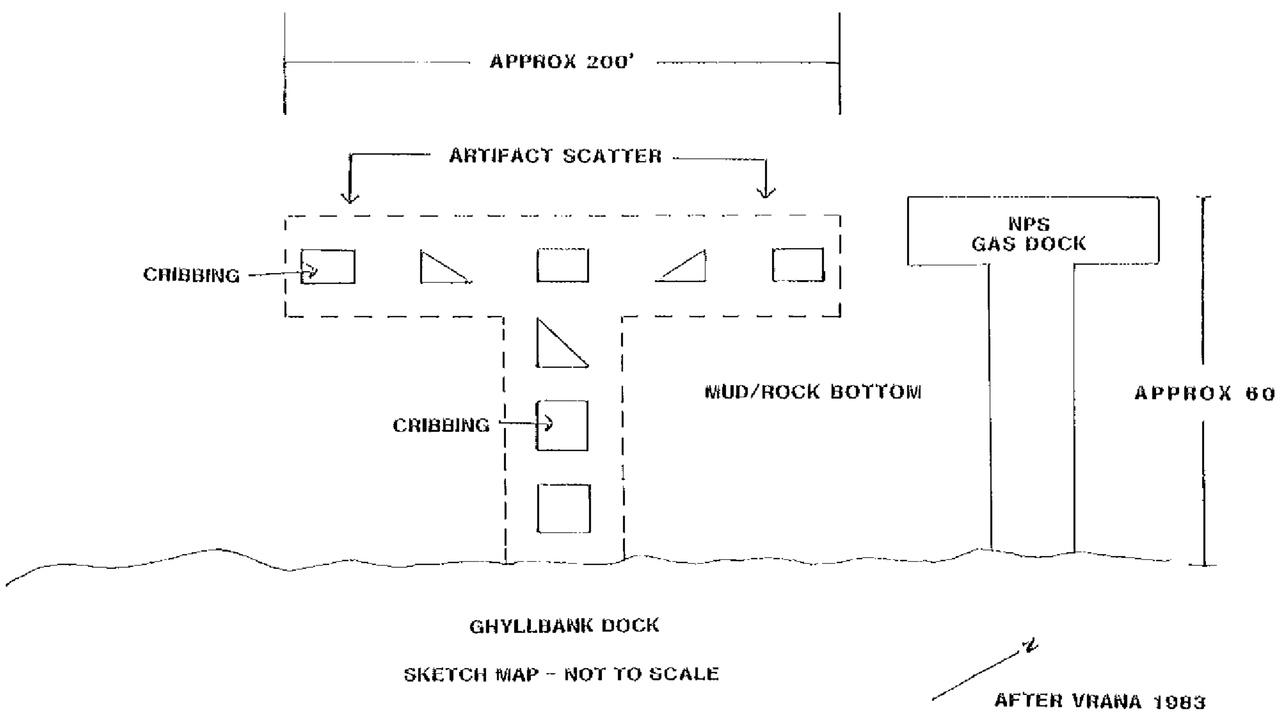


Fig. 6.40. Ghyllbank wharf sketch made in 1983, prior to dredging of the site in preparation for modern dock construction.

Site Description: The T-shaped wharf extended out from the shoreline approximately 60 feet and was 150 to 200 feet wide (Fig. 6.40). Prior to site destruction in 1983, several disarticulated cribs, joined with wooden pegs, remained in situ. The mud/rock bottom was littered with bottles, crockery, leather shoes, iron fittings, pipes, and dinnerware (Vrana 1983).

Site Analysis: Following construction of the gas dock, park employees could still see the remains of a few of the original cribs just below the surface of the water. Observed artifacts, prior to disturbance, were consistent with a late 1800s early 1900s occupation of the area, and reflected a mixture of industrial and homestead activities. The extent of damage to the site during construction and dredging is unknown. In other locations where dredging has occurred, site damage has been limited to the immediate impact area. It is impossible to predict either the nature or extent of damage to this site.

Conclusion: While dredging has clearly adversely impacted this site, it by no means necessarily completely destroyed it. The fact that some cribs remain, strongly suggests that some area of the site was undamaged. It is highly probable that the site retains enough integrity to warrant detailed investigation and documentation. Dredging and other dock construction activities in the immediate area should be curtailed until the site is examined and tested.

Analysis of this site could produce information that, when compared to other similar sites around the island, can provide insights into isolated, industrial community adaptation at the turn of the century.

Tobin Harbor Resort

Historical Background and Description: The Tobin Harbor resort was owned and operated by a Swedish-Finn by the name of Gust Mattson. Mattson began fishing out of Minong Island in 1900, and shortly thereafter started the small resort business. Mattson and his wife operated the resort from 1901 until approximately 1910. Mattson's resort, one of the first on Isle Royale, was recalled by Glenn Merritt during an interview in 1962. He described its history as follows:

> ... it became quite a popular resort for Duluth people. Quite a few Duluth families stayed there with the Mattsons. He was a good guide and a good hotel man in fact, a very interesting character. He used to take people out fishing, and he knew just where to go to get the real big, good fishing. So he operated that resort 'till about 1910. He sold it to a school teacher, from Calumet, by the name of Martini .... Martini kept it for a couple of years, decided he couldn't make any money off it for some reason, and wanted to sell it. So he disposed of it and sold it to Captain Smith. Captain Ed Smith, who was not the Indian Captain on the AMERICA, he and his wife, along with Fred Scofield bought this resort. Due to some condition which we never knew about, Mr. Scofield was out and Mr. Smith came up as owner of the resort, and he [Mr. Smith] operated the resort 'till he died in 1916. Then the family, Mrs. Helena Smith and the daughters, Emily Smith and Grace Smith, operated the resort 'till the middle 1930s when it was taken over and acquired by the State before it went into the National Park ownership .... Fred Scofield, of course, who was supposed to be one of the partners in this deal went over to what is now called Belle Isle .... [and] developed Belle Isle Resort (Glenn Merritt, oral history tape, September 28, 1965).

Ingeborg Holte also described the resort as she remembered it as a young girl traveling from Two Harbors to Isle Royale via AMERICA:

> ... on the south side of Isle Royale, heading for Tobin Harbor ... there are many little islands scattered around the harbor, most of which belonged to "the summer people" who built snug little cabins on the islands .... On the largest island of this group there was a resort called "Tobin's" operated by a family named Smith. There was one building here I remember well from my childhood: a small cabin close to the dock with "United Sates Post Office" printed in large letters across the front. The Smiths flew the American flag nearby, and ... it seemed so tremendously important.
>
> The Smith's had some very lovely daughters who gathered on the dock, and as the AMERICA hove to, they burst into song, "T-O-B-I-N-S where the food is the rarest, and the girls are the fairest, T-O-B-I-N-S" (Holte 1984:19-20).

Tobin's Resort was being considered for acquisition by the National Park Service in 1937 when Donald Wolbrink and George Walling completed a report on the existing Isle Royale resorts. The purpose of the report was to assess the present condition of all of the island's resorts and to make recommendations regarding their future use as tourist accommodations. Renamed Minong Lodge by the time of Wolbrink and Walling's visit in 1937, recommendations for its future use were bleak.

> The development is relatively more pleasing and of sounder construction than that at Rock Harbor Lodge, but is not, in our opinion, of sufficient value or merit to be retained as a permanent development for a resort .... There is a suitable small craft dock and a service dock of crib and board construction. It is, however, set so low to the water that should the lake again reach its former level it would be submerged ....
>
> The development contains several frame and log buildings and two docks having salvageable material. There is a small pressure water tank ... an electric light plant and various logs and timbers on the site. These materials may be readily salvaged if and when required for permanent construction in other areas. A small residence building is to be used by the recent owner during next season. Certain of the smaller cabins can be moved intact to the Rock Harbor development across the way and utilized temporarily. Other buildings may be razed and material salvaged .... It is recommended that the area be abandoned and existing structures razed. It is possible, however, to use it as it stands as a small resort for a few years as it has a definite following and might well afford a limited source of revenue for the time being. In the event of a decision to follow the latter course, we recommend that it be looked at with a "cold eye" simply as a source of revenue, and that no expenditure or improvements be made (Wolbrink and Walling 1937:13-14).

Wolbrink's suggestions were followed and Minong Lodge/Tobin's Resort was ultimately abandoned. At the time of National Park Service acquisition, the resort was comprised of approximately 20 buildings clustered at the southwestern end of Minong Island (Fig. 6.41). A store and post office, dining hall, main lodge, laundry, storehouse, bath house, various service buildings, and eleven cottages were present

Fig. 6.41. Minong Lodge as it appeared in 1938. The resort consisted of approximately 20 buildings clustered at the southwestern end of Minong Island. The main dock is far right. NPS photo.

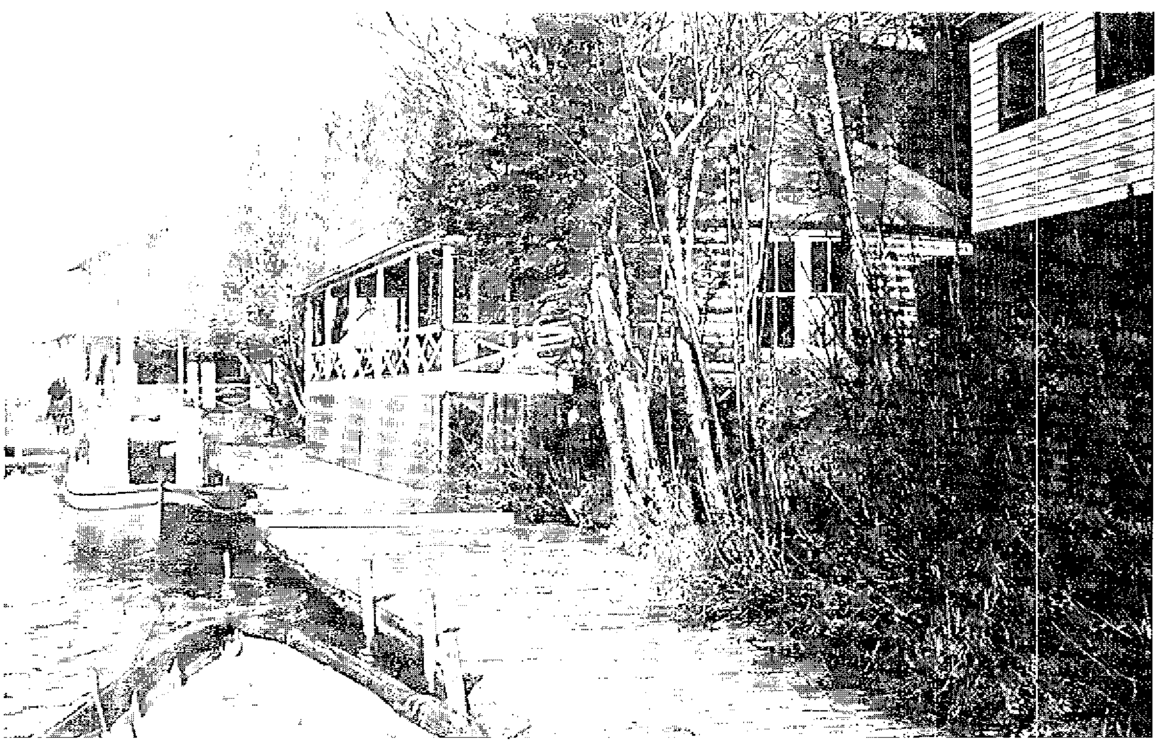


Fig. 6.42. Minong Lodge main dock looking west. NPS photo by Donald Wolbrink, 1937.

in 1937 at the time of Wolbrink's visit. Each of these structures were photographed at that time. A large service and passenger dock fronted the lodge (Fig. 6.42). That dock, composed of rock-filled cribs, was large enough to accommodate the steamer AMERICA. The dock was U-shaped with a perpendicular spur at its base.

At the same time that his brother Gust was fishing and setting up the resort on Minong Island, Louis Mattson was fishing across the channel in Tobin Harbor. The Louis Mattson fishery was located slightly southeast from Minong Lodge on the mainland shore, southwest of Scoville Point (Fig. 6.43). Louis Mattson and his sons, Arthur and Ed, fished out of this location into the early 20th century. August Anderson and his three sons, Emil, Ernest and Arthur, also fished out of Tobin Harbor during this same period. Their dwelling was adjacent to the Louis Mattson home. A crib dock on the south side of the channel served both families (Glenn Merritt, oral history tape, September 28, 1965).

In addition to the activities associated with the Mattson resort, Minong Island is also the location of what may be the first summer cottages built at Isle Royale. Built by Colonel Roberts in approximately 1903, the cottages are still occupied during the summer months by Mr. and Mrs. Donald Wolbrink (Wolbrink personal communication, February 1987).

Prior Research: The Tobin Harbor Resort site was visited in 1937 by Wolbrink and Walling in order to evaluate its suitability for commercial development by the National Park Service. Documentary research at the site did not occur again until Gordon Haber, a Service seasonal employee, visited the resort sometime between 1962 and 1964. Photographs were taken and a rough sketch of the island was made indicating the foundations of old buildings and the location of the old service dock. Several objects were collected from the site by Ranger Chuck Dale in the early 1980s; these are presently in the Isle Royale museum collection. The area was visited in 1985 by Submerged Cultural Resources Unit personnel in an effort to document offshore cultural remains associated with the early Gust Mattson fishery and resort occupations and the Louis Mattson/Art Anderson fishery across the channel.

Intrusions and Data Limitations: Following NPS acquisition, the resort was allowed to deteriorate. By 1951, the resort and docks were in ruins (Fig. 6.44). In 1953, the Post Office and dock were replaced. Finally, in 1963 a work order was issued for the removal of derelict buildings and docks. No details on how the destruction activities were carried out were provided in the in-house work order completion report.

Site Location: Tobin Harbor, a long narrow bay, is located at the northeast end of Isle Royale. Minong Island, situated at the eastern entrance to Tobin Harbor, is the largest of the several islands that guard the only access to the bay (Fig. 6.1). Minong Island is clearly marked on USGS topographic charts and NOAA lake charts. The island's recorded position on the Isle Royale 15 minute topographic map is T67N, R33W, Section 26, SW 1/4, SW 1/4 and Section 35, NW 1/4, NW 1/4.

Both the island and the resort site can be reached by entering Tobin Harbor from the southeast and rounding Scoville Point. Minong Island is located in the channel between Smith Island and Scoville Point. The resort was located on the southwestern end of the Minong Island. The old crib dock associated with the Mattson/Anderson fishery is located across the channel on the mainland.

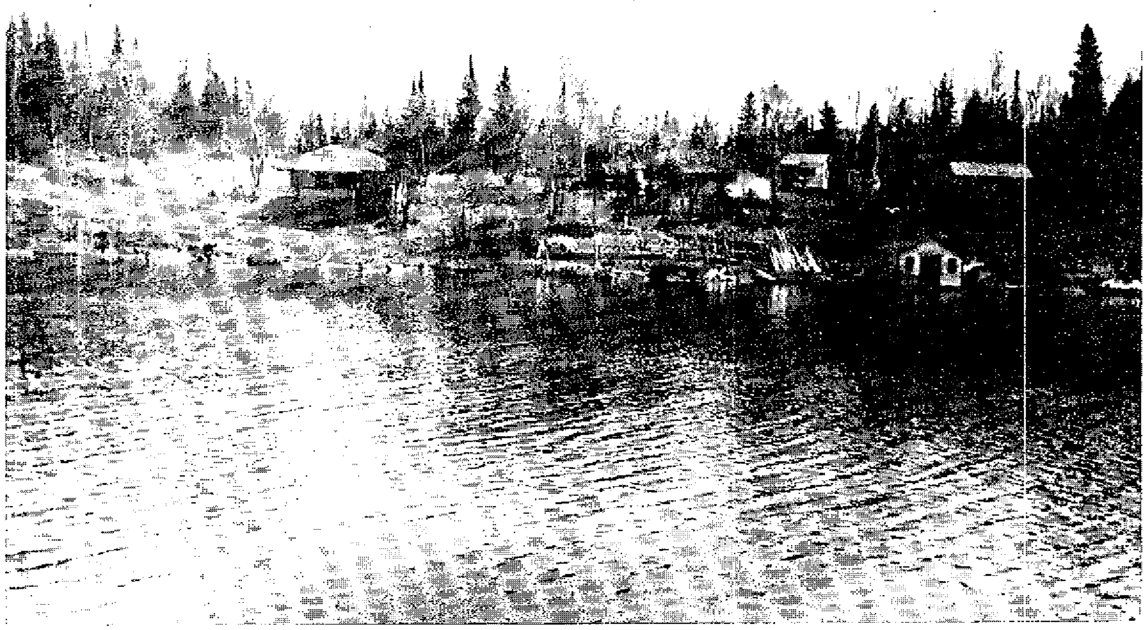


Fig. 6.43. The Louis Mattson and August Anderson fishery in Tobin Harbor, across from Minong Lodge, in 1938. A small dock is present just in front of the fish house (right). NPS photo.

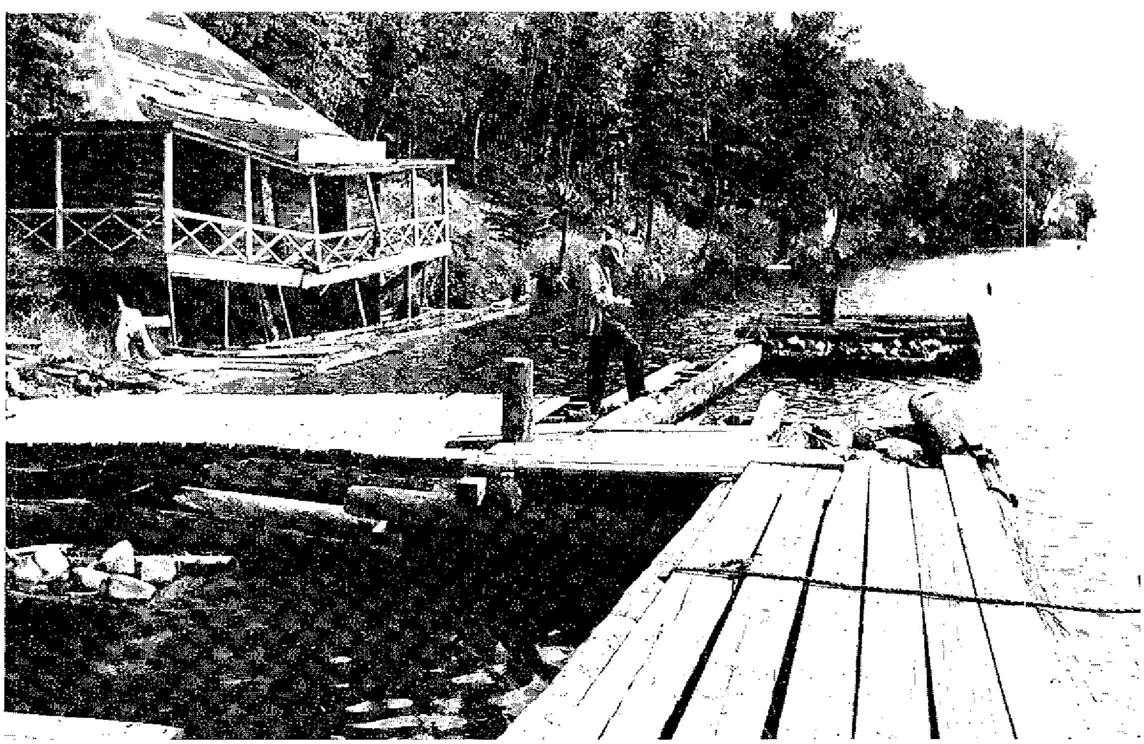


Fig. 6.44. Remains of Minong Lodge and main dock in 1951. NPS photo.

Administrative Status: Tobin Harbor Resort on Minong Island is included in the Isle Royale Interim Cultural Sites Inventory as an undesignated site, number U-14; it is referred to on that list as the Minong Lodge Site (Maass 1984). It does not have a State of Michigan number and is not included on the National Register of Historic Places.

Research Methodology: A diver reconnaissance by SCRU personnel was conducted in 1985. The area examined by divers included the bottom around the old Minong Lodge service dock, the channel in front of the dock between Minong Island and Scoville Point, and fishing or private docks across the channel in the vicinity of the Mattson/Anderson fishery. Photographs were taken and observations recorded by the team.

Site Description: No standing structures from the resort remain on the site. The sketch map of the resort (Fig. 6.45), reproduced below, is based upon several sources including the rough sketch made by Haber between 1962 and 1965 , historic photos taken by Wolbrink and others, as well as recent photos.

Cement foundations of one building, possibly the Mattson residence, are visible at the southwest end of the site. The remains of the cabins, roughly 10' by 10', line an old walking path that runs from the dock toward the northeast. The remains of a large wooden structure are present on a low ridge in the center of the island.

The present NPS small craft and service dock, in the same location as the original docks at the resort, runs parallel to the shoreline. The remains of another old crib dock used by the Mattsons and Andersons, across the channel and southeast of the resort, is in deteriorated condition and no longer usable.

Underwater, artifacts are distributed for approximately 500 feet along both the Minong Island shoreline and the area adjacent to the Mattson/Anderson fishery. Remains also extend into the middle of the channel.

The only standing structures on Minong Island today are two cottages on the island's northeast end, occupied by Donald and Florence Wolbrink under life lease (Wolbrink personal communication, February 1987).

Site Analysis: Resort buildings and the large dock were removed nearly 25 years ago, however, foundations and clearings still exist that indicate their previous locations. Depending upon the methods used to remove the buildings, it is reasonable to assume that a variety of features and artifacts may remain on the land portion of the resort site. It is not known to what extent destruction of the resort has impacted the potential for future research on land, however, the areas underwater adjacent to the former resort dock, the channel between Minong Island and Scoville Point, and the area of the Mattson/Anderson fishery across the channel have strong research potential.

The present NPS service dock is in the same general location as the former resort dock. During preparation for construction of the NPS dock in 1963 , dredging of the immediate area occurred. The visible results of the dredging is evidenced by the dearth of small artifacts, from the historic period, around the present dock and the disarticulated remains of cribs from the former crib dock a short distance away.

Water depth in the channel varies from 15 to 30 feet, and the uniformly silty bottom is littered with a wide variety of remains. As expected, the underwater area directly

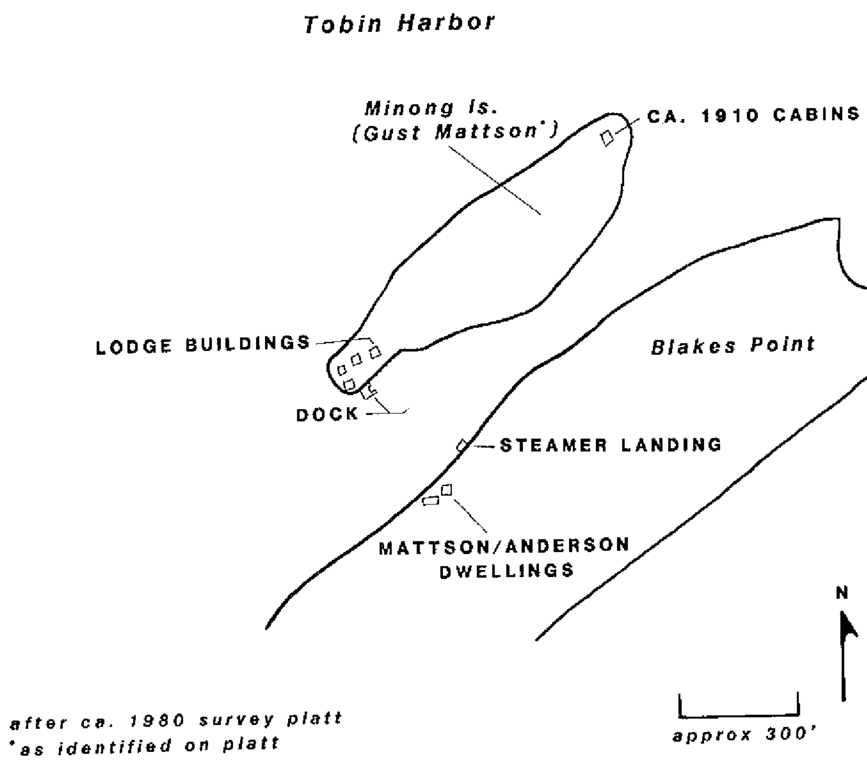


Fig. 6.45. Minong Island and Scoville Point sketch map with the location of the Mattson/Anderson fishery, the Minong Lodge and resort, main dock, and circa 1910 cabins.

Fig. 6.46. Broken pieces of dinnerware, service crockery, wash basin water pitchers, and other utility wares were found in the channel adjacent to the resort. Remains associated with commercial fishing were found offshore of the Mattson/Anderson site. NPS photo by Joe Strykowski, 1985.

offshore of the resort is scattered with artifacts that can be associated with resort operations. Broken pieces of dinnerware, service crockery, wash basin water pitchers, and other utility wares were observed (Fig. 6.46).

Immediately offshore of the fishery across the channel remains included broken tools, boxes, barrels, smashed paint or tar containers, pieces of a cast iron wood stove, a scythe, an axe head, miscellaneous construction materials, and a concentration of fire brick. The remains of two crib docks are also present (see historic photo, Figure 6.43). One, adjacent to the remains of the Mattson fish house, is obviously tied to that feature. The second, approximately 500 feet northeast of the fish house, may be the remains of an old steamer dock. Not surprisingly, the heaviest concentration of artifacts, overall, is offshore of the fishery; occupation at the site has extended into the 1980s. The Mattson/Anderson site is no longer an active fishery. The various structures associated with the operation are still standing although they are deteriorating.
Items deposited in the middle of the channel could not be ascribed to any particular activity area on shore, although they appeared to be more closely aligned with the fishery operation. They include a large hatch cover, planking, and a narrow-beamed flat-transomed open boat.

Conclusion: The Minong Lodge and Mattson/Anderson fishery sites have been occupied from the turn of the century up through the 1930's in the case of the former, and through the 1980s in the case of the latter. While inhabitants at both sites were faced with similar problems resulting from isolated location, limited access to consumer goods, and variable weather, both the nature of their occupations and the manner they adapted to the conditions on Isle Royale are very different.

Obvious occupational-related differences can be found on land at the resort and the fishery. The distribution of remains underwater, predominantly fishery related on the south side of the channel and resort related on the north side, reflect their land counterparts. The differences tend to be less obvious and blend together in the center of the channel. It is possible that site similarities, resulting from ethnic background of the principal inhabitants, may be able to be discerned through detailed study. The combination of the two sites can provide an excellent opportunity to study intra- and inter-site variability and cultural processes. Both sites should be added to the State of Michigan inventory and additional study is recommended.

Belle Isle Resort

Historical Background and Description: Belle Isle, formerly called Fish Island, was the location of the first American Fur Company fishery on Isle Royale. This fishery, established in 1837, was located in a small bay at the eastern end of the island. American Fur Company fishermen used this location as a base of operations until the company ceased operations on the island in 1842; however; the buildings and site continued to be used intermittently by independent fishermen.

At the time of the Ives survey in 1847, the same buildings were re-occupied by miners from the American Exploring, Mining and Manufacturing Company. Ives described the site at the time of his visit:

> ... to the east end is a very handsome Bay which has a gravel beach and first class landings for small vessels. Vessels can come within

> 150 links of the shore in deep water. This is one of the N.W. or American Fur Company's trading posts.
>
> ... There are two small dwelling houses and a new one near by. There are about 2 acres cleared (Ives 1847).

The American Exploring, Mining and Manufacturing Company's explorations were unproductive and they are reported, by Rakestraw, to have abandoned this location in 1847.

While there are no written records or oral histories documenting the occupation of this island between 1847 and 1897, it is highly probable that various fishermen visited the island and fished out of it during that 50 year period. During this same period, the Isle Royale Land Corporation, a British syndicate, purchased over 80,000 acres on Isle Royale. The corporation's mining activities occurred from 1889 until 1893, when all operations ceased.

Fishing and mining operations were occurring simultaneously on the island prior to and just after the turn of the century. By 1897 John Anderson had made Fish Island (Belle Isle) his base of fishing operations. His son, Emil, continued fishing here until the establishment of Belle Isle Resort, moving to Johnson Island about 1913 (Glen Merritt, oral history tape 1965).

In 1909, most of the holdings of the Isle Royale Land Corporation were taken over by the Island Copper Company of Duluth (letter from the Office of Island Copper Company, 1921). Still called Fish Island at that time, Belle Isle was among the British corporate holdings that transferred to the Duluth-based company. The president of the company, Thomas A. Cole, retained control of Fish Island as a personal holding until its sale to Fred Scofield. Scofield, dealt out of the Tobin Harbor Resort, purchased the island from Cole in 1913 or 1914, renamed it Belle Isle, and subsequently established a resort (Glenn Merritt, oral history tape).

During the teens and twenties, the resort flourished. It was one of the four lodges that was still a "going concern" when the island was being considered for NPS acquisition (Wolbrink and Walling 1937:2). Hakala (1955:39) suggested that the island was enjoyed by a "privileged few" during this period. Belle Isle enticed the tourist with such activities as "... fishing, trailing moose in native haunts, delicious home cooked meals, and a haven for hay fever suffers, mak[ing] it an ideal spot for your vacation" (Isle Royale tourist information brochure, circa 1930s). Rates advertised for the resort were $21 per week and up, American Plan (Hakala 1955:39). Regular passenger service from Duluth and Houghton was provided by a number of Booth Line vessels, including AMERICA, and by Kauppi's Cabin Cruiser COPPER QUEEN. The passenger steamer WAUBIC made regular trips from Port Aurthur and Fort William to Belle Isle and Rock Harbor until the late 1930s. After the loss of AMERICA, WINYAH continued passenger service to the island. After World War II the COASTAL QUEEN provided passenger service to the island from the Canadian side (Marjorie McPherren personal communication, February 1987).

Scofield operated the Bell Isle Resort until the late 1930s, when it was first taken over by the State of Michigan and later transferred to the National Park Service. When the National Park Service obtained Belle Isle in 1938, management responsibility was transferred to Mrs. Bertha Farmer, the proprietor of Rock Harbor Lodge. In addition to her Rock Harbor and Belle Isle responsibilities, she was also asked to manage a small store at Mott Island. When the Windigo Inn was completed in 1940, she was asked to assume responsibility for it as well (Baggley 1938 and 1940).

By 1941, the management of the three facilities had deteriorated to the point that an outside evaluation of the situation was needed. E. C. Eccleston, from NPS Park Operations Division, arrived in August of that year to tour the various resorts and stores. The obvious poor management of the resorts and poor maintenance of the facilities resulted in the recommendation that other managers be brought in to run the existing tourist facilities (Eccleston 1941:1-5). In 1942, National Park Concessions, Inc., received a contract to manage the resorts (Eccleston 1941:4).

The advent of World War II resulted in a decrease in visitation to the park. Both Bell Isle Resort and Windigo Inn were closed in 1943, in an effort to minimize financial losses. Bell Isle reopened in 1946, however the resort's financial picture was disappointing (Little 1978:154). In 1947 Belle Isle was closed permanently (Little 1978:154).

Of the several resorts on Isle Royale, Belle Isle was considered one of the best (Fig. 6.47). Ingeborg Holte described the resort as she remembered visiting it as a young girl:

> Belle Isle is fairly large and was dotted here and there with cottages. The main lodge was quite pretentious, with an enormous stone fireplace made more interesting with design of various semi precious gems, thomsonites [prenites], greenstones and amethysts. It was rumored that this lodge even had a golf course and a tennis court. For some of the passengers, this was their destination, but for others this stop was the way back to the mainland and home.
>
> When the AMERICA backed away from the dock at Belle Isle and proudly headed for Blake Point ... we passed one of the most memorable events of the trip .... On the east point of Belle Isle stood a wigwam and beside it a very lovely Indian maiden. As we passed her, she raised her arm in a benevolent gesture of farewell ... Our boat went as close to shore as possible so we could admire this ... beauty. I was too young to inquire into the authenticity of this happening.

The Wolbrink and Walling report on existing Isle Royale resorts recommended that Belle Isle continue to serve as a tourist destination. In 1937, when the report was written, the resort was described as consisting of:

> ... a lodge and dining room combination building with isolated cottages ... The buildings, while not of the quality standards of the Service are in usable shape and can continue in use for several years to come ....
>
> Life in the resort centers around the dock and the lodge. In the lodge is a lounge with a huge fireplace and easy chairs and sofas. It is the center of life in the evenings. The dining room,which is off the lounge, is the only place for eating. In the lounge is a cigar counter that corresponds ... to a typical ... store, adequately serving demands of guests ....
>
> Service in the cabins might well be compared to a small provincial Swiss hotel, it is crude but as well done as facilities permit. There is

Fig. 6.47. The main lodge and dock at Belle Isle Resort. NPS photo, circa 1930s.

Fig. 6.48. The resort's golf course is now the location of the NPS campground on the island. A prehistoric site, the American Fur Company Fishery, and the American Exploring and Mining Company buildings were located in this vicinity. NPS photo, circa 1940s.

> a small wood stove in each cabin and hot water is brought in the morning. There is, of course, no plumbing in the cabins ....
>
> The present dock is not suitable for the handling of large vessels ... Soundings taken at the present dock are:
>
> East end (boats approach from this direction) 10'6", West end 9'0"

Advertisements from the middle 1930s also describe the resort as having a "nine-hole golf course with grass greens ... [and] tennis courts" (Isle Royale tourist information brochure, circa 1930s) (Fig. 6.48). Aerial photographs of Belle Isle and the resort in the 1930s showed there were more than 15 structures on the island, including two docks. The main dock, located in front of the lodge, was T-shaped. The service dock, in a small cove behind the resort, ran perpendicular to the shoreline (Fig. 6.49).

Wolbrink and Walling recommended the eventual remodeling and relocation of the lodge and cottages to bring the resort up to National Park Service standards. They also recommended replacing the existing main dock with another T-shaped dock, approximately 200 feet long, similar to the one planned at Mott Island (1937:4-5).

Prior Research: A long low beach at the northeast end of Belle Isle was used as a recreation area by the resort between 1913 and the late 1930s. This same location was examined by Fox in 1911, who interpreted a low ridge outlining a rectangular area as the remains of a cabin and chimney of an American Fur Company building (Fox 1911:81). Beaubien (1953:22) came to similar conclusions following his later examination of the same location.

No other archeological activities occurred at the site until 1961 and 1962, when a survey and excavations were conducted by the University of Michigan. Rakestraw visited the site in 1964 and again in 1967 as part of the background documentation of sites for an historical base map of Isle Royale. He reported finding a small mining exploration pit from this company's activity, overgrown with spruce, near the present NPS campground (Rakestraw 1967a:28).

In 1980 members of the Submerged Cultural Resources Unit examined the locations of the Belle Isle Resort historic docks for remains of the prehistoric and historic occupations. The resort and dock areas were inventoried into the Park maintained undesignated site file by Maass in 1984.

Intrusions and Data Limitations: The prehistoric period site was surface collected by professional archeologists in 1911, 1955, and again in 1960 and 1961. In 1961, several test pits and one trench were excavated. Artifacts collected included worked copper, flint flakes, and sherds. The American Fur Company component of the site was excavated in 1961 and 1962. A narrow trench near the north end of an east wall was excavated, and the removal of rocks from a nearby rock pile revealed the presence of dry-laid paving. Twenty-four kaolin pipe fragments were recovered from this site; these represent nearly half of all of those collected on Isle Royale. The pipes probably date from the latter half of the Nineteenth Century (University of Michigan Site Survey Form 1961). Both sites are in the former location of the resort golf course.

The National Park Service constructed a community kitchen and shelters at the campground between 1961 and 1962. The Belle Isle campground occupies the

Fig. 6.49. View of the lodge and other service buildings looking southeast. Several small boats are tied up at the service dock. NPS photo by Donald Wolbrink, 1937.

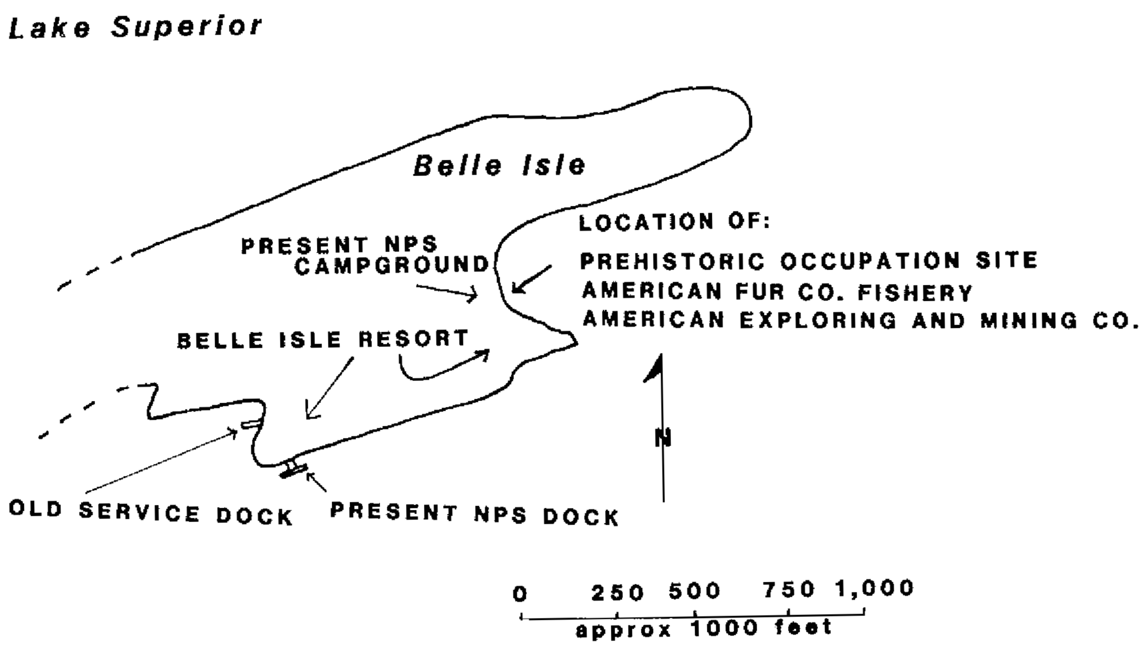


Fig. 6.50. Location of resort, prehistoric site, fishery site, and mining company buildings on Belle Isle. Drawing by Toni Carrell.

former location of the resort golf course. In 1962, a work order was issued by the NPS calling for the razing of undesirable structures at Belle Isle. The destruction of the buildings was accomplished by cutting them into sections, burning combustibles, and burial of non-combustible rubble (PCP M-29-6, Isle Royale National Park 11/27/62). A total of 31 buildings or structures were slated for removal and included 22 cottages, the ice house, wood shed, chicken coop, tennis court, main toilet, generator house, toilet at golf course, laundry, four outside toilets, and the main lodge. No mention was made of the docks at that time.

Site Location: Belle Isle is located at the northeastern end of Isle Royale. The island, a finger of land separating Robinson Bay and Amygdaloid Channel, runs northeast and southwest. It can be reached from the southeast by rounding Blake Point and traveling in a northwesterly direction, passing the entrances to Duncan Bay and Five Finger Bay on the port side (Fig. 6.1). Hill Point, Diamond Island and Green Island guard the east and west entrances to Robinson Bay and Belle Harbor. The island is clearly marked on NOAA Lake Charts. The former location of the majority of buildings at the old resort is at T67N, R34W, Sec. 35, SW 1/4, SW 1/4, on USGS topographic maps, just west of the present NPS Belle Isle campground (Fig. 6.50).

Administrative Status: The Belle Isle Resort is included in the Isle Royale Interim Cultural Sites Inventory (Maass 1984) as an undesignated site, number U-8. It is not recorded by the State of Michigan and is not included on the National Register of Historic Places. The historic and prehistoric occupation sites, recorded by the State of Michigan as 20IR29, are in the same vicinity as the resort. The prehistoric occupation, circa 800 to 1300 AD, and the American Fur Company fishery site, circa 1837 are designated by the State of Michigan as 20IR29. The NPS Belle Isle Campground now occupies the location of 20IR29. None of these sites are currently on the National Register of Historic Places.

Research Methodology: The areas immediately offshore of the present NPS dock and the resort-era service dock were visually examined by divers. The reconnaissance extended along the shoreline east of the main dock, between the two docks, and from the shoreline out toward the middle of a small inlet.

Site Description: Carol Maass, the Park Cultural Resource Specialist, visited the resort site in 1984 and described its present condition:

> The remains of cement stairs to the teepee at the point, the Lake Superior "swimming pool" and shuffleboard can still be seen. Much of the garbage from the lodge can be seen underwater in the area to the west of the dock (Maass 1984:U-8).

Site Analysis: During the examination of the two docks by Submerged Cultural Resources Unit personnel in 1980, a rich assemblage of historic period artifacts associated with the operation of the resort were observed. Immediately adjacent to the present NPS dock there were very few historic remains. This can be attributed to the removal of the resort-era main dock, site preparation, i.e. dredging, and construction of a new T-shaped dock in its place. The original dock, built in 1912, was completely replaced sometime after 1939, and possibly as late as 1952. The general park policy in the late 1930s was to repair and use existing docks as much as possible. The park files contain a document with a photograph of the dock dated 1952. The document refers to the 1912 construction date of the original dock.

Fig. 6.51. Remains of enameled cooking ware, pot, pails, shoes, dinnerware, broken crockery, planks, notched logs and other construction materials were found off shore of the former main dock. NPS photo by Toni Carrell.

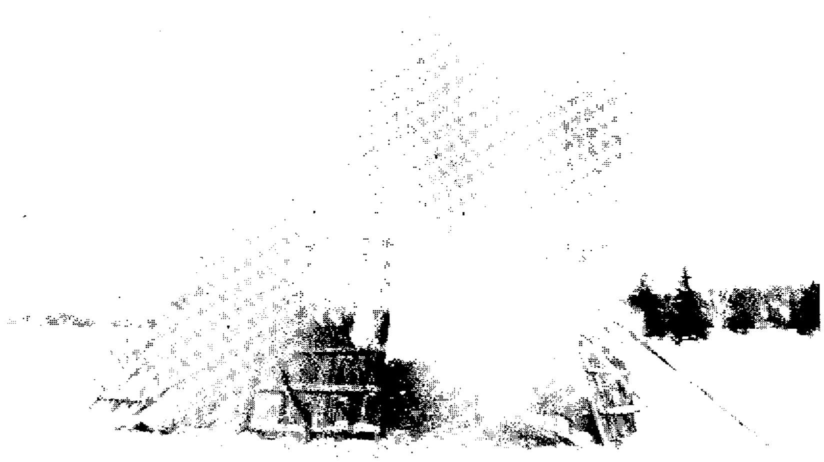


Fig. 6.52. In February, 1963, most of the combustible materials from the remaining resort buildings were bull dozed onto the ice and burned. NPS photo.

The silty bottom was littered with a variety of remains that extended along the shoreline and out into the main channel. Remains included broken crockery, dinnerware, enameled cooking ware, pots, pails, shoes, as well as a wide variety of planks, notched logs and other construction materials (Fig. 6.51). The construction materials are undoubtedly from the razing of the resort. In February, 1963, most of the combustible materials from the buildings were moved out onto the ice, south of the main dock, and burned (Fig. 6.52).

Rock-filled cribs, associated with the former service dock, are still visible from the surface. A brief examination of that area revealed the presence of broken tools, planks, and some crockery. No prehistoric occupation artifacts were observed in the area of the docks.

Conclusion: The Belle Isle Resort site and associated historic occupations, from the early fishing and mining activities, represent more than 110 years of nearly continuous use. This site may contain some of the earliest fishing operation information on Isle Royale, outside of the Checker Point site, and spans the early resort period up to World War II. The resort, fishery and mining sites may be able to provide an opportunity to study diachronic processes represented by the various activities on the island.

At minimum, the lodge site and associated docks should be added to the State of Michigan archeological site files. Further, some consideration should be given to nomination of the complex to the National Register. Additional research on land at the American Fur Company and mining sites and offshore at the docks, fishery and mining site is recommended.

Passage Island Lighthouse

Historical Background and Description: The need for a lighthouse on Passage Island was recognized as early as 1871. A report went to Congress that year recommending action:

> The discovery of the silver mines on Lake Superior and consequent sudden and remarkable increase of travel and traffic to that region, renders it desirable that a Light-house should be built on Passage Island, to mark the channel between it and Isle Royale. The island is difficult of access, and therefore any structure put there will cost more than if erected at some more accessible point. It is respectfully recommended that an appropriation of $18,000 be made for the purpose indicated (Light-House [sic] Establishment, 1871).

In 1873, another request was forwarded to Congress:

> The annual report the last two years has contained a recommendation for a light-house on Passage Island, together with an estimate of cost, but no appropriation has yet been made. The recommendation and estimate ($18,000) are respectfully renewed. Some arguments have been advanced to show that the appropriation for a light-house on Isle Royale might be used for the [same] purpose, but with these the board does not agree, as Passage Island is an entirely distinct island, at a distance of three and one-half miles from the most easterly point of Isle Royale (U.S. Light-House Establishment 1873).

A request for funds was submitted again in 1874 and in 1875. In March of 1875, Congress finally agreed to the appropriation. However, their approval was dependant upon the construction of a lighthouse on Colchester Reef by the Canadian Government. This conditional approval proved to be a stumbling block that further delayed construction of the lighthouse. Finally, all conditions had been satisfactorily met, and Congress released the funding for the light in 1880.

In the early summer of 1881 "all of the materials were landed, the grounds cleared, shanties for workmen erected, and a boat-house and crib [dock] for boat landing constructed" (U.S. Light-House Establishment 1881). The lighthouse was completed the following year and the first keeper was authorized on May 16, 1882. In addition to the lighthouse, a mechanical "fog-bell" was erected in a small, separate structure that became operable at the same time as the light. On July 1, 1882, Passage Island Light was illuminated for the first time.

The mechanical "fog-bell" was replaced by a 10-inch steam-powered fog whistle in October 1884. At that same time, a simple frame structure covered with corrugated sheet iron was built for the signal. The annual reports of the Light-House Board from 1889 to 1905, summarize the major activities at the station:

1889 - Passage Island, Lake Superior, Michigan. The tramway for the delivery of coal and supplies, 208 feet in length, was rebuilt; the gauge of the track and car was changed from 48 inches to 36 inches, and minor repairs were made to the houses and fog-signal machinery.

1897 - An iron water tank was put up in the fog-signal house. The landing crib was extended. Minor repairs were made. This is a fixed red light of the fourth order. It should be at least of the third order, and it should be a flashing light in order to increase its visible range. This improvement is not in contemplation.

1898 - The characteristics of this light were changed from fixed red of the fourth-order to flashing white every ten seconds, fourth-order, on the night of September 24, 1897. The old apparatus was packed and shipped to the Light-House Depot at Detroit. Repairs were made.

1902 - Some 150 feet of walks were re-laid, and the platform in front of the dwelling was filled with stone and decked with planks, and a runway 26 feet long, leading from the landing to the boathouse, was built. Six concrete piers were constructed to support the fog-signal, the sheave stand at the head of the tramway was rebuilt, the turntable was reset, a tramway car was rebuilt, and a fire plug for an additional water supply was fitted up. Various repairs were made.

1903 - The old smokestacks of the fog-signal plant were taken down and replaced with a brick chimney 40 feet high, to which both of the fog-signal boilers were connected with a new iron breeching. A new stand for the water tank of the signals was erected. The tank was placed thereon, and the pipe connections were modified to suit new conditions.

1905 – The concrete blocks for the erection of an oil-house were made at the Detroit light-house depot and were delivered here.

By the early 1900s, both freight and domestic trade were prospering in the United States. In an effort to keep pace with this growth, the Department of Commerce and Labor were created by an Act of Congress. Between 1903 and 1910, the board form of organization, under which the Light-House Service and the Light-House Establishment had operated came under constant criticism. Passage Island Lighthouse was initially administered by the Light-House Establishment, run by the Light-House Board, and was manned by Light-House Service keepers and assistant keepers. In July, 1910, under heavy criticism, Congress finally dissolved the Light-House Board and in its place established the Bureau of Light-Houses within the Department of Commerce and Labor. This organizational hierarchy remained unchanged until 1939, when the Bureau was absorbed into the U.S. Coast Guard and the Light-House Service name dropped (O'Brien 1976:13-30, 65-71).

With the absorption of the Light-House Service into the U.S. Coast Guard, the keepers and their assistants were formally charged with the responsibility for saving mariners in distress, not just warning them of impending danger.

Lighthouse keepers traditionally came to the rescue of disabled or wrecked sailors with whatever boats were at hand, including dinghies (Fig. 6.53), the open surf boat, and the more traditional cabin motor launch (Fig. 6.54). Anna Bowen-Hoge recalled an incident during her childhood that her father, Passage Island Light keeper Vern Bowen, played a lifesaving role.

> The storm seemed to last for days [and] the keepers went out to bring in the survivors of a shipwreck, while my mother watched the light. [When they finally returned] ... they brought a group of wet, cold, hungry men with them. There were a lot of them. They ate with us for days, until a boat could come for them. I remember all of us sitting around as the men told stories and sang (Hoge in Mahan and Mahan 1985:49).

Mrs. Hoge also recalled the attitude of many of the lighthouse keepers and their families:

> Tending the light was not just a job or a duty -- it was something the keepers did with pride. We knew that the light was important to the ships out on the lake, and we felt very needed. As the men dusted and polished the lens, they wore an apron to protect the glass from being scratched by buttons on their clothing. Dad used to tell us that the lens was very valuable and expensive, handmade in France, [and] if everybody took care of it, it could last forever. ... [We] viewed tending the light as the responsibility of the whole family (Hoge in Mahan and Mahan 1985:49).

Passage Island lighthouse was still actively manned as recently as 1957, when an article appeared in a Houghton-based newspaper regarding the seasonal re-opening of the light. By that date, the mineral oil lamps of the early 1900s had been replaced by by diesel and gas engines. The usual tour of duty, virtually continuous during the season in earlier days, had been changed at most of the Lakes stations to three weeks on duty and six days shore leave. On Passage Island light, however, even this was considerably different by 1957. Due to the light's remote location, the

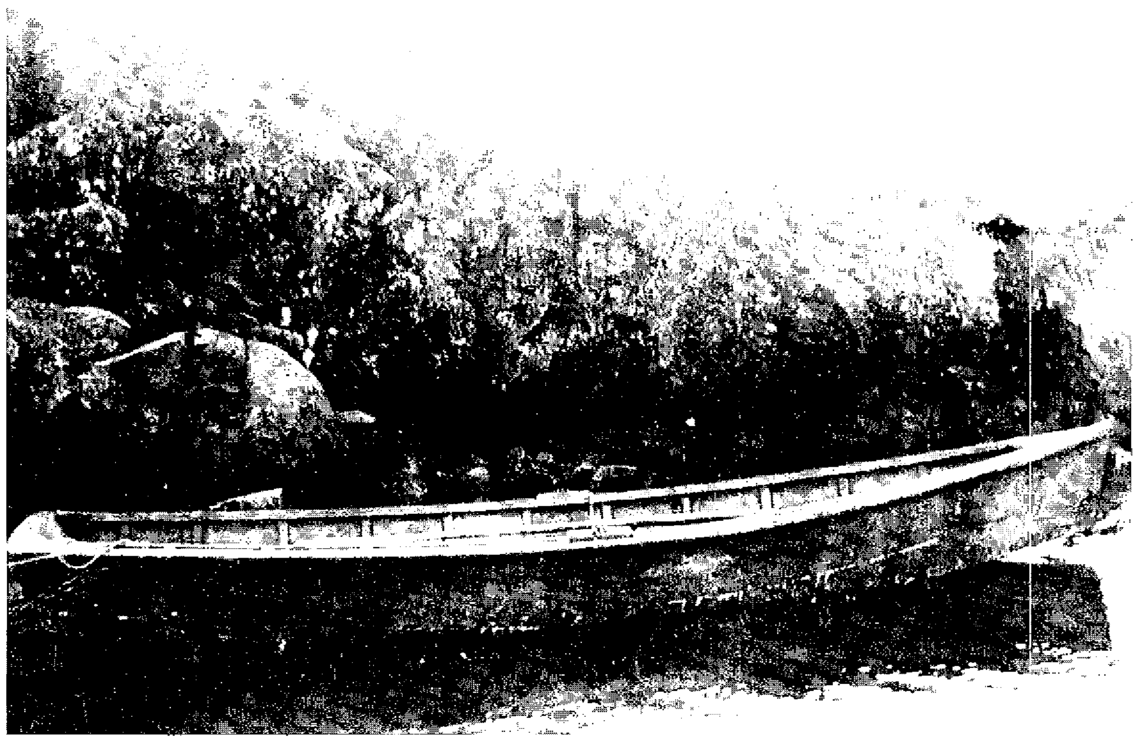


Fig. 6.53. Typical US Light-House Service dinghy, circa 1930s. This was one of two dinghies used at Passage Island Lighthouse. NPS photo.

Fig. 6.54. U.S. Coast Guard 26-foot cabin motor launch, circa 1941-1947. Edith Bowen, wife of former Coast Guardsman at Passage Island Lighthouse, Jim Bowen, is seated on the cabin. Photo courtesy of Edith Bowen.

keepers' tour of duty was six weeks long, followed by 12 days shore leave (Daily Mining Gazette, March 2, 1957).

On December 20, 1978 the Passage Island Lighthouse, along with many others in the Great Lakes, was fully automated, ending a 96-year tradition. Today Passage Island Lighthouse still operates under the aegis of the U.S. Coast Guard.

A survey of the lighthouse station was undertaken in 1897, and a map of the facility, dated February 23, 1906, showed the existing buildings. However, a detailed description of the station was not completed until 1910, when a report of inspection was filed by Oliver G. Brown. The following description is summarized from his report, unless otherwise noted.

Passage Island lighthouse is located on the southwesterly point of Passage Island. The island is thinly wooded and the soil and surrounding bedrock are a dark grey. Crib landings are present in rocks near the fog signal and boathouse on the east side of the island. A tramway leads from the fog signal to one landing, while a rough trail leads from the keeper's dwelling to the landing at the boathouse, a distance of approximately 1/2 mile. The boathouse is located in a natural harbor on the easterly shore of the island. Boat is the only way that the lighthouse may be reached, and the nearest steamboat landing is in Tobin's Harbor "where Booth boats land, a distance of 6 miles" (Brown 1910:2). The nearest towns to the light are Port Arthur, Canada, 48 miles away, Portage Lake, Michigan, 68 miles away, and Duluth, approximately 202 miles away. The condition of the station's buildings was considered "good" at the time of Brown's visit.

The red brick, octagonal lighthouse rests upon a square base, which merges into an octagonal prism at the second floor (Fig. 6.55). The height of the tower is 43 feet 6 inches, with only one light. The keeper's dwelling is attached to one corner of the tower.

The keeper's quarters consisted of seven rooms in a two-story building. Additional buildings at the site included a workshop, privy, and hen house. At the time of Brown's visit there was no garden for fresh vegetables or fruit. The keeper's and their families drew their drinking water from the lake, and in addition there was a cistern located under the kitchen.

The light apparatus still in use in 1910 was constructed by Barbier and Benard in 1896 and was a fourth order Fresnell lens. The apparatus bore makers marks "BB/107" when it was installed. The six-panel lens was constructed in a bulls-eye, made up of one central bulls-eye, surrounded by two concentric circular elements. Above these were six separate concentric prisms, and below were three separate concentric prisms. The light rotated once each minute and flashed white every 10 seconds.

B. A. Todt built the 10-inch steam whistle in 1884. It was characterized by a 5-second blast, separated by a 25-second silent interval. The signal was powered by a fire tube boiler, 12 feet long by 3 feet 6 inches in diameter. The boiler was built in 1883 by the Buhl Iron Works of Detroit, Michigan.

Eventually the steam-powered fog signal and the light were completely automated and much of the old equipment removed. By the time of Anna Bowen-Hoge's visit to her childhood home in 1985, the light was no longer manned. Anna's father, Vern Bowen, was one of the keepers at the light in the 1930s. Mrs. Hoge recalled, in a

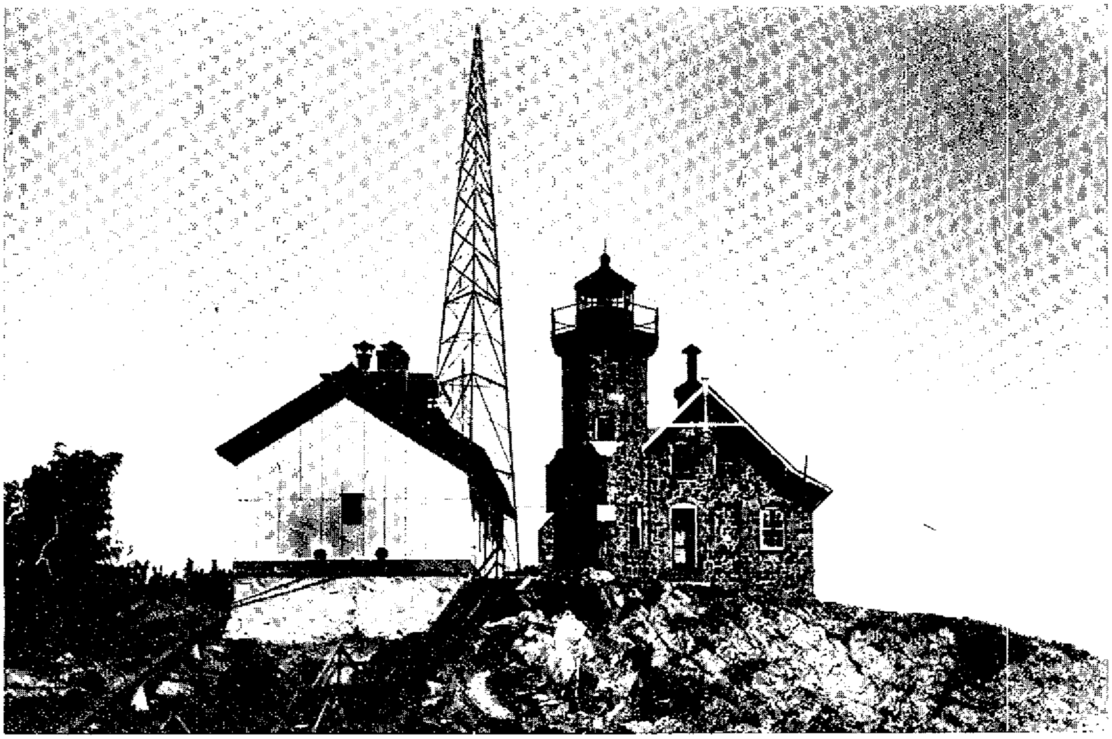


Fig. 6.55. Passage Island Lighthouse and radio tower, view looking southwest, circa 1930s-1940s. NPS photo.

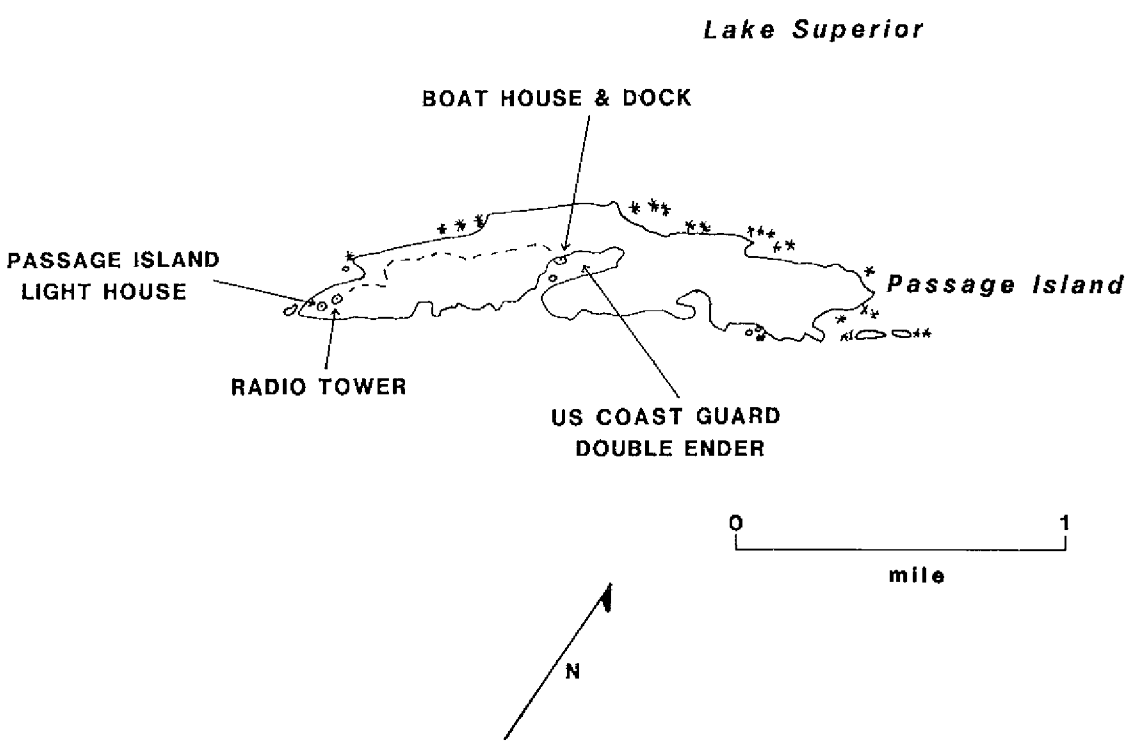


Fig. 6.56. Passage Island sketch map with location of light house, radio tower, boat house, dock, and remains of US Coast Guard double-ender.

magazine interview, that as a child the family picked wild blueberries and strawberries, and planted a small garden. When the storms of Lake Superior tossed waves up onto the windows of their home, they would close the heavy wooden shutters and would wait out the storm "safely inside our sturdy light-house" (Hoge in Mahan and Mahan 1985:49). Improvements and repairs at the still-active light have continued to the present day.

Prior Research: Park Rangers Ken Vrana and Chuck Dale conducted a reconnaissance of the cove in 1980; at that time they briefly examined an abandoned fish boat near the mouth of the cove and a Coast Guard launch in the center of the cove. No archeological studies in the cove had been made prior to 1984, when Submerged Cultural Resources Unit archeologists visited the station and conducted a cursory survey of the remains of the Coast Guard boat. Comprehensive research on the lighthouse has not been conducted by the National Park Service to date. Rather, only limited archival searches and general inquires to the U.S. Coast Guard have been undertaken. In an effort to increase the park's knowledge of the light station and collect oral histories, a program aimed at contacting former Coast Guardsmen was initiated in 1986 by the park historian.

Intrusions and Data Limitations: It is assumed that regular repairs and small alterations have been undertaken by both the Light-House Service and the U.S. Coast Guard during the life of the lighthouse. The full extent of changes or repairs to the two crib docks, the boat house, and landing are presently unknown. It is known however, that in 1949, the boat house, along with a 26-foot cabin motor launch, were destroyed in a fire resulting from an explosion. The boat house was rebuilt the following year.

Site Location: Passage Island is located three miles offshore of the northeasterly end of Isle Royale within T67N, R32W (Fig. 6.1). The lighthouse is located on the southwesterly point of the island. Both the island and lighthouse are clearly marked on USGS topographic sheets and NOAA lake charts.

Administrative Status: Passage Island Lighthouse is not presently included in the Isle Royale Cultural Sites Inventory, nor is it recorded by the State of Michigan. The lighthouse is currently administered by the United States Coast Guard.

Research Methodology: In 1984, members of the Submerged Cultural Resources Unit visited Passage Island to follow up on the report of a U.S. Coast Guard double-ender resting in a small cove on the south side of the island. Diver survey of the cove resulted in discovery of a 26-foot motor launch.

Site Description: The remains of a U.S. Coast Guard double-ended cabin motor launch are resting in approximately 25 feet of water near the center of the small cove on the south side of the island (Fig. 6.56). Constructed entirely of wood, the vessel is 26 feet long. The hull is intact up to the level of the gunnels on the starboard side, aft of amidships. On the starboard side, the metal gunnel guard, still attached at the starboard stern quarter, is twisted and rolls outboard of the hull forward of amidships. The gunnel is missing from amidships forward to the bow on the starboard side.

The port side is intact only up to the level of the deck. Decking is present and uncovered aft of amidships; forward it is covered by debris. The vessel's steering quadrant is present, but no longer in its original location. The stern is intact, and the rudder, screw and exhaust are undamaged. Her cabin is missing, and the hull is misshapen and bulges outward approximately amidships.

The vessel's gasoline engine and the fuel tank are present approximately amidships. Both are apparently in their original location. Miscellaneous planking, piping, and other debris are scattered across the forward deck. All of the loose debris from the vessel is contained within the hull.

Site Analysis: During the brief examination of the remains of the double-ender, the most prevalent impact noted was that the vessel had obviously burned. Charred remains are scattered across the deck. The results of the explosion is evidenced by the bulging of the hull on the port side. While no identifying marks remain, undoubtedly this vessel is the same one that is reported to have burned in 1949.

The existence of a double-ender in the Passage Island cove has been known by park employees for some time. It's present condition, the circumstances surrounding its loss, and identification of the vessel had never been pursued.

Quentin Miller, a former Coast Guardsman at the light house in the years 1949 to 1951, responded to a general request from the park for information about the light house. Surprisingly, he happened to be stationed there at the time the vessel was destroyed and recounted the events leading up to the vessel's loss:

> We had a bad fire, during 1949, in our boathouse that was about 1 1/4 miles away from the PILS [Passage Island Light Station] itself. A narrow and rocky path had to be walked in order to get back and forth afoot. Gasoline fumes in the bilges of our then 26 foot cabin motor launch, which had a 4-cylinder Grey Marine gasoline engine, were ignited when [Nelson] Goudreau attempted to start the launch for the first time in early 1949. That he [Goudreau] managed to escape from the small cabin, roll off the bow and into the boatwell water, climb out and then walk that 1 1/4 mile back to the PILS, half his clothes burned off, face an ashened grey putty color, and skin hanging from his hands, I'll never know, is a miracle of human survival and endurance. The boathouse and small boat were completely destroyed ....
>
> An investigation followed, of course, and poor Johnny of southern Michigan, was made the goat. He went down to the boathouse the night before and in the dark refueled the launch and in the process spill[ed] or overflowed gasoline into the launch's bilges. Johnny also failed to secure the fuel shutoff valve that led to the gasoline hose and the valve leaked, dripped gasoline, all the rest of the night ... until Nelson discovered it the following morning.
>
> Nelsön vented the launch, but he failed to realize just how much fuel had been spilled into the bilges. The launch was a gasoline bomb waiting for a spark, and when Nelson turned the ignition key to crank the engine up, that's all she wrote! That Nelson survived was a miracle indeed.
>
> In time the boathouse was rebuilt by special crews .... (Quentin M. Miller 1986:2-3).

The same motor launch that exploded in 1949 was photographed sometime between 1941 and 1947 (Fig. 6.54). Seated on the cabin is Edith Bowen, wife of former Coast Guardsman Jim Bowen.

This 26 footer was also involved in the rescue of long time Isle Royale fisherman, Milford Johnson, Sr.:

> We happened to be outside, it was a real stormy day. I don't know how he [Jim Bowen] ever spied that boat that was floating out there .... He spotted them from just looking out over the water. ... He said "that boat looks like its not under power". So he ran down and got the ... 26-footer and went out. And sure enough they were with out power. It was Milford Johnson, from Rock Harbor, who had these people out for the day. The engine konked out and he couldn't repair it. How he ever spotted it among the white caps I'll never know (Edith Bowen, wife of Coast Guardsman Jim Bowen 1985).

Conclusion: A combination of coincidence and chance led to the discovery of the circumstances surrounding the loss of the Coast Guard vessel and a photograph taken prior to 1949. Every effort should be made to obtain additional information about this particular vessel. Date and location of construction, model or "type", and history of use at Passage Island Lighthouse should be documented. If construction plans for this class of vessel do not exist, the underwater remains should be thoroughly documented. This vessel is part of the submerged cultural resources base at Isle Royale and its history can contribute to the story of the park. The vessel should be added to the State of Michigan cultural sites inventory and be evaluated for addition to the existing Shipwrecks of Isle Royale National Park Thematic Group Nomination.

Civilian Conservation Corps Camp Siskiwit at Senter Point

Historical Background and Description: In August, 1935, the first Civilian Conservation Corps volunteers arrived at Isle Royale and set up their base camp at the head of Siskiwit Bay at Senter Point. Camp Siskiwit was the first of three permanent base camps eventually established on Isle Royale by the CCC.

During the first year of operations at Camp Siskiwit, CCC crews graded a trail from Senter Point to Lake Desor, constructed a shelter on the Lake Desor trail, a ski-patrol cabin, and a moose corral, disposed of slash in the Senter Point general vicinity, and developed a range study area. In addition, the crews constructed several buildings to house the volunteers and support camp operations. The majority of the facilities were either tents or were constructed of pulp logs (Wolbrink personal communication, February 1987). A small dock on the south side of Senter Point was also built (Shevlin 1937:1).

In 1936, the second season of CCC work on Isle Royale, bureaucratic and organizational delays hampered the implementation of projects both at Siskiwit and Rock Harbor until July. Improved fire prevention was a top priority project for the CCC that year. Because of the delays, crews were not released from camp assignments for field duties until July, when the danger of forest fires was at its peak. The fire prevention program had just gotten under way when the most extensive fire in Isle Royale's recorded history began on July 28,1936.

The fire broke out in Mead Lumber Company "slash" just southwest of Camp Siskiwit. Crews from the camp were immediately sent to combat the flames, however, high winds and temperatures, combined with tinder-dry underbrush resulted in almost impossible fire fighting conditions. Winds leapfrogged to a second area north of Hay Bay and a third area near Siskiwit Lake (Little 1978:98-100).

Before the fire could be brought under control, it burned nearly 1/3 of the island and required the fire fighting efforts of 1200-1600 additional CCC volunteers recruited from throughout Michigan. In all 26,000 acres were destroyed and a swath of burned timber, from Rock Harbor on the east to nearly Lake Desor on the west and from Chippewa Harbor on the south to Todd Harbor on north, scarred the interior landscape (Little 1978:98).

In an effort to make up for work delayed due to the fire, CCC volunteers stayed on the island at Camp Siskiwit through the winter to remove damaged trees and fallen logs. Among the core of the crew at Camp Siskiwit in October, 1936, were several supervisors including, Frank Stone, Erik Erickson, J. Alfred Croze, Harry R. Nichols, and Vincent Pope, plus seventeen enrollees (Camp Siskiwit Log, October 1936). By mid-November of that year, more volunteers had arrived and work was begun on preparations for their winter stay.

Work that fall and early winter focused on the construction of a new camp inland at the site of the Mead Lumber Company (Camp Siskiwit Log, October 19, 1936). In fact, the CCC occupied several of the lumber company buildings (Wolbrink personal communication, February 1987). Camp Siskiwit was systematically dismantled and building materials re-used in the construction of the new camp. While waterline problems plagued the new camp throughout the winter, few other major problems were encountered. Regular radio communications with Houghton provided the volunteers with the ability to keep in contact with friends and relatives. By Thanksgiving several buildings at the new camp had been completed and the volunteers' spirits remained high.

> ... and with this we close another month of the winter sojourn on Isle Royale. We are in first class condition and with food in storehouses, lumber and material for construction, tools and equipment to build with, and our spirits and health at top, we begin another month confident (Camp Siskiwit Log, November 30, 1936:25).

This camp was supposed to be officially named Camp Isle Royale (Camp Siskiwit Log, October 28, 1936), however it was always generally referred to as Camp Siskiwit by the volunteers (Wolbrink personal communication, February 1987). By December 8, 1936, the move to the new camp was complete and the area at Senter Point was becoming "deserted and bare" (Camp Siskiwit Log, December 13, 1936:29). The last official contact with the mainland by boat was in mid-December, and from that date until the next April, the men at Camp Isle Royale were completely isolated. Their only means of communication with the mainland was by radio and through irregular airplane flights for emergency evacuation.

Despite their isolation from the outside world, the men enjoyed snow shoeing, ice skating, and Christmas dinner with all the trimmings. A New Year's Eve party in the mess hall

> ... continued well into the night to bring down the curtain on another year and another month of our ... stay through the winter on Isle Royale. There is at this time a marked note of contentment and satisfaction among all who are here. Work has progressed rapidly, there has been no serious sickness or accidents of any kind and the

> morale is very high. All indications point to success (Camp Siskiwit Log, December 31, 1936:36).

The appearance of the U.S. Coast Guard cutter CRAWFORD in early April, signaled the end of the winter and the beginning of another season on the Island. CCC work in 1937 followed the pattern of previous years, with the crews involved in fire-related clean up and various navigational and wildlife projects. The selection of Mott Island as the permanent headquarters for the island resulted in a heavy concentration of effort in that area the following year. Fire hazard removal and trail construction continued in the old Camp Siskiwit area.

Work at Mott Island headquarters and Senter Point continued in 1939, following the plans outlined in previous years. The next year, 1940, saw the establishment of another CCC camp at the west end of the island.

Isle Royale's remoteness and the emphasis by NPS officials on maintenance of the island's wilderness required some changes in the usual operation of CCC camps. Camp Siskiwit and later Camp Isle Royale reflected these adaptations. Horseshoe pitching, hiking, and water sports were substituted for other group recreational activities, such as baseball and football. The absence of large buildings also limited indoor recreational activities. Fortunately neither academic nor vocational training were hampered by the island's remote location. The curriculum included mechanical drawing, radio operation, photography, typing, nautical skills, American history, math, English, and even beginning French.

CCC projects on Isle Royale terminated in September 1941, with the seasonal departure of volunteers and the abolition of the CCC in June, 1942.

The facilities for the volunteers at Camp Siskiwit, built during the first season of activities, included barracks, a dispensary, mess hall, blacksmith shop, supply building, bath house, power house, store house, National Park Service office and Army Headquarters buildings, a water supply tank and pump house, a chemical toilet, as well as several other miscellaneous structures (Camp Siskiwit Log, Winter, 1936). A crib dock, on the south side of Senter Point, was constructed the first summer of operation (Fig. 6.57). The only structure that was not reported to have been dismantled during the winter of 1936 was the crib dock and a small storage room for non-perishable supplies. The CCC log does not specifically mention the dismantling of the store room in the Spring of 1937, although this is highly likely due to the relocation of the entire camp to the Mead Lumber Company location.

Camp Isle Royale facilities, the replacement for Camp Siskiwit, included all of the above mentioned structures as well as a recreation hall, ice rink, root "house", tool room, oil house, photographic lab, moose corral and barn (Fig. 6.58). No additional dock facilities were required at the new location as the existing lumber company wharf proved suitable (Fig. 6.59). The site was abandoned by the CCC at the end of the 1941 season.

Prior Research: Wolbrink visited Camp Siskiwit at Senter Point during the winter of 1936 and took numerous photographs. Isle Royale Cultural Resource Specialist Carol Maass visited the site of Camp Isle Royale in March, 1984, and included it on the undesignated Isle Royale Cultural Sites Inventory. Maass recommended field testing be conducted at the Camp Isle Royale site to determine its spatial and temporal limits and identify any outlying areas.

Fig. 6.57. Civilian Conservation Corps Camp Siskiwit crib dock located on the south side of Senter Point. NPS photo by Donald Wolbrink, 1935.

Fig. 6.58. The CCC occupied many of the buildings of the Mead Lumber Company during the winter of 1935-36. The Senter Point location was abandoned in favor of the Mead Lumber Company site. NPS photo by Donald Wolbrink, 1936.

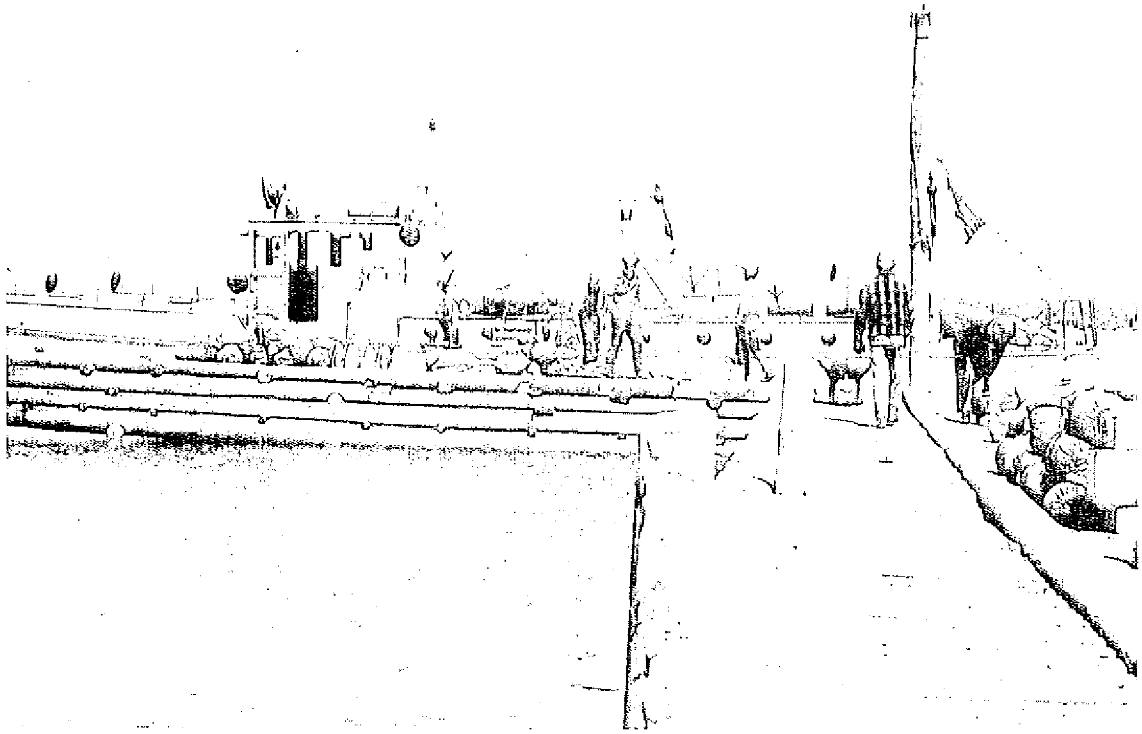


Fig. 6.59. Mead Lumber Company wharf later used by the CCC at Camp Isle Royale (aka Camp Siskiwit). NPS photo, 1945.

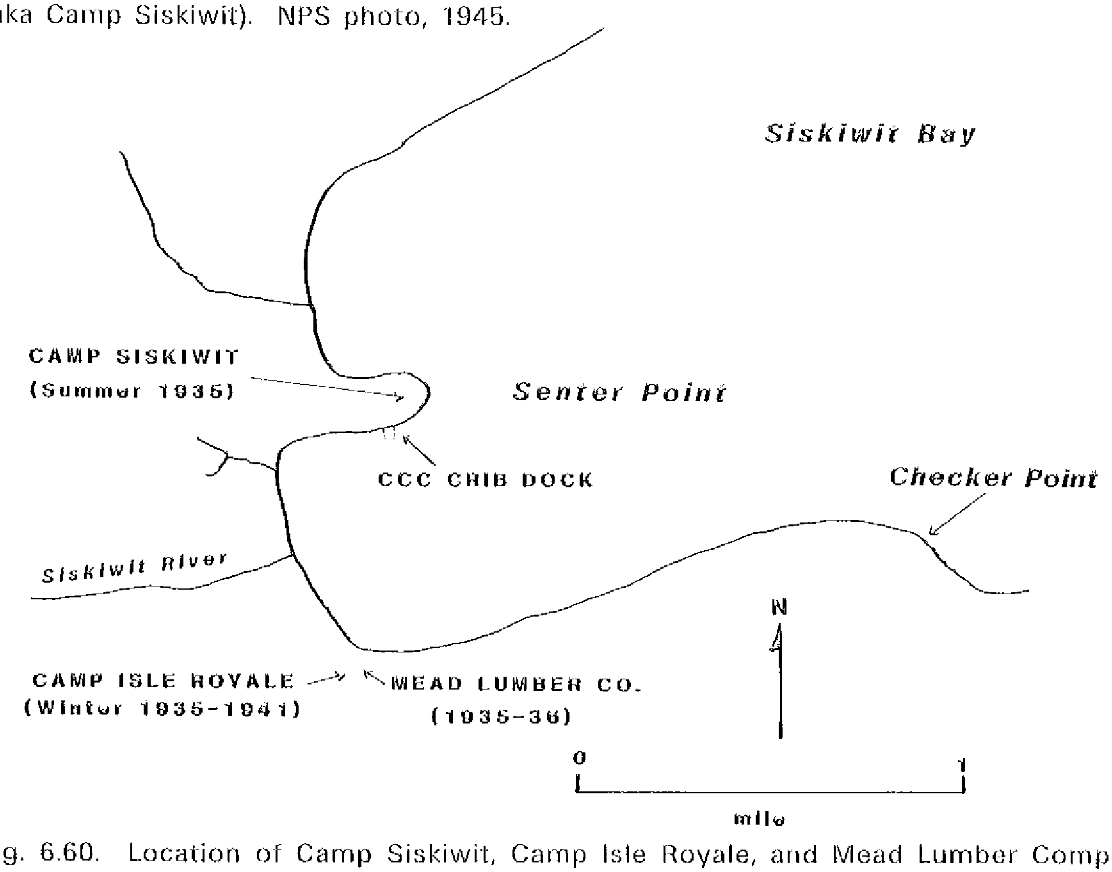


Fig. 6.60. Location of Camp Siskiwit, Camp Isle Royale, and Mead Lumber Company in Siskiwit Bay. Drawing by Toni Carrell.

Submerged Cultural Resources archeologist Toni Carrell, Isle Royale Park Ranger Ken Vrana, and Maass visited Senter Point in June 1984 in an effort to locate the remains of the Camp Siskiwit crib dock and to examine the offshore area for associated artifacts. No examination of the original Camp Siskiwit location has been undertaken to date.

Intrusions and Data Limitations: Following abandonment of the CCC camps in 1942, buildings from all three camps began being re-used by the fledgling park. Structures were dismantled in sections, in some cases, and moved to other locations for use as residences, offices, shelters, ranger stations, and warehouse space. Salvageable materials were also used for upgrading existing buildings on an as needed basis. Eventually, each of the camps was obliterated, the last CCC building at Camp Siskiwit/Camp Isle Royale was burned in October 1985 (Isle Royale National Park files). The crib dock at Senter Point was apparently allowed to deteriorate on its own.

Site Location: CCC Camp Siskiwit on Senter Point and its associated features are located at the west end of Siskiwit Bay (Fig. 6.1). The crib dock can be reached by traveling in a northwesterly directly in the bay, toward Senter Point, a geographic place name clearly marked on USGS 15 minute topographic maps and NOAA nautical charts. The remains of the dock are on the south side of Senter Point, just below the surface of the water.

CCC Camp Isle Royale (aka Camp Siskiwit) at the Mead Lumber Company location, is recorded as being within Township 63 North, Range 37 West, Section 4, SE 1/4, NE 1/4. The Camp Siskiwit and dock location, at Senter Point, is in Section 33, SE 1/4, NE 1/4, and in Section 34, SW 1/4, NW 1/4 (Fig. 6.60).

Administrative Status: The Civilian Conservation Corps camp site at the Mead Lumber Company location is included in the Isle Royale interim Cultural Sites Inventory as undesignated site number U-43. It does not have a State of Michigan number and is not included on the National Register of Historic Places. The camp site on Senter Point is not presently recorded by the park.

Research Methodology: Divers examined the offshore area of Senter Point down to a depth of 15 feet. The entire point was examined down to a depth of 10 feet. Good water visibility and light penetration facilitated the examination, and it is felt that no major artifacts were overlooked. During this survey the remains of the dock were located. No examination was made of the historic CCC camp location.

Site Description: The crib dock, in approximately 4 feet of water, is composed of two scattered sections of cribbing. One crib is partially intact with several logs still in place (Fig. 6.61). The second crib consists only of rounded boulders, which extend from the shoreline out toward the partially intact crib (Fig. 6.62).

Site Analysis: During the offshore survey of the north side of Senter Point, numerous artifacts were located that probably date from the CCC era. Pieces of broken crockery and two small aluminum bowls, specifically, point to the activity here in the mid to late 1930s. The five-inch diameter aluminum bowls have a rolled lip and the word "Kellog's" is embossed in the bottom. Examination of the south side of the point, adjacent to extant crib dock remains, revealed the presence of iron spikes, used in the construction of crib docks, along with various pieces of broken crockery and other miscellaneous nails. There is no question that this is the location of the CCC crib dock associated with Camp Siskiwit.

Fig. 6.61. Remains of Senter Point crib dock underwater. NPS photo by Toni Carrell.

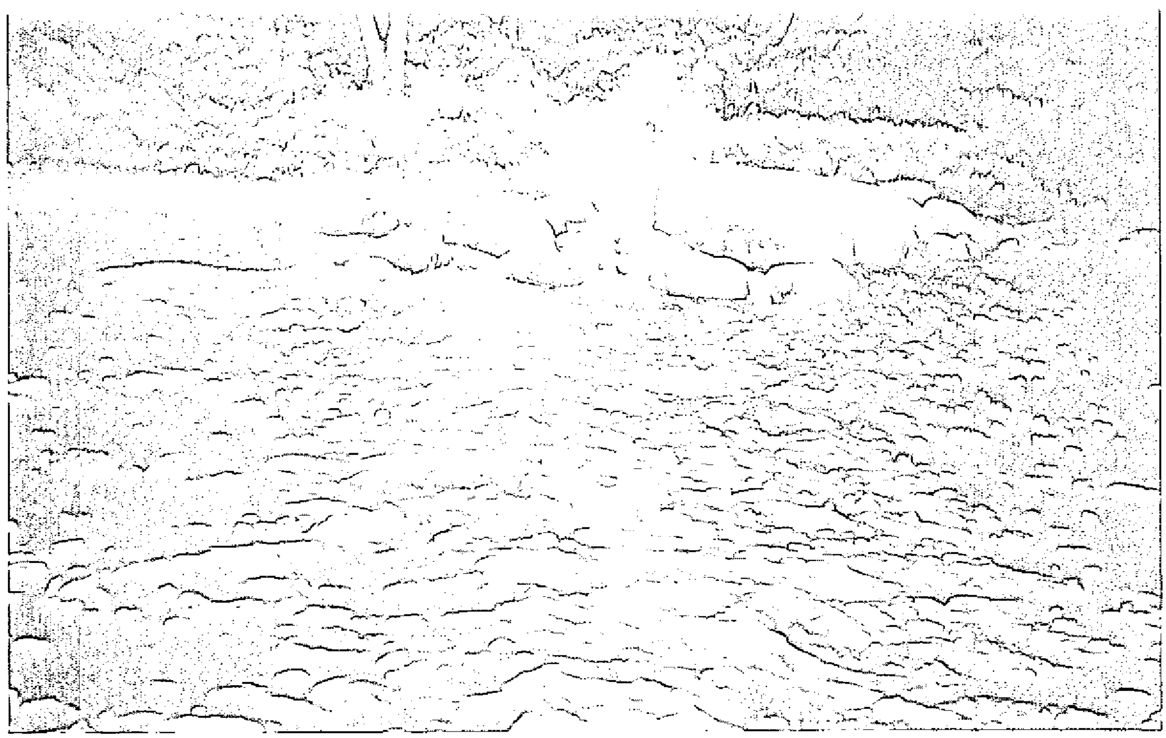


Fig. 6.62. Shoreline evidence of former CCC crib dock at Senter Point. NPS photo by Carol Maass.

Conclusion: Confusion over the original site of Camp Siskiwit with its Mead Lumber Company location has resulted in some difficulties in identification of photographs from the two camps and has led to an inaccurate interpretation of the history of this activity by present day park staff. The continued use of the camp name Siskiwit by the CCC volunteers, the removal of nearly all buildings from the original site, and the oral history regarding the site, has undoubtedly contributed to this confusion. As a result, no baseline cultural resources survey of the original location has been undertaken. The Senter Point site of Camp Siskiwit should be investigated and recorded by the park.

Further examination of the area immediately offshore of the Senter Point CCC dock may result in the discovery of additional artifacts that could be used as part of an interpretive display or program. Documentation of the dock remains should be completed; this can easily be accomplished by a combination of wading and snorkeling the area.

While the old crib dock does not represent a significant cultural resource of its own accord, the overall story of the CCC on Isle Royale and its impact on the development of the park should be interpreted. Photographs of the extant dock along with Wolbrink's historic photo record, combined in a small brochure and self-guiding hike to both camp locations, could provide the casual visitor to this area a richer understanding of the development of the park and the Civilian Conservation Corps. The crib dock should be included as part of the CCC Camp at Senter Point and recorded as a State of Michigan historic archeological site.

The area of the crib dock at the Mead Lumber Company location should be investigated and remains documented. This second dock area may contain a diversity of artifacts that are associated with both lumbering and CCC activities.

Other Known or Suspected Sites

Siskowit Mine

The historic Siskowit Mine offshore location was very briefly examined on two occasions in 1984 and 1985. This area contains cultural remains from the prehistoric period, the historic mining period, and modern remains from the mid-1930s.

Historical Background and Description: One of the earliest written documents about prehistoric copper mines on Isle Royale comes from C. G. Shaw (1847), who was mining on the island in the 1840s. In 1849, an article entitled "Ancient Workings" appearing in The Lake Superior Journal (1849:2) carried a brief description of Shaw's 1847 finds. A subsequent article, "Isle Royale", reported the additional discovery of prehistoric mines near the Siskowit Mine in Rock Harbor (1854:2). Dustin also specifically refers to the presence of prehistoric mines in the Siskowit Mine area (1930:495).

Organized in 1844, the Isle Royale Union Company went through a series of reorganizations, eventually emerging as the Siskowit Mining Company in 1849. During this period the company conducted a number of explorations on Isle Royale concentrating on Mott and Outer Hill Islands. By 1850 the company was concentrating its efforts on the historic mine location, across Rock Harbor Channel from Mott Island, that bears its company name. The Siskowit Mine was established in the vicinity of known prehistoric copper mines. Between 1847 and 1855 the mine produced nearly 200,000 pounds of refined copper (Rakestraw 1965:8).

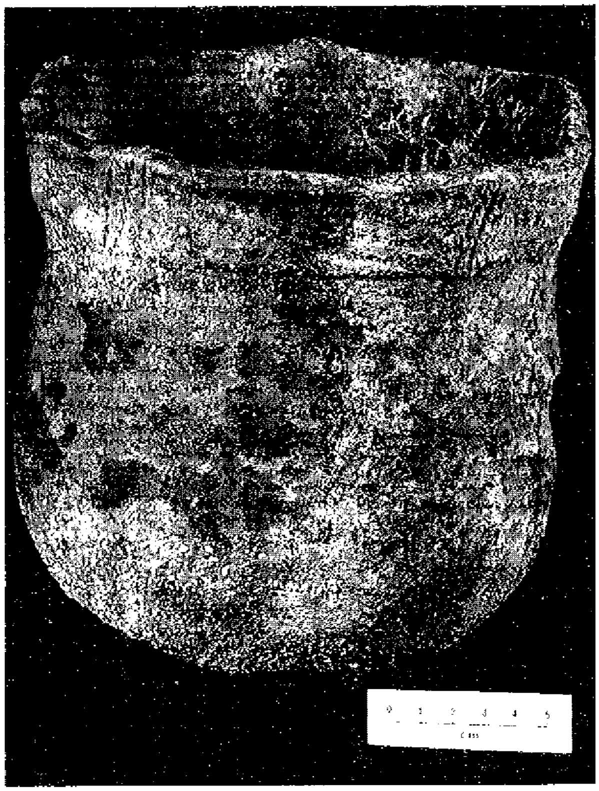
In June, 1935, a small pontoon plane failed to complete a take off from Mott Island and nose-dived into Rock Harbor Channel just offshore of Siskowit Mine. Both the pilot and the single passenger on board managed to escape from the rapidly sinking craft, despite having severe injuries. The plane broke up and sunk (Daily Mining Gazette, June 30 and July 2, 1935). Shortly thereafter, the plane was hauled up onto the shore and the engine, pontoons, and other miscellaneous items were salvaged. After everything of value was removed, the remains were used as a dock for a time. When the canvas-covered craft began to deteriorate, it was pulled offshore and dumped in deep water (Donald Anderson personal communication, February 1987).

Site Discussion: It is not surprising, given the history of prehistoric exploitation of copper on Isle Royale and the presence of a prehistoric mine, that some prehistoric remains should be found in the vicinity of the Siskowit Mine. What is remarkable is the nature of the artifact located just offshore in 70 feet of water; a nearly intact 14th century ceramic clay pot (Fig. 6.63).

The pot was accidentally discovered in August, 1985, by Scott McWilliam, a volunteer diver working with the Submerged Cultural Resources Unit. McWilliam video taped the pot in situ then carefully removed it to the surface where it was stored in a cooler filled with lake water. The pot was immediately transported to park headquarters and turned over to the park naturalist and park historian for stabilization.

Analysis of the pot has been undertaken by Dr. Patrick Martin, archeologist with Michigan Technological University. The following is excerpted from his initial evaluation of the pot:

> ... the discovery of the 14-inch tall [pot] in the well-used Rock Harbor Channel is remarkable in itself, but the vessel has significance in several other ways as well.
>
> ... the vessel is nearly intact, with about 75% of the original pot still present in one piece. This is highly unusual in a northern environment such as that found around Lake Superior, where relatively porous vessels, such as this one, typically succumb to damage caused by moisture and freeze-thaw cycles. Very few vessels of this age and degree of intactness are known from the Upper Great Lakes.
>
> The pot ... [is an] indicator of wide-area cultural contact ... [and] exhibits several clues as to its age and cultural origin, distinctive attributes of style and manufacturing technique ....
>
> The combination of manufacturing and design attributes form a distinctive style of pottery best known from an archeological site in the Straights of Mackinac called the Juntunen Site .... That a similar vessel should be found in both locations is not terribly surprising, for the occupants of the Juntunen Site were regular users of native copper, a material that could be obtained with ease by traveling to the Keweenaw or Isle Royale, or by trading with people in this area ....



a.

b.

Fig. 6.63 a & b. Nearly intact prehistoric pot found in Rock Harbor Channel in August, 1985. This pot has been dated to circa 1020-1200 A.D. It is the most intact example of this pottery type found in the region to date. Photos by Patrick Martin.

> [Juntunen Phase pottery] has stylistic affinities or inspirations from the Ontario homeland of the Iroquois, and has been dated from circa 1200-1400 A.D., or perhaps even later. Attaching an ethnic identity to material several centuries old ... is tenuous ... but makers of this pot were probably ancestors of the Chippewa, or Ojibwa people who lived in this region when European explorers first visited here (Martin 1985)

Since the initial evaluation, the results of accelerator-aided radiocarbon analysis have been received and a more conclusive date for the pot has been determined. Dating from 1020 to 1200 A.D., the pot is now ascribed to the early, rather than late woodland period as originally believed (Dr. Patrick Martin, personal communication April 1987).

In June, 1980, and again in September 1984, park divers were attempting to locate the remains of the pontoon plane, and instead found a number of artifacts associated with the historic mine immediately offshore of the mine tailings. Remains included a wheel barrow wheel, a partially intact ore barrel, pieces of iron machinery, and "a surprising amount of old leather shoes or shoe soles" (Vrana 1980, 1984).

Wing struts from the pontoon plane were located by Vrana on the same dive in 1984, and the frame was located by McWilliam in August, 1985. The partially wooden frame is laying upside down in 70 feet of water, not far from the location where the prehistoric pot was found.

Conclusion: It is apparent that the Siskowit Mine area would benefit from additional research consisting of both shore-based and underwater reconnaissance. While the area immediately adjacent to the pot's former resting place was thoroughly examined for additional remains by Submerged Cultural Resource Unit archeologists in 1985, with negative results, the near-shore area should be surveyed. It is not unlikely that additional prehistoric, historic, and modern remains are resting on the silty bottom.

Additional Research Locations

Although Isle Royale was established as a National Park in order to preserve its wilderness values, the range of human activity from the prehistoric period to present-day tourism have left their imprint on the island. Numerous prehistoric sites have been documented on the island, many are along the shoreline or just inland. Given the discovery of the prehistoric pot in Rock Harbor Channel, examination of offshore areas of known sites could prove fruitful.

Many of the structures associated with the historic period have either been demolished or allowed to deteriorate on their own. Their surficial remains have often been compromised by the establishment of camping areas, other visitor use areas, park service facilities, or general site clean up following razing of buildings. In a number of cases historic wharfs or docks have been destroyed or altered during the process of replacement or improvement for modern use. However, the comparative degree of "damage" done to the underwater components of the various land-based sites, discussed previously in this chapter, has been minimal. The most severe impacts coming from dredging associated with the construction and maintenance of docks or other park facilities.

The preliminary information gathered at each representative site discussed in this chapter has already provided remarkable insights into the prehistory and history of

Isle Royale. With this knowledge as a baseline from which to draw tentative conclusions, it is reasonable to assume that other land-based sites with underwater components may also contain a great deal of valuable information.

Conclusion: As of 1984, thirty-seven prehistoric sites were documented on Isle Royale (Maass 1984). Those sites that are adjacent to the shoreline, rivers or inland lakes, should have an offshore reconnaissance. The offshore areas of possible Northwest Fur Company and American Fur Company trading posts should be examined for both early fur trade and fishery station remains. Each of the historic mines required the construction of small docks or wharves, these should be located and documented. Docks and underwater remains associated with lumbering, recent fishing, resorts, the lighthouses and the CCC should also be examined and evaluated for their historical significance.

Maass' undesignated cultural sites inventory (1984) and the park's designated cultural sites list are excellent starting places for planning of future surveys and documentation efforts. Liberal use of the park's building and dock files would also be useful in this regard. These records should be incorporated into park historic files after use by park resources management and maintenance divisions. Oral histories and contemporary written accounts are also an important part of preparation for the survey and documentation process.

Vernacular Watercraft

Numerous examples of small wooden watercraft are present at Isle Royale. These vessels represent a local expression in boat design that was developed to meet the physical requirements of the work engaged in, and to function in a variety of weather and water conditions around the island. Similarly, these vessels were developed within limitations of low cost, available materials, repair and maintenance by possibly amateur builders (the owner), and construction by "semi-pro" (locally recognized and/or part-time), and professional builders.

In the heyday of sail, in particular the latter half of the 1800s, about 200 distinct types and subtypes of small sailing boats were used in North America (Chapelle 1951:3). The vast majority of these vessels are now gone, their usefulness passed when the sail was replaced by the low-cost gasoline engine. Isle Royale's sailers were phased out by the use of the gasoline engine. In their place the "gas-powered boat" became the workhorse of fishermen, vacationers, and even the rescue services, i.e. U.S. Light-House Service and U.S. Life Saving Service.

Larger inshore, coastal, and Lakes sailing vessels, those from 35 to 40 feet and up used principally for commercial purposes, were also designed to meet geographical and service needs. There were more than 100 types of sailing craft used in the fisheries and in commerce between 1800 and 1900 (Chapelle 1936:xi). Unlike their smaller counterparts, these vessels were built in recognized shipyards by skilled shipwrights. These sailing vessels, like the small sailers, were gradually replaced by mechanization. Steam-powered vessels rapidly dominated commercial trade although, at least on the Lakes, some types of intermediate-sized vessels were still gasoline powered.

One of the problems faced by anyone attempting to describe or discuss vernacular craft is terminology. Like most of the country, small craft types on the Great Lakes have not been well studied and nomenclature varies from area to area. It also varies from person to person depending upon age, ethnic background, and even occupation. "They pretty much called them whatever they wanted to call them" (Marjorie McPherren personal communication, February 1987). Fishermen and boat captains not only viewed their vessels differently than vacationers and pleasure craft owners, the two groups referred to similar vessels using different terminology. To further complicate matters, the same generic term, such as skiff, was used to describe entirely different vessel construction.

In order to avoid attempts at lengthy "definitions" of vessel types, the several examples around Isle Royale will be discussed in the vernacular, that is, in the terms used by fishermen and their families (Milford and Myrtle Johnson and Milford Jr.; Stanley Sivertson), summer residents and resort owners (Phil Gale and Marge McPherren), boat captains (Stanley Sivertson), boat builders (Reubin Hill; Westy Farmer), and engine mechanics (Elvis Moe), who lived, worked, played, and built boats for use around Isle Royale. The explanations surrounding the various craft are limited to the modern or Scandanavian period of commercial fishing and resort activity, thus emphasizing the period from the 1880s to the 1950s. This narrow time frame was necessitated by the oral traditions and memories of the individuals queried about the craft.

It will be quickly recognized that much of the vessel terminology is both functional and descriptive. Cochrane documented the functionality of the fishermen's view of their lives and surroundings while researching the folklife expressions of three Isle Royale fishermen (1982). Given the adaptive nature of the terminology used to describe the vessels under consideration in this chapter, photographic illustration of the various vessel types will be used whenever possible. This is not intended to be a thorough examination of the wide variety of craft either present or used around the island. Rather it is a brief overview.

With the above caveat in mind, the general categories of vessels, often referred to as boats regardless of their size or function, include: sailboat, skiff, rowboat, gas boat, launch, fish tug, work tug, passenger boat, steamboat or steamer, and yacht. These can further be broken down into inferred categories of use: commercial, recreational, or private (not for hire).

The general term sailboat simply referred to any sail-driven craft, regardless of size.

> Grandpa had a sailboat, a two-masted schooner. She had thin ribs. The NORTHERN BELLE. Narrow planking. She's laying in the slough, the little slough behind Sam Johnson's dock at Wright Island (John M. Malone, Sr. 1986).

A particular type of sailboat, a craft less than 35 feet in length, was popular on the western Lakes and with Isle Royale's fishermen from the 1880s to just after the turn of the century. It exhibited a distinct hull form and was referred to as a Mackinaw sailboat (Fig. 6.64).

> Nothing was more excitingly beautiful than watching Papa's return from the nets. His two-masted Mackinaw sailboat would come into sight around a rocky point ... sails unfurled and billowing in the wind (Ingeborg Holte 1984:33).

The Mackinaw was built in three distinct models: the double-ended, straight-sheered Collingwood style built on both the American and Canadian shores of Lake Huron; the double-ended, strong-sheered, high bow, and plumb-stemmed style from Lakes Superior and Michigan (see Figure 6.64 above); and the square-sterned Huron boat

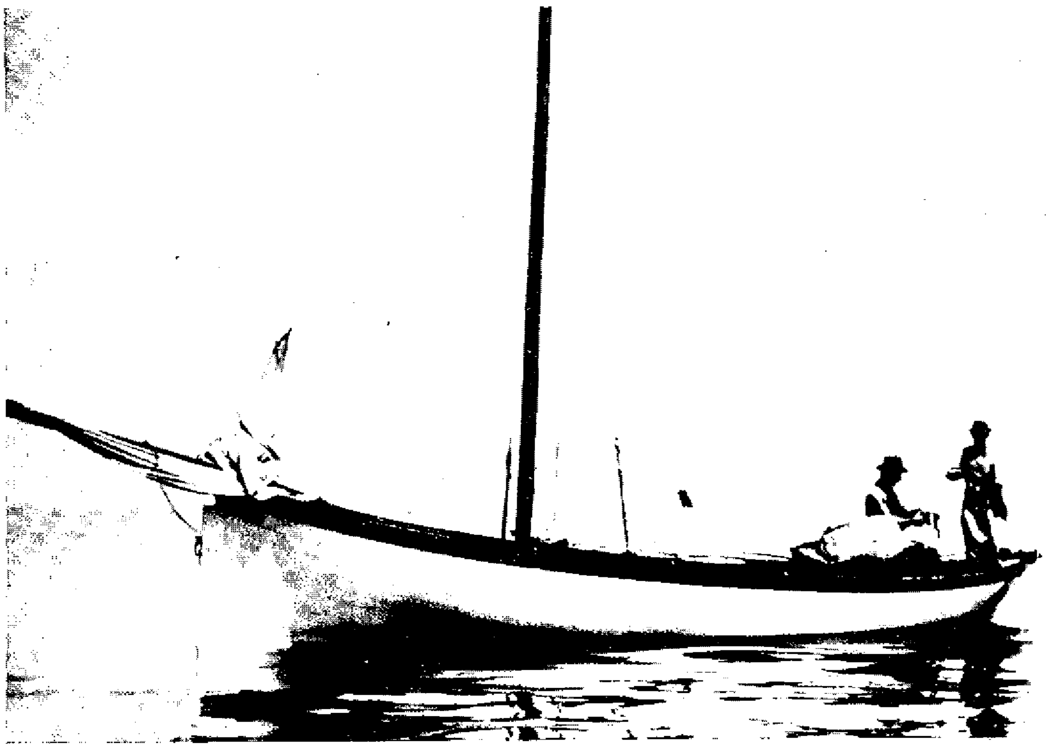
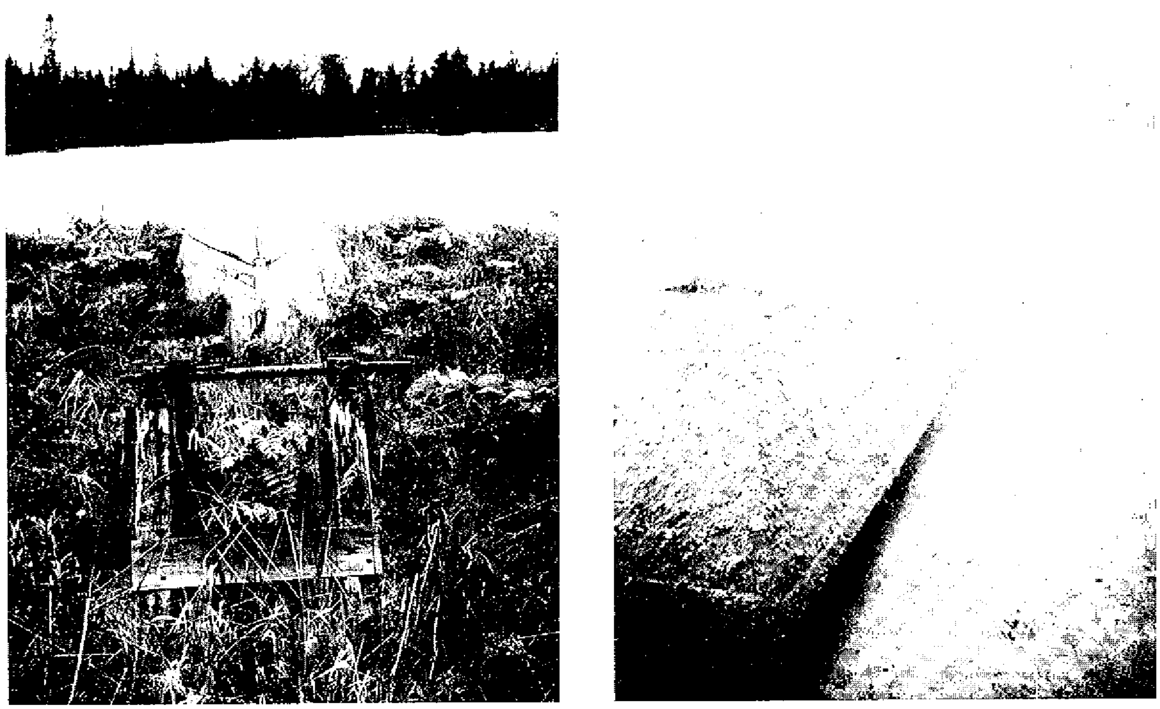


Fig. 6.64. Mackinaw sailboats were used on the lakes until after the turn of the century. This one is a typical Lake Superior Mackinaw with its high bow and sharp stern. National Archives photo, circa 1890s.



a. b.

Fig. 6.65 a & b. The fishing skiff was a small rowed boat with a sharp bow (left), flat bottom, hard chine, and flat stern (right) used by commercial fishermen. The skiff at right exhibits an early stern configuration, a deep transom extending to the bottom. NPS photos by James Bradford (l.) and Joe Strykowski (r.).

(Chapelle 1951:180-185). The presence of a square stern on the Huron boat may have lead to some recent confusion over identification of this type as a Mackinaw.

The western Lakes Mackinaw was "unquestionably the finest of the Lake types, for they were not only fast but also very fine seaboats" (Chappelle 1951:182). They were rigged as either a schooner or a ketch and always had a jib. The bowsprit was hogged downward and very often the lugged foresail was replaced by a boomed sail. Historic photographs of Mackinaws around Isle Royale circa 1890 show masts of the same height, a typical attribute. The Mackinaw was considered treacherous in the summer months during a sudden squall. If the fishermen could not get the sails down quickly enough, the boat could capsize. A few fishermen lost their lives this way (Sivertson 1987).

The Mackinaw ranged in size from 26 to 35 feet and was constructed with bent or sawn frames and a plank keel. Their beam was carried well forward, with a centerboard just forward of amidships. Reubin Hill stated that white oak and white pine are the preferred building materials of Northshore[4] builders. Presumably Hill's father, who was also a Northshore builder, used oak and white pine in construction of circa 1900 boats. Today Hill steams oak for frames, and oak is used in the stem, keel and transom. It would not be surprising to find oak used similarly in the construction of Mackinaws, although this has not been documented. Based upon the preferences of builders today, it is possible that native white pine or cedar may have been used to plank the hull.

While the sharp-stemmed and raked-stern Mackinaw was the most popular on Lake Superior, there were some smaller square-sterned boats used on the lake. Stanley Sivertson's father, a fisherman on Isle Royale at the turn of the century, had two Mackinaws; one was a 20-foot square-sterned sailer (Sivertson 1987). The advantage of the sharp stern over the square stern was that the fishermen could push them off a ramp without broaching, and in a following sea they didn't "sashay around so much or broach so easy" (Sivertson 1987). The stern, while considered sharp, was rounder than the bow.

The Mackinaw sailboat was widely used until the introduction and ready availability of the gasoline engine just at the turn of the century. The general Mackinaw hull shape appears again in post-1900 craft, discussed below. A few Mackinaw sailboats are reported to have been lost around the island. One or possibly two may be off Long Point, and one, owned by the MacGuire bothers, was lost off the northeast side in 1874 (Robinson 1938:12-13), and one in Washington Harbor (Sivertson 1987).

The skiff, a small rowed boat, was used both for fishing and occasionally for recreation by fishing families. A work boat used in shallow bays and coves, the fisherman's skiff or fishing skiff was flat-bottomed.

> They were generally a 16 or 17 footer with a flat bottom and side ... that's the way they were made. What we call a chine job .... A piece of oak runs the length of it at the break from the bottom to the side (Hill 1987).

---

[4] The Northshore is Minnesota's Lake Superior shoreline.

Around the turn of the century, the fishing skiffs were made with a sharp stern. Because of the lack of safe bays and harbors on the Minnesota shore, the skiffs, like the Mackinaw sailer, had to be launched off steep slides; the sharp stern prevented broaching in the waves. As many as 350 were launched from areas on the Northshore when herring fishing was at its peak. Two Isle Royale fishermen, Bruen and Petersen, are reported to have made a slide off the steep northeast side of Houghton Point so they could launch their skiff because all of the bays and coves were filled with herring fishermen (Sivertson 1987).

Later the fishing skiff became square-sterned, although it retained its hard-chine, and high-sides varying from 20 to 24 inches deep. These skiffs were, above all, a stable work platform upon which to haul fishing nets (Fig. 6.65a). Early skiffs had a deep transom that extended to the bottom (Fig. 6.65b). In order to make it easier to row, the beam on a fishing skiff was just a little less than 1/3 its length (Hill 1987). Because of its use in herring fishing, this vessel was often referred to as a "herring skiff". Its use was contemporaneous with the Mackinaw sailboat, the Mackinaw being used in open water, while the skiff was used in relatively protected locations. Fishing skiffs continued in use well into the early 1900s.

Another style of rowed boat was popular with vacationers during the resort era on Isle Royale, circa 1890s – 1940s (Fig. 6.66). This vessel was round-bottomed with rounded sides and a gently sweeping fantail stern. This type of stern has also been called a "Y" stern by some Isle Royale fishermen (Milford Johnson Jr. 1987). "Construction was either lap-strake or smooth seam, but always round-bottomed" (Hill 1987). While the fishing skiff was built out of oak and native white pine, the rowboat/rowing skiff was very often built of cedar strips, although both were plank on frame, ie. carvel (Hill 1987). Craft built from cedar or white pine strips are generally referred to as strip boats. Popular lengths for these recreational boats were 12, 14, and 16 feet; their breadth being just under 1/3 the length (Hill 1987). Unlike the high-sided fishing skiff, the rowboat has only a 14 to 16 inch depth.

Simply called a rowboat by fishermen and local boat builders (Milford Johnson Jr. 1987; Hill 1987), it was referred to as a rowing skiff by resort owners and summer residents (Phil Gale personal communication, March 1987; Marjorie McPherren personal communication, February 1987). When asked about the resort owner's and summer resident's adoption of the term skiff from the fishermen and boat builders Reubin Hill replied:

> Well of course a lot of people have a name for them, just like a brown horse, or a black horse .... Its about the same thing with a round-bottomed boat, it's just a round bottom. But those [rowboats] are not called skiffs, a skiff is a chine job that the fishermen mostly was using (Hill 1987).

Examples of both the fishing skiff and the rowboat/rowing skiff are known to exist around Isle Royale. The locations include: Wright Island – herring skiff, Tobin Harbor – rowboat/rowing skiff and herring skiff, Crystal Cove – herring and rowboat/rowing skiffs, Johnson Island – herring skiff, Malone Island – unknown skiff type, Washington Island – herring skiff, and Barnum Island – herring skiff.

The gas boat is an all purpose work boat and "the most revered type of fishing craft around Isle Royale" (Cochrane 1982:55). At the turn of the century gas boats were built as double-enders, adapting the double-ended Mackinaw hull to motorization (Fig. 6.67). Shortly thereafter, the double-ended style was dropped in favor of the

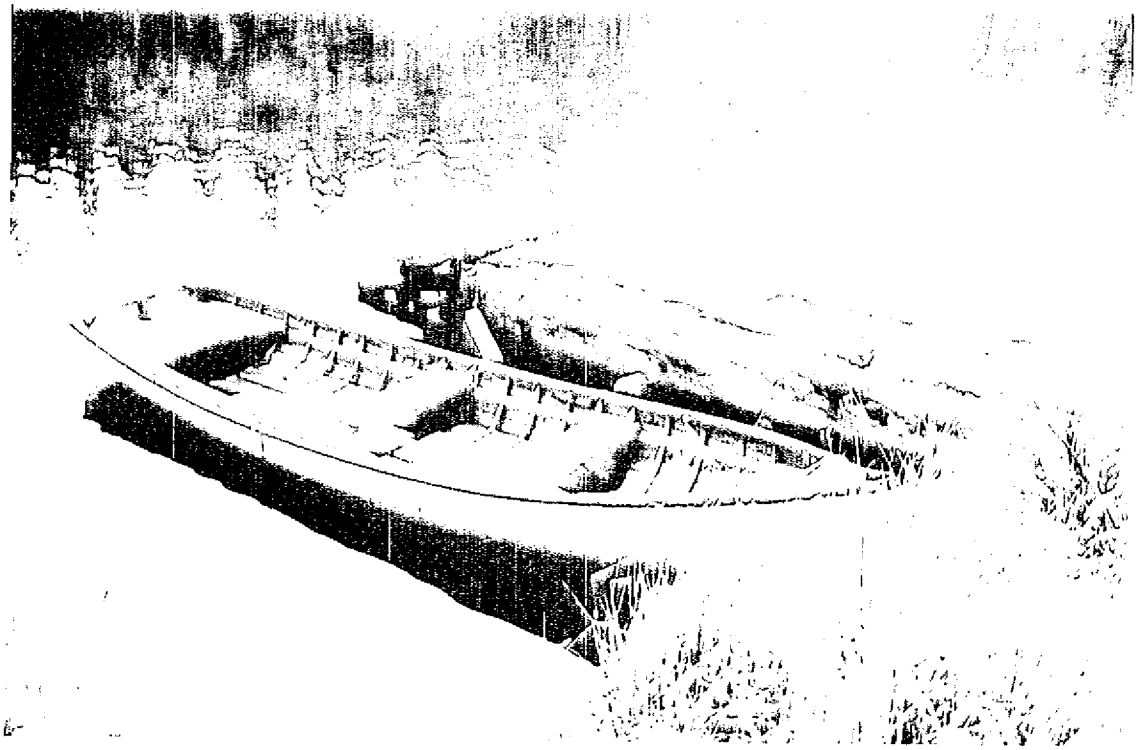


Fig. 6.66. The rowboat/rowing skiff is a round-bottomed boat with a sweeping fantail stern. This recreational craft was popular with summer residents, vacationers, and fishing families. Photo courtesy of Ken Vrana.

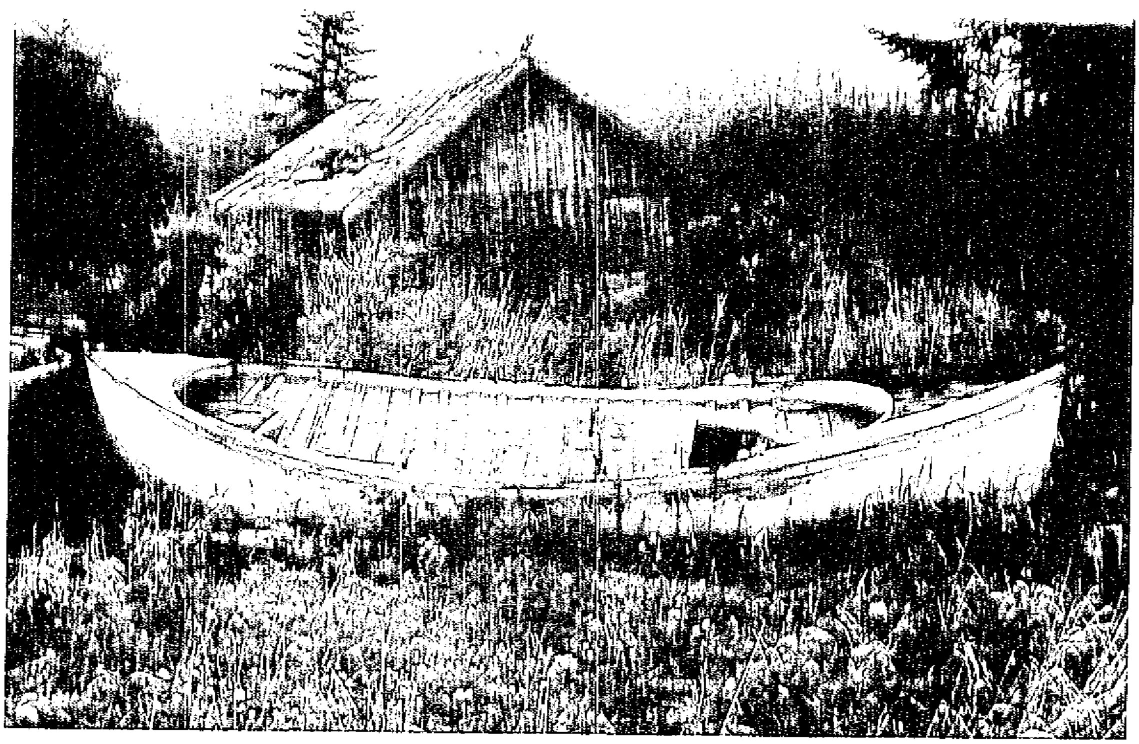


Fig. 6.67. SKIPPER SAM, a double-ended gas boat built in the 1930s, was equipped with a 4 cylinder engine mounted amidships. It's existence is an anomaly since double-enders like this stopped being built just after the turn of the century. NPS photo by James Bradford.

roomier raked square stern. Double-enders were also called canoe-backs by local fishermen and boat builders (Hill 1987).

The "hot head" or "hot tube" engine was used in the early gas boats and were the forerunner of the diesel (Moe 1987; Sivertson 1987; Hill 1987). Kerosene-fueled and started with a blow torch, these engines could not be used in an enclosed area because of the fumes they gave off and the danger of fire (Moe 1987). Fishermen often carried a sack of flour or sand with them just in case a fire started (Sivertson 1987). Double-ended gas boats were later equipped with 2 cycle marine engines with 1, 2 or 3 cylinders (Moe 1987). Early manufacturers, recalled by Stanley Sivertson, Elvis Moe, and Reubin Hill, included Scripps, Palmer, Fox, Knox, Straubal (sic), Detroit, and Kahlenberg.

The Depression years also marked the transition period between 2 and 4 cycle marine engines:

> ... *some of the fishermen used car engines, because they had a* transmission in them, and to set the hook lines they could shift down into low gear or second gear. And when you were setting nets, if it was a calm day it was nice and you didn't have to fuss with the engine, you could just put it in low gear or second gear. If it was rough, and you had to head up against the wind, or the wind was on the forward quarter, well you just put it in high you see. And with hook lines it was especially nice, being able to shift was the ultimate (Sivertson 1987).

The most popular engine was the Buick 6-cylinder Master 29, although 4-cylinder Studebaker, Chrysler, Dodge, and Model-T Ford engines were also used (Moe 1987; Sivertson 1987). Car engines were used for practical reasons as well; during the Depression these engines could be purchased for $100, considerably less than marine engines (Moe 1987).

A surviving example of a double-ended gas boat exists at Wright Island (Fig. 6.67). According to Ingeborg Holte, SKIPPER SAM was built by Charles J. Hill in the 1930s, on a special request, for her father, Sam Johnson.

The "typical" modern gas boat was widely used from the early 1930s through the 1950s (Fig. 6.68). Many of the wooden-hulled Isle Royale and Northshore gas boats were made by master boat builders, principally the Hill family of Larsmont, Minnesota.

Based upon the Mackinaw hull, the gas boat ranged between 20 and 28 feet long. The length of a boat was determined by what size the fishermen could handle:

> ... *particularly in areas where they had to pull the boats up on a ramp,* if they didn't have good shelter ... many of the fishermen around Isle Royale, as well as here [Minnesota], wanted 24-footers, round-bottomed boats. A few were a little larger, but most ... were looking for about a 24-footer. Many of those were on Isle Royale, down in Siskiwit and on the Northside, in Washington Harbor, Belle Isle and that area (Hill 1987).

A rule of thumb was to make the beam on a gas boat 1/3 the length (Hill 1987). Gas boats were open decked and carried an inboard engine mounted amidships. These plank-on-frame boats were constructed with a sharp bow and raked square stern, to make them easier to handle in rough weather. A number of Hill's boats had a cut-away stern, rather than a big wide deep transom, to improve their

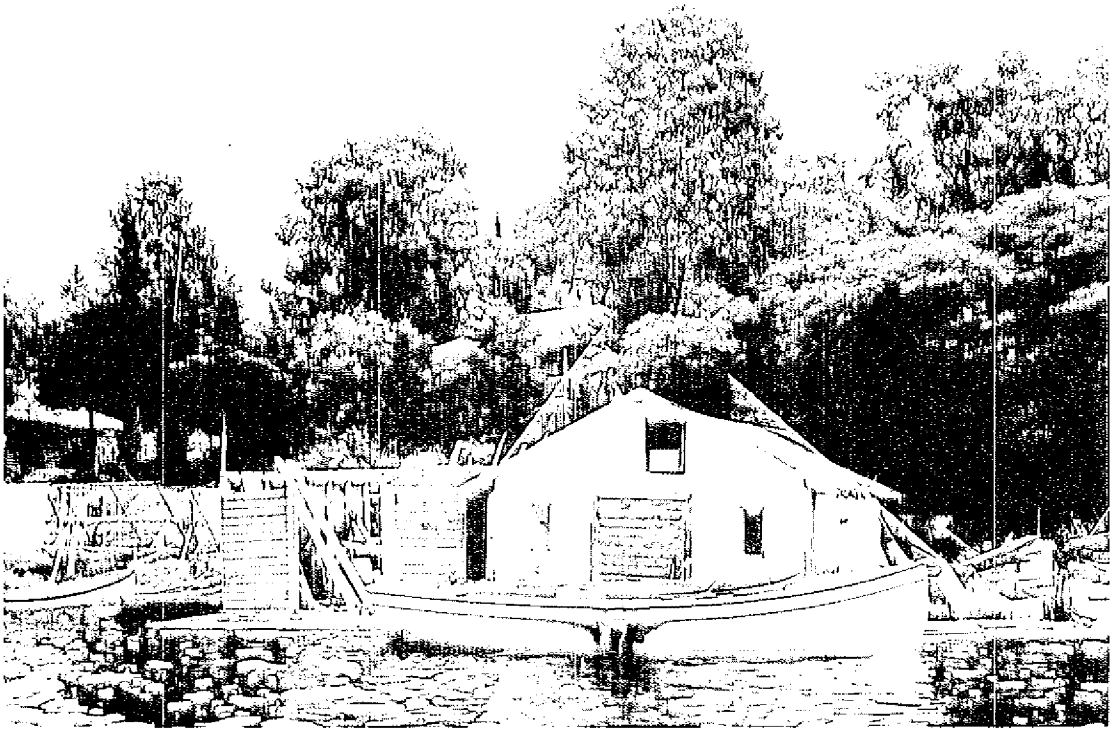


Fig. 6.68. A typical modern gasboat circa 1950s. Its raked square stern, sharp high bow, and strong sheer, reflect its Mackinaw hull beginnings. NPS photo.

Fig. 6.69. A double-ended launch at the turn of the century is basically the same hull as SKIPPER SAM (Fig. 6.67), the launch was different from the gas boat only in name. The Mackinaw hull shape was simply adapted to motorization. Photo courtesy of Cathryn Baker.

handling in a following sea. That type of modified square stern would "split the sea when running ahead of it" (Hill 1987).

The keel, transom, stem, and frames were constructed out of white oak. The first two planks from the keel were often oak as well, "to give the boat a stronger backbone" (Hill 1987). Cypress or cedar were used for a portion of the bottom and the remainder of the vessel constructed using native white pine. Gunnels were of oak because of its straight grain and its resistance to peeling with the grain when nets were hauled over the sides.

During the height of their popularity in the 1940s, gas boats were generally equipped with a 4 cylinder gasoline engine. Common manufacturers were Doman, Oshkosh, and Redwing out of Wisconsin, Chrysler and Grey Marine out of Detroit, Campbell, Hercules, and Kermath (Moe 1987; Hill 1987; Sivertson 1987). The most popular engine among Isle Royale and Northshore fishermen appears to have been the Grey Marine; Reubin Hill installed more of those than any other (Hill 1987).

The gas boat replaced the Mackinaw sailer and was used in open water fishing for lake trout, whitefish, and siskiwit. The larger "open [gas] boat of 24 to 26 feet [was commonly] used for hook lines, float nets, and gill net fishing" (Sivertson 1987). The gas boat also eventually supplanted the fishing skiff, that craft being relegated to occasional and recreational use by fishing families.

The same hull used for gas boats, built for recreational purposes rather than as a work boat, was referred to as a launch or motor launch (Marjorie McPherren personal communication, February 1987; Johnson Brothers Brochure 1940). Both fishermen and boat builders considered the launch a resort-related boat (Sivertson 1987; Hill 1987). In the latter 1890s and early 1900s, the double-ended launch was not uncommon (Fig. 6.69), however like the double-ended gas boat, that stern configuration was dropped for the roomier raked square stern. A typical post-1900 resort-era launch on Isle Royale, many built by the Hill family, was described by Reubin Hill as:

> ... one that is used for commercial use, for taking people out ... that was fancied up a little bit different. It maybe had a top the full length of it and curtains to drop down in case of weather. That's what the boats at Rock Harbor were (Hill 1987) (Fig. 6.70).

In the 1920s and 1930s, launches were larger-sized, typically up to 30 feet. Two such launches used around Isle Royale at that time were SUNBEAM and LADY RUFFLES, the "fancy boats" (Sivertson 1987).

The raked square-sterned launch, unlike their working counterparts, may have been fitted out with decorative brass rails and constructed using cedar with some mahogany (Fig. 6.71). More recently the 12, 14, and 16 foot launches, constructed of cedar strips and equipped with modern outboard engines, have become popular with sport fishermen in the area (Hill 1987). Today this vessel type is called an outboard boat or runabout.

By the 1930s, the stern on both the launch and the gas boat took one of three forms, a fantail, a raked square stern, and a cut-away stern (Fig. 6.72). While any of the three were used for the launch, the square stern and cut-away stern were preferred by fishermen.

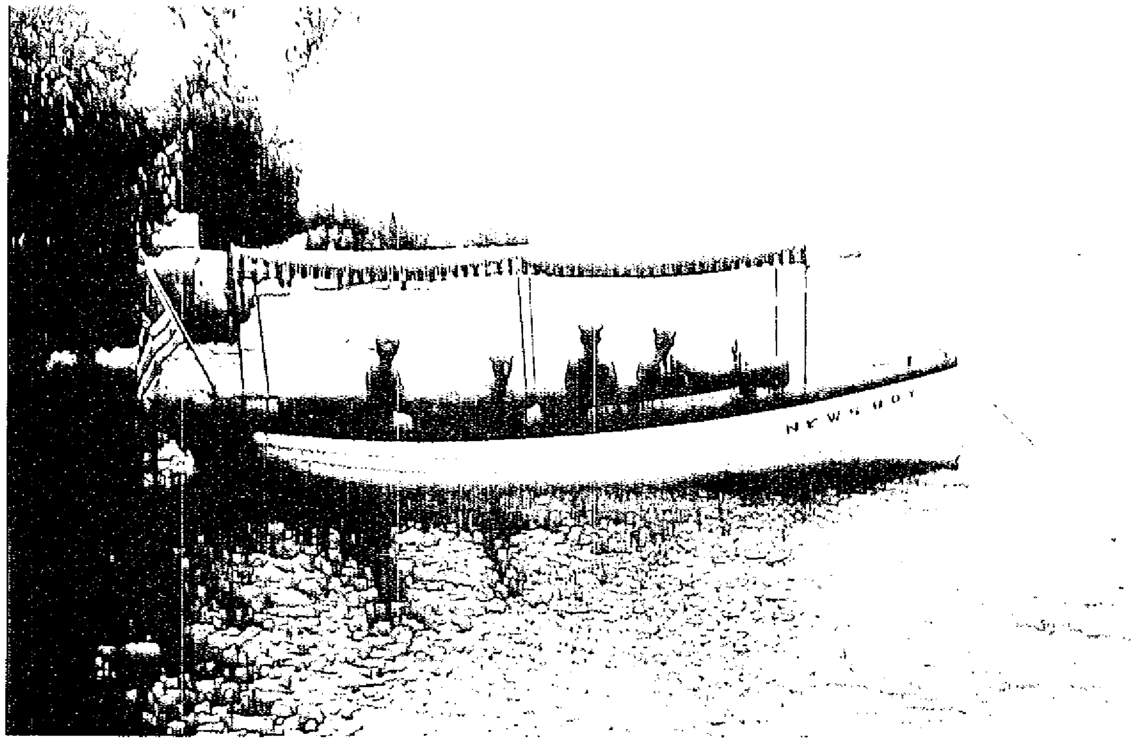


Fig. 6.70. A typical post-1900 resort-era launch on Isle Royale had a top the full length of it with curtains to drop down in case of bad weather. The boats at Rock Harbor Lodge were very similar to NEWSBOY, a 1900 launch from Port Huron, Michigan. Photo courtesy of Cathryn Baker.

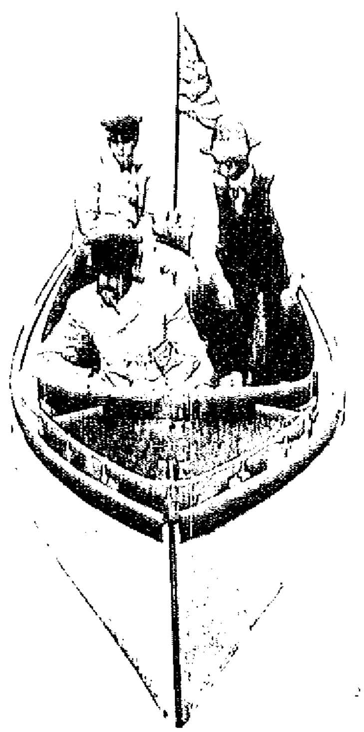


Fig. 6.71. A narrow beam, decorative brass rails, and a square stern typified the circa 1900 launch. These boats are the forerunner of the modern outboard. Photo courtesy Cathryn Baker.

Fig. 6.72. By the 1930s the stern on both the launch and the gas boat took one of three forms, a fantail, a raked square stern, and a cut-away stern. The fantail and raked square stern were also seen on the larger fish tugs, the latter being the most common. NPS photo.

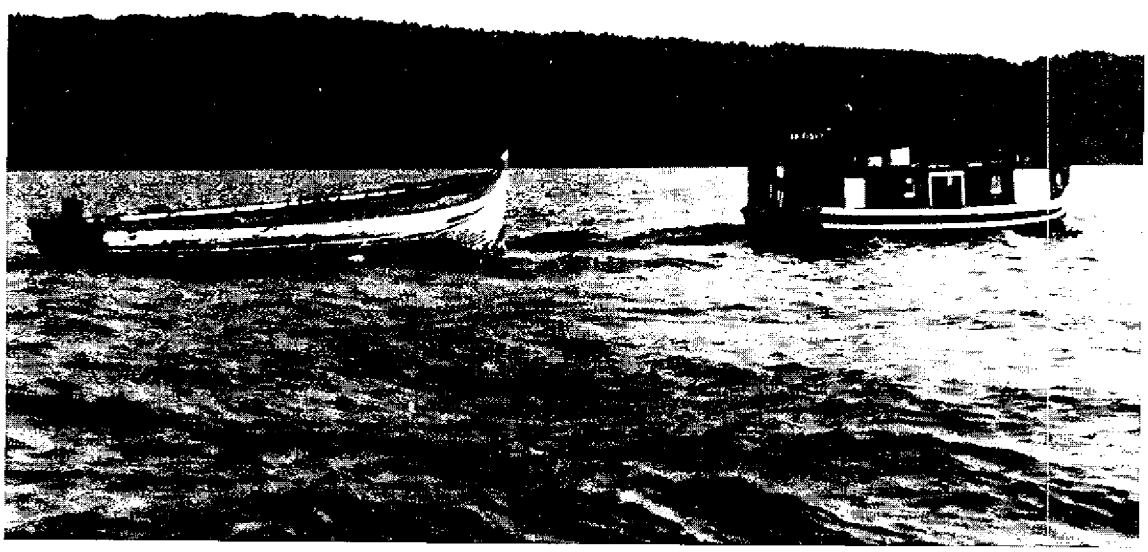


Fig. 6.73. A stripped down NOR'LAND is being towed by NELLS J. Both vessels are typical 1930s - 1950s Lake Superior fish tugs. The influence of the Mackinaw hull is clearly evident in these vessels. Photo courtesy of Ken Vrana.

Numerous examples of gas boats are reported to be lost or abandoned around Isle Royale. These include: Johnson Island -- gas boat, Lane Cove - gas boat, Thompson Island - gas boat, Washington Island -- gas boat, Barnum Island - gas boat, Johns Island - gas boat, and Wright Island -- double-ender gas boat owned by Sam Johnson. In addition, a gas boat once belonging to Pete Edison was donated to the Blue Water Boat Guild in Bayfield, Wisconsin.

There is one known loss of a launch around Isle Royale, LADY RUFFLES in Washington Harbor. In addition there are three good examples of this type of vessel from the resort era on Isle Royale still afloat today. They are: HMS, owned by the Gale family of Tobin Harbor; WINDSOR, originally owned by Dr. Clay of Clay Island and Davidson Island, owned until recently by National Park Concessions, and presently in the Keweenaw peninsula; and PICNIC owned by Buddy Sivertson of Grand Marais, Minnesota.

The heyday of the wooden fish tug was from the 1930s to the 1950s. An intermediate sized work boat, the fish tug also drew upon the Mackinaw hull for its design characteristics with its sharp stem, high bow, strong sheer, and raked stern (Fig. 6.73). A major difference between the gas boat and the fish tug is overall vessel size. During the early years on the Northshore fish tugs ranged from 26 to 35 feet, while Southshore[5] fish tugs were as long as 45 feet. In the early 1930s, the competition between Minnesota and Southshore fishermen came to a head and legislation was enacted to restrict the size of fish tugs to 35 feet. Until the 1960s the length of a tug was limited in Minnesota waters by legislation (Sivertson 1987). Wisconsin and Michigan tugs were regularly 38 feet long, although a tug that size could not be used for commercial fishing in Minnesota. In the 1960s the 35 foot size restriction was dropped, and in its place a restriction on the minimum size of a fish tug was enacted.

Another distinctive feature of the fish tug is its completely enclosed deck and pilothouse (Fig. 6.74). While specific cabin and pilothouse arrangements may have varied from vessel to vessel, the cabin extended from bow to stern. Hatches on the sides permitted hauling in nets. Fish tugs were regularly constructed with oak frames, keel, transom and stem, and with cedar, cypress, and white pine planking, similar to the gas boat (Sivertson 1987; Hill 1987).

The wooden-hulled tug was gasoline powered by either a 6 or 8 cylinder industrial or marine engine placed amidships, like its smaller cousin the gas boat. Common manufactures included Grey Marine and Chrysler (Crown or Ace) out of Detroit, and Doman and Redwing out of Wisconsin. Diesel engines by Grey Marine as well as the Kahlenberg out of Wisconsin were also used.

Gasoline engines were popular in the 1930s to 1950s because of their lower initial cost than similarly sized diesel engines. Today tugs are not only steel-hulled but also generally diesel-powered for safety.

Descriptions of fish tugs were embellished with additional information relating to their physical attributes. For example, while all the tugs had a graceful stern, they were not necessarily similar. They might be described as having a fantail or duck

---

[5]The Southshore is the Michigan and Wisconsin Lake Superior shorelines.

tail stern, meaning in this case that the fantail planks swept or extended up to meet the gunnel at the level of the main deck. Master boat builder Reubin Hill described that attribute as:

> ... fancied up a little bit. But that kind of stern keeps the weather down ... especially in a following sea. ... its a trimmer boat (Hill 1987).

More commonly the vessels had a raked square stern, that is, a small transom[6] (see Figure 6.73). The square stern was preferred over the fantail, because it was easier to clean. As the excess material used in a fantail began to deteriorate, fishermen often sawed the stern off and put in a transom (Sivertson 1987). In order to keep the sterns from looking boxy, the Hill family worked a "tumble-home" into the stern; the gunnel was "rolled in a little bit from the bilge" (Hill 1987). Other common adjectives used to describe fish tugs are "round-bottomed" or "soft-chined" (Hill 1987; Milford Johnson, Sr. personal communication to Ken Vrana, 1979).

Another category of tug, used in commercial activities other than fishing, is referred to as a work or harbor tug. With basically the same hull as a fish tug, the major differences in the work tug were heavier frames, thicker hull planks, and an abbreviated cabin configuration allowing more open deck space.

After conversion to other uses, principally transportation or pleasure cruisers, fish tugs were referred to as simply passenger boats or cabin cruisers. Two converted fish tugs, BELLE ISLE and Kauppi's ISLE ROYALE QUEEN, serviced several of the resorts around Isle Royale in the early part of this century.

Examples of fish and work tugs around Isle Royale include AW-WA-NESHA, DAGMAR, STANLEY, and an unidentified tug in Five Finger Bay. AW-WA-NESHA, launched in 1922, was built along the lines of a commercial fish tug, although its early use was in the passenger/freight trade (see Figure 6.74). Purchased in 1937 by Holger Johnson and Otto Olsen, the vessel was "converted" to commercial fishing. No longer principally a passenger boat she was then referred to as a fish tug. Lost in Chippewa Harbor in 1955, this vessel is one of several fish tugs either known to exist or suspected around Isle Royale.

DAGMAR, launched in 1914, was also built along the lines of a fish tug. Used as an inland coastal freighter, it was purchased in 1930 by Arnold Johnson and used as a fish tug and later a freight/passenger boat. DAGMAR was lost in 1935 approximately 1/2 to 3/4 mile northeast of Chippewa Harbor. At the time of loss, the tug was owned by the Brazell Motor Freight Company. Two additional examples of fish tugs include STANLEY at Star Island and an unidentified vessel rumored to exist off Caribou Island.

The fish tug STANLEY would have been described as sharp stemmed, round-bottomed, with a square stern (Fig. 6.75). The fish tug is 42 feet 5 inches long overall, a breadth of 10 feet, and a depth of hull of 4 feet 6 inches. From keel

---

[6] The square-sterned tug was not blunt-ended, rather it too was over-hanging and had a pronounced counter. A more descriptive term for this stern configuration would be "square-sterned fantail", although that particular terminology was not used by any of the individuals interviewed.

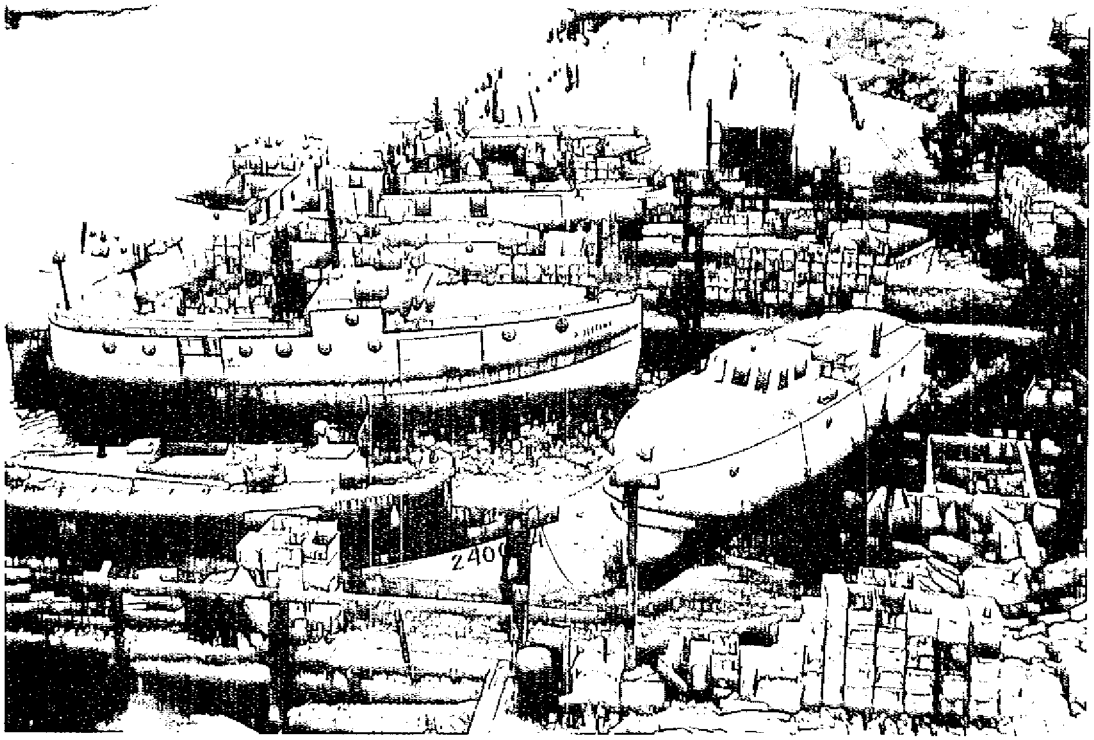
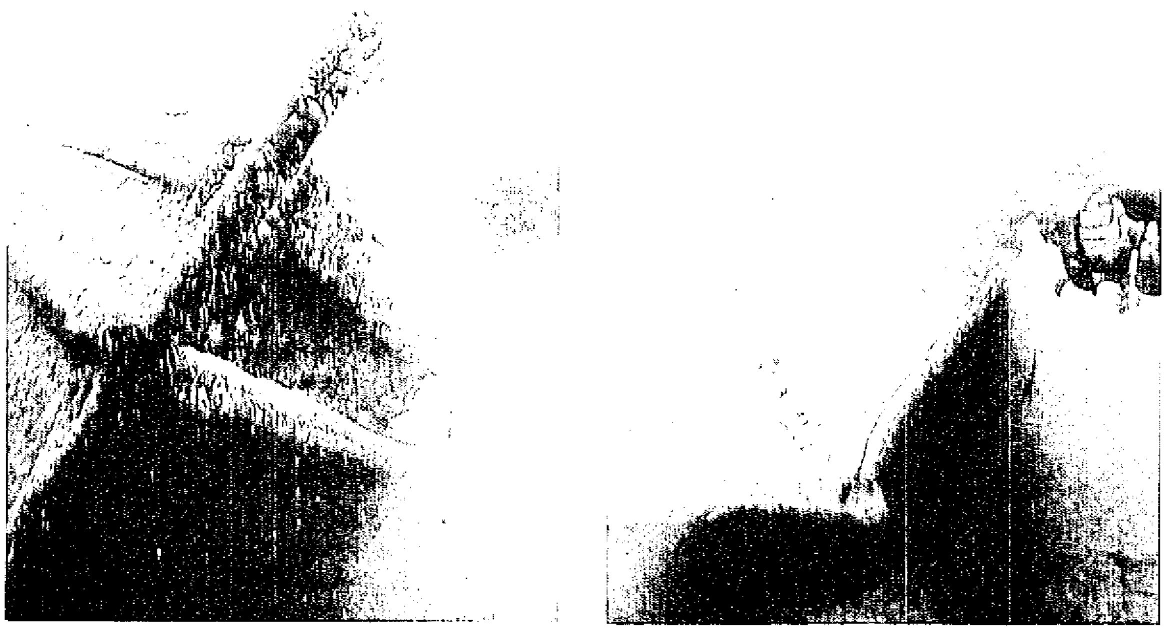


Fig. 6.74. Fish tugs getting outfitted for the fishing season on Lake Superior in the 1940s – 1950s. JEFFERY (center) was owned by Milford and Arnold Johnson of Star Island. AH-WA-NEESHA was owned and operated by Holger Jonson, half-brother to Milford and Arnold. C. Patrick Labadie Collection.



a. b.

Fig. 6.75 a & b. STANLEY exhibits typical attributes of the 1930s era fish tug on Lake Superior. Her sharp, high bow and raked square stern made her very seaworthy. NPS photo by John Brooks.

to rail it was constructed entirely of wood, however, iron spreader bars at deck level are present. The keel, stem and sternpost are of oak. Planking is 1 3/4 inches thick and 6 inches wide, while the ceiling width varies from 3 1/2 to 5 1/2 inches. The engine was mounted amidships, and at the time of STANLEY's loss, it was painted green. The tug, owned by John E. Johnson, was built in 1914 in Two Harbors, Minnesota.

STANLEY sunk adjacent to the main fish dock at Star Island sometime prior to 1935. After abandonment it was stripped of the engine, other useful items and possibly the cabin, and scuttled approximately 150 feet southwest of the dock in Loreli Lane in approximately 20 feet of water. When examined in 1982, she was listing to port approximately 40°. STANLEY is intact up to the level of the deck, the gunwale is present only in the first 4 feet 5 inches aft of the stem; the cabin is absent. STANLEY is typical of a circa 1920s to 1930s era fish tug.

The Five Finger Bay tug was spotted in 1976 during a flight over the island. After its discovery, park divers visited the wreck in order to obtain some information about her. The unidentified work tug is typical of its type. The tug is equipped with a 4 cylinder Doman gasoline engine mounted amidships and is approximately 40 feet long with a 10 foot beam. The hull is heavily built, a small cabin and pilothouse are amidships, and a tow bitt is in the stern. The only clue to the tug's identity is a 1920 Michigan boat plate, number 68. Records that could have provided additional information about the vessel's past were destroyed in a fire, although a long-time Isle Royale boat captain suggested that the tug may have been used in lumbering activities (Roy Oberg personal communication to Ken Vrana, August 1984). In the 1920s, pulp logs were transported across the lake in booms, large log nets connected by chains. Tugs, similar to the one in Five Finger Bay were used to tow these booms, and were referred to as boom-log tugs (Oberg 1984). Illegal salvage activities by divers in 1977 adversely impacted the vessel, but she is still capable of providing a great deal of architectural information to maritime historians and recreational enjoyment for sport divers.

Steam boats or steamers are simply any steam-powered vessel used for commercial purposes. The Booth Line vessel AMERICA, discussed elsewhere in this publication, was referred to as a steamer. Even after the introduction of large diesels, the terms steam boat or steamer were still used locally to describe large commercial vessels as discussed in previous chapters (Sivertson 1987; Milford Johnson, Jr. 1987).

Whether steam-powered or sail-driven, any "large" vessel privately owned, used strictly for pleasure, and not for hire, was referred to as a yacht, more specifically a "rich man's yacht" (Marjorie McPherren personal communication, February 1987). A well-known yacht was owned by G. W. Megeath, who maintained a 100-foot sailer in Amygdaloid Channel in the 1920s (Marjorie McPherren personal communication, April 17, 1987). Another well known example of a yacht is the 100-foot WINYAH, owned by Andrew Carnegie. This vessel was later purchased by H. Christiansen and Sons, fishmarketers, to replace the freight and passenger service provided by AMERICA (Holden 1976). Stripped of all luxury accessories and converted, the vessel was generally referred to as a steamer. Remains of PEGGY BEE, a 65 foot yacht that caught fire at the Singer Hotel dock in Washington Harbor in 1928, may be found in the channel toward Booth and Grace Islands (Holden 1984, correspondence).

Other unknown vessel types are reported to have been lost in Vodrey Harbor, near the abandoned lighthouse west of Middle Islands, and in the mouth of Passage Island small boat cove. Several unidentified "fishing boats" are reported to have been lost in Tobin Harbor (Carol Maass personal communication, 1985), and a barge or boat is also reported to have been lost in this location (Hoge 1984).

Other losses of sailboats, possibly schooners, are suspected to have occurred on Isle Royale prior to the turn of the century. Possible locations include McCargoe Cove, the vicinity of Canoe Rocks, and the general northeast end (Milford Johnson Sr. personal communication to Ken Vrana, 1979). This end of the island reportedly saw Northwest Fur Company fishing activity and schooners were commonly employed by the company to transport catches back to Fort William. Some of the schooners used in the early fur trade and fishery operations on Lake Superior were OTTER (pre-1800), BEAVER or similar craft (1800), PERSEVERANCE, FUR TRADER (1812), RECOVERY (1809), MINK (pre-1812), SPEEDWELL (1789), and the sloop NANCY (Mansfield 1899:1:127). Beers also alludes to several other decked vessels being on Lake Superior prior to and during the War of 1812 (Mansfield 1899:1:127).

Conclusion: The importance of boats to the people of Isle Royale cannot be overstated. They have played a critical role in transportation, have served as a work tool, provided recreation, and facilitated communication with the rest of the region. Cochrane explained the importance of boats to the fishermen of Isle Royale:

> [That] fishermen identified with their boats [is attested to] by their affinity to speak of their boat's history, maker, and of adversities overcome while in their boats. Among the first ... information a newcomer on Isle Royale learns is the biography of a boat from fishermen and most other island residents. Tracing back the ownership of a boat is generally quite easy since such knowledge is highly valued .... Fishermen not only identified with their boats, but they also could be identified by them .... Their boats [are] a center or a focal point of their occupational identity ... and boats reflected upon their past and present owners (Cochrane 1982:55-62).

In effect these craft were an extension of not only themselves, but of the entire region encompassing Canada, the Northshore, and the Southshore of Lake Superior. In a land that virtually all of the first generation of fishing families immigrated to, and in an occupation that was solitary, their craft provided them with a sense of temporal continuity; ties to the past through knowledge of prior ownership and ties to the present through the sharing of similar occupational hazards and the joys of island life.

The vernacular craft around Isle Royale are part of the submerged cultural resources base of the island and their history and place in the maritime development of the region will contribute to the story of the park. The history of the development of these craft has been mainly handed down from generation to generation by word of mouth; the ability to create and maintain these vessels was continued through apprenticeship. However, the people whose lives were most directly affected by either the use, construction, or repair of these boats, are in their 60s, 70s, and 80s, and apprentices are few in number. The recent death of Myrtle Johnson, the last member of the Johnson family to hold a research fishing permit and carry on the historic Isle Royale fishing lifeway, not only marks the end of an era but it also marks the loss of an opportunity to learn more about Northshore, Southshore, and Isle Royale fishermen and their boats.

Known examples of vernacular watercraft should be documented and evaluated for their significance as either part of a thematic group on their own, or as an addition to the existing Shipwrecks of Isle Royale National Park Thematic Group Nomination (Carrell 1983). Suspected locations of vernacular craft should be investigated and known locations of unidentified craft, like the big 10 shipwrecks ringing Isle Royale, should be carefully documented and their histories recorded.

The major shipwrecks around Isle Royale were documented using historical and archeological techniques. However, unlike the big 10, the vernacular watercraft are best documented in those terms used by the people who were involved with them on a daily basis. The model used in this section on vernacular watercraft is basically an ethnographic approach. Isle Royale, along with the other western Lake Superior National Parks, may be in a unique position to continue this study of vernacular craft using the same model simply because there are still a few individuals alive who possess knowledge of these vessels. It is, after all, the vernacular watercraft that played a major part in the lives of the people on Isle Royale and that occupy a special place in the maritime history of Isle Royale and the Lake Superior region.

CHAPTER VII. MANAGING SHIPWRECKS IN A NATIONAL PARK: THE ISLE ROYALE EXPERIENCE

Introduction

Public use of shipwrecks at Isle Royale predated the establishment of the Park, the advent of scuba diving, and even the presence of the wolves, which are a major natural resource interest on the island. As in many other maritime communities, the misfortune and tragedy associated with shipwrecks was tempered by some real benefits. These events granted fishermen lumber for dwellings and fish houses, unexpected groceries, salvaged hardware and tales to pass on over coffee or brandy.

> From Isle Royale, Lake Superior, come reports that its fishermen are suspected of having rifled the bodies of the victims lost in the ALGOMA disaster last fall .... The revenue cutter ANDY JOHNSON leaves Milwaukee tomorrow for Lake Superior and will probably make a thorough investigation .... This theory is strengthened by the finding of mutilated clothes and articles of value in their cabins (Detroit Free Press Aug. 2, 1886)

Although the accusation was probably untrue or greatly exaggerated, tales persisted about Isle Royale fishermen "cleaning up" after shipwrecks. Of course, other non-diving Isle Royale residents and vacationers also scavenged shipwrecks or submerged sites. Light fixtures from EMPEROR still illuminate a life lessee residence on Captain Kidd Island. A recent examination of artifacts donated to the Isle Royale National Park temporary museum and perusal of popular literature references reveal a surprising variety of private collectors.

With the establishment of the National Park in 1940, Island residents and the general public involved in removal of artifacts from submerged cultural sites were joined by National Park Service employees. Park management at the time showed no consciousness of these activities being threats to underwater historic sites. With the advent of sport diving during the later 1950s and early 1960s, these threats took on an added dimension.

The story of how Isle Royale National Park (NP) as a managerial entity became aware of the historical significance of the shipwreck sites, went through a period of ambiguity regarding their appropriate use, and finally settled on the present policy is an intriguing one. Public agencies have a convenient aspect to them from a historian's perspective: they leave paper trails. In the following pages we will let the Park superintendents and other players from inside and outside the Service speak in their own words to establish an administrative history of the Park regarding submerged cultural resources. That section will be followed by a comprehensive look at present day submerged cultural resources management at Isle Royale.

Bernie Gestel, a Park ranger with the National Park Service reflected on the old days (1950s and 1960s) as an Isle Royale employee and scuba diver:

> The Park staff didn't recognize shipwrecks as a recreational resource. I would tell employees about what I saw and the history of the wrecks. The staff seemed interested, but not interested enough to protect the wrecks, ask what was being brought up or the Park's right to artifacts. They seemed unconcerned about what was there ... I took advantage of the situation. There was an "open season" ethic among divers. Not too much removal of artifacts by other private divers at that time, except on the AMERICA .... If I wouldn't have done it, someone else would. If someone else had brought up these artifacts, the Park Service would never see them (Paraphrased from NPS Oral History Recording, Gestel March 3, 1983).

One of the first "private divers" to visit AMERICA was Jack Coghlan, a commercial diver from Thunder Bay, Ontario. As taken from the Duluth News Tribune in 1957 (April 28):

> Jack decided to tour AMERICA just because he had heard about the ship for years. "It's sort of eerie," he said last week. "You can still see dishes on the sideboards, and the tables are piled high on one end of the room" ... More rewarding was his entry into the purser's office, which he accomplished by breaking in the door. Rummaging in an old desk, he felt a mass of paper, thought he was wealthy and found that the "banknotes" were old snapshots ... Still in the hold is an ancient Model T Ford which he said seems in good condition. Coghlan took the car's horn as a souvenir. Another souvenir was a bottle of meat sauce he found in the dining room. He said it was "sort of ripe."

A number of sport divers visited AMERICA during the later 1950s and early 1960s, accelerating the attrition of the wreck's fabric and stripping it of most portable artifacts. Jack Soetebier, past president of the Duluth Frigid Frogs Dive Club confirmed the "take what you want" attitude. During the late 1950s approximately 25 members of the club visited AMERICA during one outing. They saw no Park rangers during the dives and were unaware of any restrictions on the wreck. Jack stated that "if we had a chance, we'd pull that whole ship back to Duluth" (Personal Communication, Soetebier Jan. 14, 1986). These thoughts almost became reality during the mid-1960s when Jim Marshall, also of Duluth, spearheaded an attempt to raise AMERICA. Marshall believed that a large proportion of its relics were going to a growing sport diving population in Minneapolis/St. Paul, Minnesota. "By 1965, all portholes, most sinks plus the engine room gauges and tools were gone. Even the hood from the Model T had been removed." Marshall termed the exodus of artifacts "wholesale looting" (Author's Field Notes 1981 and Personal Communication, Marshall Jan. 10, 1986).

With awareness growing among members of the scuba diving community that a quality diving experience was available on AMERICA, it was inevitable that the public would search for other sites. An article from The Milwaukee Journal in 1965 (Jan. 10), entitled "SUNKEN TREASURE HUNT," further substantiates the prevalent ethic among sport divers. Arthur A. Vierthaler, Professor of Art at the University of Wisconsin describes a dive on EMPEROR.

> We all swam down to where the pilot house used to be. This had been smashed by the ice, and the gaping black hole made some good shots

with Art [Wells] and Erich peering into the opening. Art went in and returned with a running light and a taffrail log. We continued down for another 15 feet to the forward officers cabins where Ed spotted a small safe .... When the safe was finally freed we guided it to the surface with Kurt and Erich winching it from the boat .... No storm seemed imminent and we were anxious to smash the safe open. By hammering and chiseling we finally broke the door off. Inside we found the ship's keys and eight $10 Canadian bills, wet but in good shape. We were disappointed, feeling that there should have been more.

Formal salvage of Isle Royale's sunken vessels was also being contemplated during this period. On August 4, 1959 a seasonal Park ranger reported that a diving and attempted salvage operation was being conducted in the vicinity of Hawk Island. It was the expressed intention of the group to locate and dive on the wreck of the steamer KAMLOOPS, which was believed sunk in the vicinity of McCargoe Cove and Todd Harbor in December, 1927. Mr. Coghlan wished to discuss the matter further and proceeded to Mott Island (Park headquarters). He was met by Chief Ranger Zerbey who explained the numerous National Park Service, U.S. Customs and Immigration regulations which had been violated and was ordered by the Chief Ranger to leave the Park as soon as possible. The rig departed from McCargoe Cove on August 7 after two days of bad weather, and it was reported that the barge sank in Lake Superior on the return trip to Canada (Isle Royale NP Report, Incident of Salvage and Diving Operation at McCargoe Cove 1959). This incident was reported in Time magazine where the salvor's intentions were clearly indicated in a quote by Coghlan:

> He yearns to try for the really big money that he is convinced waits for the taking in sunken Lake Superior treasure. Major bonanza is the Canada Steamship Line's KAMLOOPS, which went down off Isle Royale on Dec. 6, 1927, with a crew of 22 and, says Coghlan, $1,500,000 in papermaking machinery, plus liquor worth $750,000. Coghlan says he found the wreck in U.S. territory last Aug. 6 in 150 ft. of water, three fourths of a mile off the island. U.S. Park rangers chased him off, says Coghlan, and he was on his way to get permission to continue when the storm swamped his barge (Time Jan. 25, 1960).

The question of bottomlands jurisdiction, with implied ownership of shipwrecks and control over sport diving, was becoming a confusing issue to Park superintendents, who were generally ill-prepared for dealing with such concepts in their management of a "natural area." Superintendent Lewis directed these questions through his Regional Director to the Assistant Solicitor, National Parks in 1959, even before Mr. Coghlan's attempt to find and salvage KAMLOOPS. The Assistant Solicitor Richard A. Buddeke returned his opinion to the Director, National Park Service on May 13, 1959.

> In his April 6 memorandum to the Regional Director, Region Five, Superintendent Lewis of Isle Royale National Park states that several times during the past several years there have been incidents involving health impairment and near accidents caused by skin-diving [scuba]. Mr. Lewis believes that steps must be taken by his office to prepare subsidiary regulations to prohibit this practice.
>
> Mr. Lewis also wishes to know what jurisdiction the National Park Service has over salvage operations involving shipwrecks in the waters within the established boundaries of Isle Royale National Park.
>
> By letter of May 19, 1944, to the Governor, this Department notified the State of Michigan that on July 1, 1944, the United States

> would assume police jurisdiction over all the lands included in Isle Royale National Park ... Exclusive jurisdiction over the submerged lands within four and one-half miles of the shore line of Isle Royale National Park, subject to certain reservations [State of Michigan reserves control of submerged minerals, fisheries and fishing activities] not pertinent in determining the question presented by Superintendent Lewis, was accepted by the United States and became effective on January 1, 1956 (21 F.R. 1111).
>
> Should it be determined administratively that regulations controlling or prohibiting either skin-diving or salvage operations within the established boundaries of Isle Royale National Park are necessary in order to carry out the purpose of the Act of August 25, 1916 (35 Stat. 535) [NPS "Organic Act"], such regulations may be issued. We believe that the suggested regulations would be in consonance with the purpose of the National Park Service "to conserve the scenery and the natural and historic objects and the wildlife herein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Memorandum, Buddeke May 13, 1959).

Supporting Solicitor Buddeke's opinion was the Antiquities Act of 1906 (Public Law 59-209, 34 Stat. 335), which provided for "the protection of historic, prehistoric and scientific remains, or any object of antiquity" on federal lands. This act also established criminal sanctions for unauthorized destruction or appropriation of antiquities (NPS Cultural Resources Management Guideline 28, Aug. 1985).

Although Solicitor Buddeke's opinion seemed clear in its intent, the issue of shipwreck jurisdiction became clouded with underlying legal questions spurred by a series of public salvage requests. Mr. Vince Jordan of Rinelander, Wisconsin contacted Isle Royale National Park during 1963 regarding salvage rights to EMPEROR and KAMLOOPS (NPS Correspondence, Jordan Dec. 16, 1963).

> My interest in salvage of the two vessels requested at this time is mostly in recovering historical artifacts that I donate to museums and historical societies. I was interested, however, in the possibilities of salvaging the cargo of ore that is on the EMPEROR (NPS Correspondence, Schmidt July 21, 1964).

The situation was directed by Isle Royale National Park acting-Superintendent Raftery to the Assistant Solicitor, National Parks, through the Assistant Regional Director. An opinion from Assistant Solicitor Bernard R. Meyer to the Director of the National Park Service stated:

> Concerning the sunken vessels in the waters of Isle Royale National Park and requested guidance on the legal aspects involved in possible salvage.
>
> It appears that one of the vessels sunk in 1927 and the other in 1948. Both are within Park waters. As such, they are property of the United States should it be determined that they have been abandoned. If the original owners of the vessels, the underwriters, or any other successors in interest of the vessels or of the cargo have evidenced a continuing claim of ownership in any manner, we cannot enter into arrangements for salvage by third parties, since the vessels and cargo

could not be said to have been abandoned and would not be the property of the Federal Government for disposition.

However, if there has been no evidence of a claim of continuing interest in the vessels or cargo by the original owners, the underwriters, or any other successors in interest, it may reasonably be presumed that the vessels and cargo have been abandoned, in view of the length of time since they sunk, and it could be determined that they are the property of the Federal Government, since they are within Park waters. In these circumstances, the Federal Government may permit exploration with a view to possible salvage and may enter into arrangements with a potential salvor.

Of interest in this regard is section 203(m) of the Federal Property and Administrative Services Act (63 Stat. 385), as amended (40 U.S.C., sec. 484), which provides:

(m) The Administrator is authorized to take possession of abandoned and other unclaimed property on the premises owned or leased by the Government, to determine title thereto in the United States, and to utilize, transfer or otherwise dispose of such property (NPS Memorandum, Meyer Jan. 31, 1964).

Isle Royale NP proceeded under Solicitor Meyer's opinion, but succeeding Superintendent Carlock Johnson brought his concerns to light in a memorandum to the Northeast Regional Director on January 28, 1965:

> Interest in salvage of sunken vessels in Isle Royale is sporadic but over the past few years has frequently been the subject of renewed interest. There is always the possibility of a serious attempt to initiate such actions. If this should occur it could pose several administrative problems as well as a general nuisance. Scuba divers, infected with the fever of "treasure" hunting, are apt to involve Park personnel in hazardous and expensive rescue operations. It is conceivable that objects of historical value might be lost as a result of their activities ... we suggest that the right of the Federal Government to take possession of abandoned wrecks on Isle Royale, as set forth in the Federal Property and Administration Services Act (40 U.S.C. 484), should be considered in the view of a possible conflict with Maritime Law of Salvage ... We believe that basic control can be achieved only if a clear title is vested in the United States Government. Obviously, it would be too time consuming and complicated to attempt to contact all parties having a title interest in all ships that have wrecked in Isle Royale. Furthermore, it is doubtful if releases could be secured since there are always some who would suspect ulterior motives. We would like to suggest that it might be possible to make a clean sweep and secure title by a promulgation in the Federal Register whereby it would be announced that all wrecks located in waters, or on lands, of Isle Royale are presumed to be abandoned and that the Government is claiming title by virtue of said abandonment. If this action is not permissible, it appears that we are in the unenviable position of furnishing unsolicited storage for property over which we have no legal control (NPS Memorandum, Johnson Jan. 28, 1965)

On March 25, 1965, Superintendent Johnson in a memorandum to the National Park Service Chief, Property Management and General Services added:

> We suggest that the Service initiate action with GSA to acquire title to all vessels which have been wrecked on Isle Royale prior to this date. Authority for custody of this property can then be delegated to the

National Park Service. This will enable us to control any undesirable salvage or exploration of these wrecks (NPS Memorandum, Johnson March 25, 1965).

Isle Royale National Park began to research background information on shipwrecks at the request of the National Park Service Chief, Division of Property Management and General Services and National Park Service (NPS) Director. This included data on original ownership, insurance and registry. The question of present ownership as defined by Assistant Solicitor Meyer revolved around determining claims of continuing interest in sunken vessels or cargo within boundaries of the Park. If no claims existed, the shipwrecks could be considered "abandoned" and property of the United States government (NPS Memorandum, Turner April 8, 1965; Harrison December 20, 1965). An information summary was sent directly to the NPS Director by Isle Royale Acting Superintendent Zachwieja in February, 1966 (NPS Memorandum, Zachwieja Feb. 23, 1966)

As the National Park Service debated these issues of ownership internally, another salvage plan was brought to the public's attention. As he outlined in the Duluth New-Tribune of September 15, 1965:

> Not until 1961, when James Marshall, Duluth, came on the scene was there any serious talk of salvaging the AMERICA. "Talk was about as far as it went," Marshall said, "until early this year when it became apparent that raising the steamer and returning her to Duluth would bring recognition to the city and provide an attraction that people throughout the nation would enjoy visiting." Hence, the AMERICA Salvage Company, Inc., was organized, and plans were made for the AMERICA's return home ... "Before salvaging operations could be started," Marshall said, "we had to obtain permission from the National Park Service, the federal agency in control of Isle Royale." Marshall said that the Northeastern Minnesota Development Association (NEMDA) was instrumental in getting this permission.

The project also had support of the Minnesota Arrowhead Association, U.S. Representative John A. Blatnik and Duluth Mayor George D. Johnson. Future plans for AMERICA included a floating restaurant (Duluth News-Tribune April 10, 1966; Sept. 24, 1965 and Author's 1981 Field Notes; Marshall, personal communication).

> SS America, Inc., plans to moor the vessel in the Duluth harbor, hopefully near the Arena-Auditorium, and charge admission for people to visit her. Money obtained in this endeavor will be spent to restore the AMERICA to her original condition. Over the years, Marshall said, divers have taken such items as portholes and the steering wheel as souvenirs of their explorations. "We hope that people who have these items will return them to the AMERICA when she reaches Duluth," Marshall stated. "These items are necessary if the ship is to be restored to her original state," he said (Duluth News-Tribune Sept. 15, 1965).

On September 21, 1965, Isle Royale Superintendent Carlock Johnson issued a Special Use Permit to AMERICA Salvage, Inc. for the purpose of conducting salvage operations on AMERICA. James Marshall stated that Mr. Johnson was very cooperative considering having this project "laid in his lap," refering to political support behind AMERICA Salvage, Inc (Author's Field Notes, 1981; Marsall, personal communication). It was anticipated that removal of AMERICA would be completed prior to December 1, 1965. As in many other affairs, expectations often fail the test of reality.

> Salvage operations were suspended on October 25th, due to the extremely unfavorable weather encountered during the last two weeks of the operation. At the time of suspension, the ship had been almost completely prepared for floating (AMERICA Salvage, Inc. Interim Report to Carlock Johnson, Nov. 22, 1965).

During fall 1965 operations, AMERICA Salvage, Inc. president James Marshall was disturbed by threats to the physical well being of salvage team members, as received by letter and over the phone. "Salvage Master" Charles McClernan finally unlisted his phone number. Also, during a dive club meeting attended by Marshall in Minneapolis, Minnesota in December 1965, sport divers said they would rather throw scavenged artifacts into the river, than donate them back to AMERICA (Author's Field Notes 1981 and Marshall, personal communication). From this same dive club meeting the Minneapolis Tribune reported; "They [sport divers] would like to buy the salvage rights and not salvage ... remaining where she [AMERICA] is, she will be visited by an ever-increasing number of scuba divers for hundreds of years to come" (NORDIC DIVER July-Aug. 1974).

Disagreement between citizens regarding recreational usage of AMERICA as a submerged public resource versus a "dry" private commodity was confronted by Minneapolis diver Merritt Bartlett, in a telegram to Vice President Hubert Humphrey on October 21, 1965:

> I am one of the National Association of Underwater Instructors for Minnesota and have been contacted by many interested persons who have asked me to inform you of the following: A private corporation, AMERICA Salvage, Inc., intends to raise and remove from Isle Royale National Park, within the week the wreck of the AMERICA, a ship which sank in 1928. This appears to be a taking and conversion of public or federal property for private use and must not be permitted without an investigation and hearing to insure that the public will not be damaged and all interested persons permitted to be heard. Furthern (sic) salvage of this nature, where a ship is moved over a hundred miles, must be carefully executed or the AMERICA will be lost in hundreds of feet of water in Lake Superior, with a resulting irreparable loss to Isle Royale National Park and the public. Please refer this matter to the proper party for immediate investigation, so one of our most beautiful parks is not deprived of one of its most valuable attractions.

The response to Merritt Bartlett from NPS Acting Assistant Director Flynn acknowledged:

> We are advised that, in view of the continuing interest in the past in salvaging the S.S. AMERICA, it cannot be considered under the application of principles of maritime law as having been abandoned by its original owner or insurer and, consequently, the United States can claim no ownership interest in the vessel as against either of them or their successors in interest ... The foregoing will explain why the National Park Service has approved the salvage operation which is being conducted for the successor in interest of the original owner by S.S. AMERICA Salvage, Inc. You may be assured that the use permit authorizing the salvage operations provides for the protection of Isle Royale National Park (NPS Memorandum, Flynn Nov. 22, 1965).

On April 13, 1966, Superintendent Carlock Johnson issued another Special Use Permit for continuation of AMERICA Salvage, Inc. operations on AMERICA, during the period of January 1 to July 1, 1966. AMERICA Salvage, Inc. divers arrived at Isle Royale during early May, 1966. Their status report to James Marshall was not optimistic:

> The crippled steamer AMERICA, resting on the bottom of Washington Harbor at Isle Royale since 1928, may have been dealt a fatal blow when someone reportedly dynamited a hole in her hull .... James Marshall, head of the salvage company, said he received word Wednesday noon of the steamer's apparent destruction from salvage master Charles McClernan .... It was on an exploratory dive that McClernan discovered that dynamiters had, "blown the belly out of the bottom" of the ship ... "I gathered from our brief talk," Marshall said, "that the ship is very badly damaged. McClernan said, I think, that the AMERICA may be unsalvageable by means of our present operation" (Duluth News-Tribune May 12, 1966).

Plans for salvage continued by assessing different techniques for raising the vessel, but AMERICA was not prepared for the proposed voyage back to Duluth when the Special Use Permit deadline expired. On August 12, 1966, James Marshall authorized the Federal Bureau of Investigation to "inspect the interior of the blasted area" on AMERICA, through the United States Attorney, Western District of Michigan (Correspondence AMERICA Salvage, Inc. Aug. 12, 1966). AMERICA Salvage, Inc. also applied for another Special Use Permit to continue salvage operations.

Before issuing another permit, Superintendent Carlock Johnson asked for advice from the National Park Service Regional Director, in a memorandum of October 12, 1966:

> As the record will show, AMERICA Salvage, Inc. purchased the wrecked vessel and has been engaged in attempting to raise the hull for removal to Duluth, Minnesota ... As of this date, all of the efforts have been unsuccessful .... One of the reasons Mr. Marshall has given for the delay is based upon the alleged dynamiting of the ship during the past winter. This claim was investigated by the Federal Bureau of Investigation. On-site examination by these investigators show no evidence of an explosion and the claim must be considered as unfounded. The attached copy of a letter from Mr. Marshall, outlines the future plans of AMERICA Salvage, Inc. and, if approved by me, will entail issuance of another Special Use Permit for work in 1967 ... The National Park Service is in the peculiar, and unenviable position of being custodian of privately-owned property located inside an area under its exclusive jurisdiction. Frankly, I am getting a wee bit tired of "baby-sitting" a shipwreck, answering critical letters from persons opposing the salvage operation, and trying to keep administrative control of a hazardous, and complicated, salvage operation. Yet I know of no way to legally terminate the affair, until ownership is vested in the Government. I realize that I could refuse to grant the permit on the basis of it being dangerous and that the operation creates a threat to public safety. However, in view of the history of scuba diving in this Park, this would be an arbitrary decision and probably could not be defended in a court .... I would appreciate any advice which you, or the Regional Solicitor, may wish to offer on this matter. In the event no suggestions are received, I will proceed to issue another Special Use Permit in the spring of 1967, and fervently hope that the ship is

salvaged and towed outside the boundaries of Isle Royale National Park (NPS Memorandum Johnson Oct. 12, 1966).

Regional Solicitor William W. Redmond reaffirmed major conclusions reached by Solicitor Meyer's opinion of 1964, when evaluating the salvage of AMERICA. In a December 8, 1966 answer to Superintendent Johnson's questions, Mr. Redmond stated:

> In its act accepting Michigan's grant and cession, and consistently therewith, the Congress provided also that the boundaries of Isle Royale National Park were extended to include submerged lands within four and one-half miles of the shore line of Isle Royale and immediately surrounding islands ... The same general area contains a number of shipwrecks, there being eleven ships sunk there during the period 1885 to 1947; and, while this memorandum is intended to and does deal exclusively with the S. S. AMERICA, the general principles applicable to the S.S. AMERICA may become applicable, depending upon the facts in each case, to one or more such other wrecks ... we conclude first of all, that, if it, in fact, does constitute a hazard to navigation, it is subject to removal by the Secretary of the Army ... Secondly, we conclude that the S.S. AMERICA had, in fact, been abandoned long prior to the time when it was purportedly purchased by AMERICA Salvage, Inc ... Whatever its status may have been prior to that time, it became property of the United States at least on March 6, 1942, the effective date of the act accepting Michigan's grant and cession .... Insofar as scuba diving, on the part of visitors to the Park, is carried on as a sport, with due regard for the rights and protection of other visitors and in such a way as not to defeat the inspirational purposes for which the Park itself was established, it is legally unobjectionable. Indeed, the refusal to permit scuba diving, as such, might well be deemed unreasonable. When, however, it includes the purpose of removing and appropriating items from wrecks that are property of the United States, it becomes, in the light of the preceding discussion, legally objectionable ... Visitors to our National Parks may not remove therefrom any property of the United States, whether it consists in items recovered from wrecked ships, mineral, or other items of property (NPS Memorandum, Redmond Dec. 8, 1966)

The Johnson and Redmond memorandums led to a denial of the Special Use Permit request to continue salvage operations on AMERICA.

The events surrounding the AMERICA salvage raised the general question of jurisdiction over submerged wreck sites within national parks. Discussions were underway between General Services Administration (GSA) and National Park Service officials in Washington, regarding historic value of and authority over shipwrecks at Isle Royale, prior to the Redmond opinion. In a letter dated March 15, 1966 to appropriate Park superintendents, including Isle Royale, the NPS Northeast Regional Director outlined procedures for evaluating the significance of sunken Federal vessels of historical value:

> Applications received by the General Services Administration pursuant to R.S. Section 3755, as amended (40 U.S.C. 310), pertaining to the salvage of sunken Federal vessels, will be referred to the National Park Service in order that an evaluation of the historical significance of such vessels may be prepared under the provisions of the Historic Sites Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. Sec. 461 et. seq (1964) (NPS Memorandum, Garrison March 15, 1966).

The Historic Sites Act of 1935 warranted the establishment of National Historic Sites and otherwise authorized the preservation of properties of "national historic or archeological significance." Interagency, intergovenmental and interdisciplinary efforts for the preservation of cultural resources were also encouraged (NPS Cultural Resources Management Guideline 28, Aug. 1985).

Full authority over Isle Royale National Park submerged cultural resources was delegated to the Secretary of the Interior from the General Services Administration on September 14, 1967. Federal Property Management Temporary Regulation H-4 stated:

> This regulation delegates to the Secretary of the Interior authority to take possession of abandoned or other unclaimed property located within the boundaries of Isle Royale National Park and in the waters of Lake Superior, Michigan, to determine when title thereto vested in the United States and to utilize, transfer, or otherwise dispose of such property (GSA Regulation, Sept. 14, 1967).

The National Park Service was in turn delegated the authority to take possession of abandoned property in the Park four months later, but with an additional dilemma, as evidenced by memorandum to the Regional Director, Northeast Region. National Park Service Acting Assistant Director Gastellum noted:

> Departmental Manual Release 1009 dated January 26, 1968 (245 DM 3), delegated to the Director authority to take possession of abandoned or unclaimed property within the boundaries of Isle Royale National Park. As a prelude to a declaration of abandonment covering the sunken vessels at Isle Royale, we would like the Superintendent to inform this Office of any salvage attempts by persons with a legitimate interest on any of the vessels ... If there have been no such activities, we intend to consider declaring the vessels abandoned and to proceed with their disposal or destruction this summer (NPS Memorandum, Gastellum March 29, 1968)

The reply from Isle Royale Superintendent Bruce J. Miller proposed that Isle Royale shipwrecks be recognized as legitimate historical and recreational resources, which should be integrated into the Park's interpretive themes.

> The last paragraph of Acting Assistant Director, Administration, Gastellum's memorandum ... indicates the intent of the Washington Office to declare the sunken vessels at Isle Royale as abandoned and proceed with their disposal or destruction this summer ... Last summer we notified Chippewa Outfitters [AMERICA Salvage, Inc.] of Duluth, Minnesota, a salvage company working on the S. S. AMERICA, of the Regional Solicitor's decision concerning the S.S. AMERICA ... At present there are no attempts being made or authorized to salvage any of the sunken vessels in Park waters. We are concerned over the intent of the Washington Office to dispose of or destroy these wrecks. The shipping history and the shipwrecks are an integral part of the Park interpretive story. The Rock Harbor Lighthouse is to be the key exhibit for this historic interpretive exhibit. Diving on these wrecks is a very popular activity for some Park visitors and we do not believe any action should be taken to destroy these underwater historic attractions (NPS Memorandum, Miller April 18, 1968).

The NPS Acting Regional Director, Northeast Region strongly agreed with Superintendent Miller, in correspondence to the Director, National Park Service on May 10, 1968:

> While we acknowledge general concern for the safety of scuba divers, the threat of intentional salvage and theft rather than exploratory diving, and the possibility of navigational hazard, we believe this concern would not call for the destruction or disposal of the vessels. We suggest that scuba diving and other related water-oriented activities be accurately evaluated before final plans are initiated ... Not only are these shipwrecks a valid resource for the immediate Park interpretive program, they are vital to our currently evolving Service policy of environmental conservation (NPS Memorandum, Palmer May 10, 1968).

Assistant Director Gastellum concurred with Acting Regional Director Palmer's recommendation regarding the fate of Isle Royale shipwrecks. As he stated on June 6, 1968:

> We were unaware that the shipwrecks were an integral part of the Park's interpretive program. Prior management at the Park and at the regional level failed to mention this aspect. Evidently, the thinking in regard to disposal of these sunken vessels has altered during the past few years ... We also agree that scuba diving and other related water-oriented activities should be accurately evaluated by the Park, over a two year period, and a conclusive report regarding these activities be submitted at the end of the two year period to both the Regional and Washington Office ... we believe that it would be to the best interest of the Service to declare these vessels abandoned and take possession immediately. This would give the Superintendent full authority to manage any activity involving these historic objects (NPS Memorandum, Gastellum June 6, 1968)

The alteration of thinking expressed by Gastellum, relating to the importance of Isle Royale shipwrecks in Park management programming, was more an evolution of concepts, molded and influenced by administrative, political and ethical considerations. NPS references reflect this progression of thought within government, private and public circles, when managers must deal with a "new" resource and visitor activity. Clearly evident in the NPS communications is the difficulty and confusion encountered when a government organization must weigh and balance a multitude of factors to realize the "greatest public benefit." In the National Park Service, public benefit is measured by the quality of resources remaining unimpaired for the enjoyment of future generations. All National Park Service managers clearly had this philosophy in mind while deliberating over the fate of Isle Royale shipwrecks.

A reply to Deputy Assistant Director Gastellum's request for an evaluation of scuba diving and water-related activities was submitted to Washington on August 10, 1970. Isle Royale Superintendent Hugh Beattie noted that:

> ... the scuba diving permit system then in effect was changed to a registration system and an attempt was made to accumulate a maximum amount of pertinent data ... During the test period which covered the visitor seasons of 1968 and 1969, our registrations show that a total of 157 divers spent 603 diver days in the waters of Isle Royale. We are certain that additional unregistered divers participated in these activities as well ... In our opinion, this is evidence of an extreme amount of interest in this activity. We can only assume that

participation in this activity will continue to increase in the future. No instance of accident or severe injury associated with scuba diving has come to our attention. We understand and appreciate the inherent dangers of the activity and realize that there is a probability that ultimately severe accidents may occur. We do not view this likelihood with any more alarm than we would if we were in a park which had extensive swimming, mountain climbing, or other such moderately hazardous visitor use activities. We do not believe that the existence of the sunken vessels will materially increase the chance of visitor accidents ... Nor is it likely that these vessels will impair the natural environment to any significant extent by esthetic or other pollution. In fact, we suspect that any attempt at disposal or destruction would degrade the environment to a much greater degree than would the continued maintenance of the status quo. We feel very strongly that we must reiterate our previous position that the existing wrecks can be an asset to our Park interpretive program. The history of shipping and the shipwrecks themselves are an important part of our Park historical interpretive story. We are in the process of formulating plans to create a historic interpretive exhibit in the Rock Harbor Lighthouse. (NPS Memorandum, Beattie July 30, 1970)

Although GSA delegation of authority to the National Park Service under Temporary Regulation H-4 (1967) remained in effect, very little correspondence was exchanged regarding jurisdiction of submerged cultural resources until January 17, 1975. This was partially explained by Superintendent Beattie in a memorandum to the Regional Director, Midwest Region.

> During 1965 and 1966 the AMERICA Salvage Corporation attempted to float the steamer AMERICA which sank in Isle Royale waters in 1928. This operation created considerable controversy over ownership which was finally settled by a Solicitor's decision [Redmond Dec. 8, 1966] ... It was suggested shortly thereafter that the Park publish a notice in the Federal Register stating that the National Park Service was formally taking possession of the sunken vessels. Our feelings at the time were that it was inopportune to do so as the salvage company, which still had equipment on board, had just been informed that the government had ownership. To state we were formally taking possession at that time could have created doubt as to the validity of our original statement and could have created conflict or challenge. There has been no controversy over salvage for some time and we believe that a formal notice is appropriate at this time (NPS Memorandum, Beattie Jan. 17, 1975).

The Department of Interior, Office of the Field Solicitor, redrafted Superintendent Beattie's "Notice of Taking Possession," to be published in the Federal Register on May 22, 1975. The topic of historic significance was emphasized by the Field Solicitor:

> We wish to point out that there are constraints and limitations placed upon the disposition or salvage of any abandoned wrecks that might be an "object of antiquity" within the meaning of the Antiquities Act, 16 U.S.C. 431, or the Archeological and Historic Preservation Act of 1974, Pub. L. 93-291 (Department of Interior Memorandum, Shulstad May 22, 1975)

The Field Solicitor referenced correspondence from the Department of Interior Washington Office of the Solicitor to GSA General Counsel Trimmer, regarding the scope of Executive Order 11593, entitled "Protection and Enhancement of the Cultural Environment."

> We view the Executive Order to be applicable to your program if the object in question is worthy of inclusion on the National Register of Historic Places. In this regard, Section 1 (2) of the Order is a general mandate to all federal agencies to direct their programs so as to preserve federally owned objects of historical or archeological significance, and must be read together with the identification requirements of Section 2(a) of the Executive Order. Section 2(a) is concerned with sites, buildings, districts, and objects under an agency's jurisdiction of control. In our view, sunken ships subject to GSA jurisdiction under 40 U.S.C. 310 would be included within this provision, and Section 2(a) requires, in effect, the identification and nomination of sites believed to be suitable for the National Register of Historic Places (Department of Interior Solicitor's Opinion, Feb. 5, 1975).

The National Register of Historic Places was expanded to include cultural resources of state and local as well as national significance by the National Historic Preservation Act of 1966 (Public Law 89-665, 810 Stat 915). Section 106 of the National Historic Preservation Act directed federal agencies having jurisdiction over a proposed federal or federally-assisted undertaking to "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register" (National Historic Preservation Act of 1966, as amended; Advisory Council on Historic Preservation 1981). Executive Order 11593 (36 F.R. 8921) of May 13, 1971 instructed all federal agencies to "locate, inventory and nominate to the Secretary of the Interior" cultural properties "that appear to qualify for listing on the National Register of Historic Places" (NPS Cultural Resources Management Guideline 28, August 1985). The "Notice of Taking Possession" was never published in the Federal Register, possibly a result of concern by the Park over compliance with E.O. 11593, which would have required a significance evaluation of the wrecks for possible inclusion on the National Register of Historic Places. Issues of shipwreck jurisdiction and federal responsibility for submerged cultural resources became comparatively dormant until 1978, when proposed salvage of KAMLOOPS raised the concerns of yet another Isle Royale Superintendent.

Although questions of jurisdiction were temporarily laid aside, preservation issues soon arose. In the late 1960s and early 1970s, scuba diving became accepted as a valid recreational-use activity, and Park managers began to take a closer look at submerged cultural resources management. The rapid growth of diving visitation was responsible for launching Isle Royale National Park into a period of assessment and monitoring of visitor diving activities.

The priority for Park personnel and funds during this period was to provide adequate visitor accommodations. Park rangers managed visitor services and safety programs, including protection of Park resources. Although Park ranger field staff was limited and heavily dependent upon seasonal workers, continual assessment of scuba diving activities was attempted. One technique instituted required visiting divers to complete daily Diving Registration Forms. The 1971 registration form recommended procedures for safe diving and stated, "Regulations prohibit ... the possession or disturbance of equipment, buildings or other structures. This includes the shipwrecks or the remains of ships in the waters of Isle Royale National Park."

Park patrol rangers were briefed about prohibitions against removing artifacts, but the "collection" ethic among sport divers prevailed. Shipwrecks were not the only sites involved, as evidenced by a 1973 Rock Harbor District report:

> A bronze propeller was observed on the campground dock and conversation with the divers disclosed that the prop had been removed from a fishing vessel down 25 feet, approx. 50 yards off the Caribou Island dock. The divers were verbally informed that the removal of items [artifacts] from the waters of Isle Royale N.P. was prohibited. The divers commented that they construed the regulations to only pertain to equipment, structures, and shipwrecks ... contact with Pete Edison disclosed that the propeller had been removed from the water adjacent to his dock ... Mr. Edison also disclosed that the divers had removed an undetermined number of Weyman snuff jars and crocks from the same area (Isle Royale NP Report, Fleming Sept. 7, 1973).

But a different ethic was beginning to capture the hearts of sport divers exploring Isle Royale's waters. In a letter to Isle Royale National Park staff on June 18, 1973, the secretary for Lake Superior Scuba Divers club of Duluth, Minnesota stated:

> Recently one of our members received the enclosed advertising brochure. It is well known that it is illegal to remove artifacts from a national park or Michigan waters. The GEORGE M. COX lies in Isle Royale waters. Yet this advertisement boasts of the souvenirs that the GEORGE M. COX is ready to yield, and has given up to divers from the Minnesota School of Diving.
>
> The GEORGE M. Cox, lying offshore, is difficult to get at for any but the affluent diver, and thus has retained most of its treasures. However, to show what can happen to a wreck when selfish, inconsiderate divers get to it, look at the steamer AMERICA, in Isle Royale's North Gap. The AMERICA is virtually a barren hulk, with little of value or any major interest remaining.
>
> We are bringing this to your attention in the hope that this piracy of a priceless relic might be stopped.
>
> Our club wishes to see the shipwrecks of Isle Royale preserved for future divers to explore, and wonder at. The thrill and adventure of seeing a wreck in its "natural" state is a thrill that no diver will soon forget.
>
> A picture is worth a thousand words, a souvenir good only to a select few. And a camera leaves the adventure there, for another to enjoy.
>
> ... We hope that you can do something to stop this wholesale raping of Isle Royale's treasures (Isle Royale NP Correspondence, Hansen June 18, 1973).

The opinions offered by Lake Superior Scuba Divers would be echoed many times throughout the 1970s and 1980s by an increasing number of sport diving "preservationists." Other divers were more cautious about the government's role in resolving problems between "treasure" and preservation ethics. Two letters from 1975 to Isle Royale Superintendent John Morehead raise some important concerns. Joe Strykowski, Director of the National YMCA Scuba Program stated that:

> Nowhere else in the world are to be found the profusion of sunken ships in such good order. It is apparent that the Park will surely be visited by ever-increasing numbers of diving families ... I understand that we share a serious concern - that of preserving underwater antiquities ... A few rotten apples notwithstanding, I am equally

> concerned with the freedom and rights of the individual recreational diver ... It is safe to say that the term "treasure diver" is rapidly becoming as distasteful to the average, right-thinking sport diver as the term "spear fisherman" ... Sometimes in our honest attempt to protect one man's rights, we hurry into law well-intended legislation which deprives equally decent and innocent citizens of theirs. Every intelligent diver shares your concern over that small group who left to their devices would explore and remove historically important parts of wrecks. The American diving community, however, has proven time after time its inherent ability to police itself ... Toward a prompt and equitable resolution of the problem, I strongly encourage the convening of a conference between yourself and other Park personnel and concerned spokesmen - representatives of the diving community. Without question, divers can provide valuable input toward the implementation of a workable program for protecting historical shipwrecks located within Isle Royale's boundaries ... (Isle Royale NP Correspondence, Strykowski July 23, 1975).

John D. Kronschnabl of Rhinelander, Wisconsin, repeated the idea of working with the diving public in solving the problem of artifact attrition.

> We were visited and checked by Park Service personnel on several occasions, checking to make sure we were not taking things from the wrecks. I can understand this because they told us some of our fellow divers were taking things. We, the divers, don't want to see this, either. I want my children and grandchildren to be able to dive the wrecks and see something more than just a stripped, barren hulk. I commend the Park Service for their efforts to save this great resource.
>
> However, I don't believe your methods are going to be very successful. No matter how many policeman you put out I think you will never be able to stop it. I believe the only way to save the wrecks of Isle Royale is for the Park Service to work with the divers. In other words, let the divers take out their own garbage. We divers know who is ripping off the wrecks; we see what they have done. Everyone is reluctant to squeal on another diver for fear it will get us all in trouble. This is a bad situation and none of us likes it (Isle Royale NP Correspondence, Kronschnabl July 19, 1975).

By the mid-1970s there was little excuse for "not knowing the regulations," although some divers continued taking artifacts from submerged cultural sites. Mandatory diver registration was widely advertised, with rangers patrolling overnight camping accommodations and dock sites. Entry points into the Park were limited, except by private boat, so a large percentage of visitors could be informed of scuba diving requirements. Some divers worried about potential measures banning visitors from wreck sites obviously impacted by artifact collection, but Park management never seriously considered this alternative, except for reasons of safety.

The safety issue became a major concern when attention was focused by a series of drownings in the late 1970s. The Daily Mining Gazette of Houghton, Michigan, where mainland headquarters of Isle Royale National Park are located, reported the first known sport diver fatality on August 23, 1976.

> A 20-year-old man from New Auburn, Wis., drowned late Sunday morning in Lake Superior .... Donald Lienhardt was diving with four other men to explore the wreck of the Steamship AMERICA .... Lienhardt's body was found in a storage compartment below the galley

at the stern of the ship in about 70 feet of water .... Authorities theorized that Lienhardt ran out of air after becoming lost or tangled in wiring.

Equipment malfunction was determined not to be a factor in Lienhardt's death, after tests were completed. A Board of Inquiry was held at Isle Royale National Park immediately after the fatality, with an inspection dive completed on AMERICA by Superintendent Jack Morehead. The Superintendent:

> ... did not consider this room to be any more dangerous than numerous other rooms or areas on several other shipwrecks at Isle Royale. "I feel it would be a mistake to try to close this particular area to diving activity. I feel this would only start a chain reaction where we might even be liable for not closing similar rooms or potentially dangerous areas on other shipwrecks. It is my recommendation, and the Board concurs, that this area not be closed" (NPS Memorandum, Morehead Sept. 21, 1976).

Rumors of site restrictions again surfaced within the Scuba diving community when the Duluth News-Tribune of August 25, 1979 proclaimed:

> DIVERS BEWARE! 2 dead in plunges off Isle Royale. On Aug. 6 Donald Curran and Mark Nordine ...dove nearly 200 feet into the icy Lake Superior waters off Isle Royale to explore the mysterious shipwreck KAMLOOPS. Nordine experienced trouble with his gear [regulator freeflow] and headed to the surface. Curran, 24 never came up. His body was found several days later .... Then, last Sunday, Rochelle Gause, 24, Minneapolis, was diving with a friend on the shipwreck HENRY CHISHOLM near the Rock of Ages lighthouse. She became separated from her friend. Her body was recovered the following day.

Although both deaths were formally listed as drowning, investigations revealed nitrogen narcosis as a silent partner in the KAMLOOPS fatality and air embolism a direct factor with the HENRY CHISHOLM incident. Isle Royale also experienced a number of non-fatal scuba diving accidents during the mid to later 1970s, including decompression sickness, which highlighted issues of diver safety. After debating the value of site closures, especially on deep shipwrecks, Superintendent Morehead reiterated Park policy:

> The two deaths this month have upset Isle Royale National Park Superintendent Jack Morehead, himself an avid diver. But he said the Park Service has no plans to restrict or eliminate scuba diving. While diving is considered safe, Morehead said, there are certain hazards that divers - like mountain climbers - accept. Both deaths this month are believed to be due to diver errors, not equipment malfunctions, Morehead said. This despite the fact that both divers were experienced ... All divers coming to Isle Royale should be in excellent shape and "very, very experienced" (Duluth News-Tribune Aug. 25, 1979).

The policy of unrestricted access to Isle Royale's shipwrecks continues today. In recognizing scuba diving as a legitimate visitor use activity, Park staff also accepted responsibility for diving emergency management. This facet of Park operations will be discussed in greater detail later in this chapter under the sub-heading "Present Day Management."

Superintendent Morehead actively confronted scuba diving issues throughout his administration at Isle Royale. This activity was emphasized even though wilderness designation was passed for 98 percent of the Park's land area in 1976. The Wilderness Act (Public Law 88-577) of 1964 stipulated a rather narrow course in Park operations by requiring that federal land be maintained in "its primeval character and influence, without permanent improvements or human habitation" (Wilderness Study Isle Royale National Park 1971). Sport diving introduced some contradictory needs and ethics to be resolved.

The key to Superintendent Morehead's notable success was direct involvement with the diving public. Park field rangers began listening in earnest to diver concerns. Correspondence directed at "returning" divers and dive clubs asked for opinions regarding techniques to manage Isle Royale submerged cultural resources. Responses to questions of resource protection were often surprisingly conservative.

> ... I personally believe that if someone is ripping something off that he is not only ripping off the Park, but he is also ripping me off because that individual is depriving me of being able to see that same artifact as it originally was. I am quite sure that this vandalism is the result of a few and it would disturb me greatly if the Park were to prohibit scuba diving entirely. I would suggest that you thoroughly search all divers upon their leaving the Park. Any individual caught with something should be fined. This fine should be enough so as to deter any further activity" (Isle Royale NP Correspondence, Rau Sept. 23, 1975).

From the Michigan Skin Diving Council came:

> The Isle Royale area should be declared an Underwater Park or preserve, with severe penalties imposed upon anyone found taking artifacts from the area. The closing of the area to divers accomplishes very little, since who then could enjoy the very things you wish to protect. A stiff fine plus confiscation of all diving gear would soon put an end to illegal underwater activity (Isle Royale NP Correspondence, Kennedy Jan. 19,1976)

Park rangers benefited from sport divers adopting a "preservation" ethic as distrust found in earlier encounters began to break down. Divers were often eager to provide information concerning regulation violations they observed or heard about through the diving "grapevine." Efforts to monitor and deter removal of artifacts from submerged cultural sites became more productive because of this cooperation of the sport diving community.

While positive gains were being accomplished in ethical relations between sport divers and Park management, the threat of commercial salvage arose once more. A Thunder Bay, Ontario law firm petitioned claim to package freighter KAMLOOPS in 1978, on behalf of a Canadian citizen. Isle Royale Superintendent Morehead provided the Park's position to the NPS Midwest Regional Director in a request for a solicitor's opinion:

> ... As far as we know now, the Park contains the greatest collection of intact shipwrecks to be found in the United States ... When Isle Royale was first established as a national park, this resource was largely ignored ... However, in the past 20 years, the significance and value of the underwater resource has become increasingly important. Shipwrecks are now an integral part of the Park's interpretive theme; scuba diving is an accepted Park use, and we now feel strongly that positive action must be taken to preserve this unique resource for future generations of visitors ... we have a major problem in protecting

and preserving the wrecks and artifacts. There appears to be a direct conflict between laws relating to maritime salvage in navigable waters and the laws pertaining to antiquities and historic preservation ... Because of this unclear legal status, we are experiencing severe depredation of the existing wrecks. This damage includes everything from proposals for complete salvage of major ships to the indiscriminate collecting of "souvenirs" by scuba diving parties ... (NPS Memorandum, Morehead March 28, 1978).

The response from Department of the Interior Solicitor Menefee concurred with views expressed by solicitor's opinions of January 31, 1964 and December 8, 1966 which:

> ... concluded that the vessels in fact had become property of the United States due to the passage of time despite the claims of the purported original owners... Based upon the cessions of jurisdiction and the transfer of title to submerged lands, one of which was completed by the Act of March 6, 1942, 16 USC 408i, and ... the letter of acceptance to the Governor of the State of Michigan ... signed December 14, 1955, it is clear that the submerged lands within the four and one-half mile area as defined by the statute are the property of the United States ... Accordingly, the United States has the authority to take whatever action is necessary to protect these long-abandoned vessels under the Federal Property and Administrative Act, 40 USC Sec. 484m. This Act provides authority to take possession of this property to the Administrator of the GSA. However, by Federal Property Management regulation, Temporary Regulation H4 dated September 14, 1967, the then Administrator of GSA ... delegated the authority to the Secretary of the Interior to carry out his authority under the Act with respect to Isle Royale NP (Department of the Interior Memorandum, Menefee June 26, 1978).

Solicitor Menefee also suggested "promulgation of special regulations prohibiting removal of objects from the wrecks" and that any attempted salvage operation be enjoined in court to confirm title. The Ontario law firm admitted that, " ... it would be difficult for our office to dispute your assertion of title either under the Federal Property Management and Administration Services Act, or under the Abandon Property Act," but requested a legal opinion of claim under "law of salvage" (Isle Royale NP Correspondence, Dubinsky Kovanchak Ferris & Ross Aug. 18, 1978).

A final response from Solicitor Menefee was similar to Solicitor Buddeke's opinion of May 13, 1959, which recognized the fundamental purpose of National Parks to "conserve the scenery and the natural and historic objects and wildlife therein ... [shipwrecks] of Isle Royale National Park are historic objects which are to be preserved ... and are no longer subject to being salvaged" (Department of the Interior Memorandum, Menefee Oct. 31, 1978). Since 1978, no serious inquiry regarding commercial salvage of Isle Royale National Park shipwrecks has materialized.

Further protection of National Park Service cultural resource sites was offered through passage of the Archeological Resources Protection Act of 1979 (Public Law 96-95). Regulations for the Act were issued on January 6, 1984 in the Federal Register and include " ... all portions of shipwrecks (including, but not limited to armaments, apparel, tackle, cargo), "which are at least 100 years of age. Criminal penalties involve fines up to $10,000 or one year in prison, or both. Civil penalties may also be assessed by the federal land manager concerned, with possible forfeiture of all vehicles and equipment used in connection with such violation (Federal Register January 6, 1984, Rules and Regulations)

Isle Royale's ten major shipwrecks were listed in the National Register of Historic Places under a thematic group in 1984. This inventory conveys further significance upon these archeological sites through a lengthy process of site classification and justification (Carrell 1984). With questions of bottomlands jurisdiction, sport-diving usage and archeological significance settled, Isle Royale National Park could seriously experiment with and implement techniques to manage their submerged cultural resources. This initiated the Park's present-day emphases on research and operations detailed in the following section:

Present Day Management

Once the value of Isle Royale's submerged cultural resources was recognized by NPS archeologists and Park administrators, an active management effort was initiated to prevent the deterioration of shipwrecks by inadvertent or intentional acts and to provide additional measures of safety to the diving public. With Isle Royale as the pilot project, the National Park Service formed a Submerged Cultural Resources Unit (SCRU) in 1980 to deal with similar concerns expressed by managers in marine and Great Lakes areas throughout the National Park System. Beginning with Superintendent Morehead, Park management at Isle Royale interacted heavily with the "SCRU Team" as a comprehensive program in submerged sites management was developed.

Mooring System for Park Visitors

Virtually all wreck diving at Isle Royale is accomplished from charter or private dive boats. Until 1985, these boats anchored within and near wreckage fields or tied off directly to temporary mooring lines installed by scuba charter operators and private divers. These mooring lines were often inadequate for the purpose intended, poorly maintained if at all and sometimes attached to fragile or movable portions of the wreck. Commercial scuba charter operators working within Park boundaries expressed concerns, similar to those of Park staff, about obvious problems this state of affairs presented for resource damage and visitor safety. A decision was made by Park management in 1984 to establish fixed moorings on several Isle Royale shipwrecks, partially as a result of recommendations made by the Submerged Cultural Resources Unit in their 1981 Field Activities Report (Murphy, et al. 1982). The objective of the mooring project was two-fold:

1. To reduce the amount of damage caused by dive boats anchoring in the wreck itself, within the wreckage field, or by the use of inappropriately secured mooring lines.

2. To improve the safety of sport diving on Isle Royale shipwrecks by providing secure and well-maintained mooring lines.

Site-specific suggestions regarding the establishment of moorings were solicited from commercial scuba charter operators, the SCRU and Park divers. Fathom Five Provincial Park at Tobermory, Ontario provided detailed information about shipwreck mooring systems gathered from years of diving management experience. Two methods of anchoring mooring buoys and lines were found to be relevant at Isle Royale. One involved placing a mooring sinker (anchor) in or near the wreck site, to which a mooring line was tied. In instances where the wreck profile or bottom conditions prevented use of a mooring sinker and where solid metal attachment points were available, direct fastening of mooring lines to shipwrecks was permitted. If it was determined that direct attachment would weaken or otherwise degrade the integrity of a shipwreck, this option was rejected. An examination of mooring techniques determined that the preferred mooring tackle should consist of a 1700 lb. cast concrete mooring sinker, 3/4-inch polypropylene mooring line and 18-inch x 30-inch commercially manufactured mooring buoys (Fig. 7.3-7.6).

Mooring sinkers were towed to a shipwreck site by small boat, with precision bottom placement accomplished by Park divers utilizing a lifting unit (Fig. 7.7). Park protection and maintenance personnel designed and built the lifting unit using an old 270 gallon fuel oil tank, which was steam cleaned and fitted with several valves, fill ports, tow and suspension points. The intra-site location of mooring sinkers and lines was based on a number of factors including obstacles or entanglements, depths over the site, points of anticipated visitor interest, dive planning considerations and general safe diving practices. Whenever possible the mooring lines were placed in an area which minimized disorientation and facilitated the ability of divers to navigate amongst wreck features and hazards. This was considered particularly important for deeper dives where the effects of nitrogen narcosis impair mental faculties.

Installed buoys are readily visible from a distance of a mile or more, which minimizes time required by dive boats to locate a shipwreck. Shipwreck name and normal depth range of the dive are inscribed for positive site identification. Attached to the buoy is a polypropylene "tag" line which floats free on the water surface. This tag line is picked up by hand or with a boat hook and tied off to a cleat aboard the dive boat. Mooring tackle scope is minimal to provide a near vertical descent for divers.

A waterproof sticker affixed to the buoy provides divers with basic information concerning mooring purpose and conditions of use (Fig. 7.2). Resource protection and visitor use regulations are included on this sticker. Some requirements were established through Superintendent's Orders which restrict mooring use to dive boats, prohibits overnight and rough weather usage and limits the number of vessels "rafting off" the mooring to three (36 CFR 3.6 c).

During the 1985 visitor season, moorings were established on AMERICA, EMPEROR stern, CUMBERLAND/HENRY CHISHOLM and MONARCH. All major shipwreck sites with exception of KAMLOOPS and ALGOMA were buoyed in 1986. Mooring sinkers were placed near CUMBERLAND/HENRY CHISHOLM, MONARCH and AMERICA sites with one proposed for ALGOMA in 1987. A two-point mooring was employed on AMERICA to prevent dive boats from swinging into a major navigational channel or a shallow rocky area near shore. On other shipwrecks, mooring lines were attached directly to very solid fittings on hull structure or exposed boilers. Working depths of these activities varied from 15 to 130 feet.

Because some Isle Royale shipwreck sites are hazardous or sensitive in nature, the Park does not want to encourage use and has intentionally chosen not to install or maintain fixed moorings. For example, wrecks such as KAMLOOPS and the stern of CONGDON, which are beyond the maximum sport diving depth (130 feet) advocated by most certifying agencies, have not been buoyed.

Each mooring system is inspected during the season by Park divers or by commercial scuba charter operators. After the diving season, buoys and their chain ballast are removed. Polypropylene line is weighted and sunk 20-25 feet to prevent winter ice damage. In spring, a dive must be made only to a depth of 20-25 feet to retrieve the mooring line for attachment to a surface buoy. This is a cooperative effort between the National Park Service and commercial dive charter operators.

As a whole, Isle Royale's mooring system has been well received by all parties concerned and is considered to have met original objectives. A written account of these plans and operations, (Shipwreck Mooring Buoy Project, Resources Management Report #7 - Isle Royale National Park, January 1985) is available by writing the Superintendent, Isle Royale National Park. This report addresses needs and rationale for establishing a shipwreck mooring system. It also includes descriptions of the material and equipment to be used, detailed mooring configurations and implementation procedures.

Operational Diving Program

Isle Royale's diving program falls under purview of the Chief, Visitor Services and Resource Protection (VS&RP). Day to day operations are under field supervision of the Park Diving Officer (PDO). The Park Diving Officer plays a critical role in successful implementation of this program, which is guided by NPS-4 Scuba Diving Guidelines, a national level policy statement pertaining to scuba diving. An "Isle Royale Scuba Diving Plan" (Isle Royale NP Guideline 3, revised Feb. 1984) specifically covers Park operational diving. Much of the following discussion was taken from Guideline 3, which is available by writing the Superintendent, Isle Royale National Park.

The core of Isle Royale's dive program is, of course, its divers. A dive team of four to five employees has been identified as necessary to meet operational objectives. This figure is influenced by diving workload, necessity to dive in pairs and logistical problems involved in composing buddy teams from widely separated areas of the Park. The number of active divers in the Park varies from year to year depending on turnover of diving personnel and how often basic scuba courses are made available to employees. Generally, the team is composed of permanent employees, however, seasonals may participate if equipment is available, and they meet requirements of the program. Park divers have typically come from the Visitor Services and Resource Protection Division; however, in the last year an effort has been made to include personnel from other areas. Currently, the Maintenance Foreman, Park Historian and a Natural Resource Management Trainee have been added to the dive team. Interdisciplinary membership has broadened areas of expertise and has helped to develop a wider support base within the Park for the dive program.

The addition of new Park divers is handled in a variety of ways, depending upon the needs of the Park. Certain key positions, such as the two District Rangers and Northshore Subdistrict Ranger, are intentionally filled by divers, if possible. Possession of a valid scuba certification is, in fact, a requirement for the Northshore Ranger position. If the Park finds itself without enough divers to maintain an effective program, Isle Royale NP may organize an in-Park basic scuba course. Relying on the local scuba community for basic certification courses is difficult with erratic summer and winter schedules of Park staff. Employees who wish to dive on the Park dive team and who come to Isle Royale with at least a basic certification are selected on an as-needed basis. Experience level, supervisory support, diving skills and physical ability are evaluated by the Park Diving Officer.

New divers must be certified at a basic scuba level and pass an NPS watermanship and skills test. Eligible employees are placed in "diver-in-training" (DIT) status until they have demonstrated sufficient expertise and have completed 12 supervised dives. Receipt of a "blue card," which lists depth restrictions, authorizes them as a "NPS diver." Depth ratings may be increased by following NPS-4 and Park policy.

With a small Park dive program such as Isle Royale, it is unrealistic to expect divemaster supervision of every dive. Consequently, most dives are performed with two divers and a tender or boat operator. Usually, the most experienced diver will act as team leader and supervise the dive. A dive plan is formulated and reviewed before entering the water. Contingencies or "what if" scenarios are discussed to anticipate emergencies, equipment failures, or other considerations. A brief critique is completed by involved personnel after the dive.

Other Park employees, besides Park divers, play an active role in the diving program. Patrol rangers or maintenance workers may serve as dive tenders and boat operators while diving operations are being conducted. A formal training session is held at the beginning of each year for those members of Park staff that frequently serve in surface support roles at diving sites. This session emphasizes timekeeping duties, familiarity with dive equipment, emergency first aid and handling of diving illness or accidents.

In 1985, a Volunteer-in-Parks (VIP) program was evaluated in combination with activities of the SCRU at Isle Royale. A VIP scuba instructor trained and certified six Park employees in basic diving. VIP divers were responsible for video taping portions of shipwrecks to fill in data gaps for the SCRU and photographing artifacts of obvious value that might easily be stolen. A Park maintenance project was also completed on a volunteer basis.

Role of Park Divers: Park divers are used to perform underwater maintenance, recoveries (of property and human bodies), archeological surveys, patrols and monitoring of underwater cultural resources. More specifically their functions are as follows.

A) Maintenance: Isle Royale is a water based Park. Virtually all transport of people, material and equipment occurs via boat. Obviously, diving capabilities are important and valuable, especially from a maintenance perspective. Park divers are regularly used to inspect, install, repair, or dismantle docks. Intakes for public and government water systems need to be attached, cleaned and removed on a yearly basis. Mooring buoys require installation in spring and regular inspection of tackle. Park divers occasionally conduct hull inspections on boats with suspected damage, that are not easily lifted out of the water. Clearing fouled propellers and replacing damaged propellers are typical maintenance functions. Situations periodically arise where Park divers have been able to resolve a maintenance problem at considerable savings to the Park by being able to make repairs or salvage equipment. For example, a break in the track of a marine railway was repaired by Park and VIP divers in two days. The alternative would have involved a major commitment of government resources, utilizing a crane, barge and large work crew for many days. Perhaps, the most visible work performed by divers is clean-up of shallow areas near visitor use areas. Trash pick-up dives are scheduled yearly to remove unsightly debris that collects around marinas and docks.

B) Cultural Resource Management: With such a significant underwater cultural resource base, it is important that the National Park Service constantly monitors the condition of these sites through underwater checks. Divers can observe impacts to these resources and document significant natural changes, vandalism, or new discoveries. Resource managers can then assess problems and provide recommendations to mitigate or eliminate future impacts. As Park divers work with research staff to develop skills and abilities, techniques such as cultural resource surveys, mapping and documentation of new sites are added to their capabilities.
Law enforcement efforts to protect underwater cultural resources from theft and degradation are substantially improved by use of patrol personnel with diving experience. "Topside" permit and boat checks are conducted frequently to let visitors know that Park management is actively concerned about preserving these resources. Inquiries about artifact removal or antiquities violations are an important aspect of information gathering for possible law enforcement measures. Visitor contacts during patrols also provide an excellent opportunity to instill or reinforce a "preservation ethic" with the diving public. Prevention and deterrence through education are the primary goals of these patrols.

C) Body Recoveries: Three sport diver drownings have occurred at Isle Royale National Park since 1976. Body recoveries were completed by private individuals under coordination of the Isle Royale Superintendent or Chief Ranger. Due to obvious questions of liability, Park divers will make future body recoveries within their capabilities. Because search and recovery operations of this type are sensitive and often complex, a full discussion is left to other sources. Numerous property recoveries ranging from tools to outboard motors are made each year.

D) Natural Resources Research: In 1986, Park divers assisted with research of in-Park Lake Superior water quality, by deployment of sampling devices. Monitoring of water quality will undoubtedly receive greater attention, due to national emphasis on baseline environmental data gathering.

Training: The Park tries to take advantage of National Park Service-sponsored scuba training opportunities, such as Advanced Operational Diver and Divemaster courses. Ideally, Isle Royale hopes to maintain at least one divemaster and one or two divers at an advanced operational level. In addition, a yearly mini-diving workshop is held at Isle Royale. This session, which usually lasts three days, concentrates on skill development. Divers are introduced to unfamiliar specialities such as underwater maintenance techniques, archeological mapping, wreck diving, use of new equipment, equipment maintenance, and emergency procedures. Park isolation and irregular schedules hinder access to local community specialty courses. Mini-workshops also provide an opportunity for Park divers to complete a required minimum of 12 operational dives each year. Due to complicated travel logistics and competition with other work duties, this minimum is sometimes hard to accomplish. Continued skill maintenance is especially difficult during winter months when open water diving is unavailable, with exception of ice diving. Recently, Isle Royale National Park has made arrangements with a local scuba club to "pool" dive during the winter.

Equipment: A central scuba locker has been constructed at one district office. Dive equipment is stored and serviced in this facility. "Turnaround" time for equipment repairs through the mail are considerable. Equipment maintenance is therefore completed in-house whenever feasible, with a stock of commonly needed spare parts. Visual inspection and hydrostatic testing of scuba cylinders are accomplished commercially. The Park hopes to put one or two divers through a visual inspection certification course. Notable savings would be realized through elimination of visual inspection fees and handling costs. Industry certification in regulator repair is also anticipated.

Isle Royale NP has made a conscious decision not to purchase an air compressor. Consistent availability of commercial air fills through scuba charter operators, is presently more economical than operation and maintenance of a government compressor. Sometimes this arrangement proves to be inconvenient, however, a recent purchase of additional air cylinders has made the situation acceptable.

A computerized database is established for every piece of scuba equipment in the Park. Equipment issued to Park divers is tracked using this program. The database includes a maintenance log for easy retrieval and update of service records. Key information such as model or serial numbers, replacement part data, purchase dates and cost is also maintained.

Program Administration: The Park Diving Officer (PDO) prepares a scuba program plan before each diving season. This includes estimated expenses from purchases, repairs, medical examinations, projected diving activities and training courses. The program is subject to approval by the Chief, Visitor Services and Resource Protection. The PDO is also responsible for ordering, stocking and repair of equipment or accessories.

Park divers are required to maintain a NPS and personal dive log. NPS dive logs are retained by the PDO. For dives in which a specific or significant project is undertaken, a more detailed reporting process is necessary, using a form designed for this purpose (Record of Dive ISRO-8). The completed Record of Dive remains at Isle Royale and provides information regarding past maintenance, cultural and natural resource related underwater activities. The PDO initiates a yearly physical examination process for Park divers, reviewing and maintaining those records. A "blue card" or Park diver certification is issued by the Regional Diving Officer on an annual basis. Brief end of year reports are prepared by the PDO, detailing dive team accomplishments during that season (Isle Royale NP Memorandum, Wells Dec. 4, 1986).

Scuba Diving Accidents And Emergency Response Procedures

Since 1976, Isle Royale National Park staff have dealt with the following scuba diving fatalities, formally certified as asphyxiation due to water immersion.

Location	Reason For Fatality/Transportation
HENRY CHISHOLM	Air embolism 8/19/79. Unauthorized commercial charter boat.
KAMLOOPS	Nitrogen narcosis 8/06/79. Private boat.
AMERICA	Disorientation and/or entanglement 8/22/76. Private boat.

Rumor mentions a possible fatality on EMPEROR during the 1950s. This victim was supposedly removed by the involved diving party and transported back to mainland facilities by private boat. Reason(s) for the death are unknown.

Non-fatal accidents or incidents reported since 1977 include:

Location	Incident and Date
EMPEROR	(2) Omitted decompressions after planned depth exceeded (1983). No symptoms after oxygen therapy on omitted decompression schedule. Commercial charter boat.
EMPEROR	Medical problem precipitated by cold water exposure, with decompression sickness symptoms (1982). Patient transported to recompression chamber, but treatment was not initiated. Private boat.
EMPEROR	Near-drowning due to panic, precipitated by suit squeeze and regulator free-flow (1982). Patient was transported to hospital for treatment. Commercial charter boat.
EMPEROR	Buddy breathing ascent due to lack of air (1981). The ascent was successful from approximately 120 feet. Unauthorized commercial charter boat.
EMPEROR	Regulator free-flow at 70 feet (1981). Dive terminated. Private boat.
EMPEROR	Emergency ascent necessitated by lack of air from possible regulator malfunction (1980). The ascent was successful from approximately 50 feet. Private boat.
EMPEROR	Air embolism due to uncontrolled drysuit ascent possibly from contamination of breathing air (1979). Recompression chamber treatment was successful. Private boat.
EMPEROR	Esophageal spasm (1978). The incident started at 60 feet after use of an oral inflator on buoyancy compensator. Diver ditched weight belt and terminated dive. NPS diver.
KAMLOOPS	(1) Regulator free-flow at 175 feet (1983). NPS diver. (1) Regulator free-flow inside vessel at depth over 200 feet (1980). Private boat. (3) Regulator free-flows at depths over 200 feet (1979). Private boats. No emergencies developed, due to use of redundant air systems.
KAMLOOPS	Rapid ascent from 160 feet due to "o" ring failure on air cylinder valve (1979). Private boat.
KAMLOOPS	Broken ankle from fall while suiting up with drysuit (1979). Private boat.
KAMLOOPS	Uncontrolled ascent due to malfunction of drysuit inflator (1979). Incident controlled by safety diver. Private boat.
KAMLOOPS	Decompression sickness (CNS bends) (1978). Recompression chamber treatment was successful. Private boat.

HENRY CHISHOLM	Uncontrolled ascent due to frozen drysuit inflator, resulting in omitted decompression (1982). No symptoms after in-water omitted decompression schedule conducted. Commercial charter boat.
HENRY CHISHOLM	(3) Regulator free-flows at depths over 100 feet (1981). No emergencies developed due to use of redundant air systems. One dive required a buddy-breathing ascent. NPS divers.
HENRY CHISHOLM	Uncontrolled ascent due to drysuit over-inflation and omitted decompression (1980). No symptoms after oxygen therapy on omitted decompression schedule. Commercial charter boat.
HENRY CHISHOLM	Regulator free-flow at 90 feet (1980). Private boat.
CHESTER CONGDON	(2) Omitted decompressions after planned depth exceeded (1983). No symptoms after oxygen therapy on omitted-decompression schedule. Commercial charter boat.
GLENLYON	Regulator free-flow (1979). Dive terminated at 30'. NPS diver.
Duncan Bay Campground	Cylinder explosion while filling tank from portable air compressor (1977). Property damage only. Private boat.

Scuba accidents or incidents are recorded on NPS Case Incident Records (Form 10-343), which are on file at individual Parks. Detailed background information and narrative of events are part of the Record. Fatalities require the formation of a Superintendent Board of Inquiry with analysis of involved scuba equipment for malfunction. Future accident investigations will use a Worksheet For Recovery of A Drowned Scuba Diver. This NPS checklist is completed underwater, before a body is removed or fatality scene disturbed (Diving Management Guideline NPS-4). Scuba divers are requested to provide information regarding accidents, near-accidents or hazardous situations before departing Isle Royale.

Park rangers follow a Diving Accident Checklist, which provides step-by-step information on emergency management. One 31-foot boat and 3 26-foot patrol/search and rescue boats are used by responding Park rangers. Other vessels are available depending upon incident requirements. Commercial scuba charter operators are also advised of diving accident procedures and communicate directly with Park employees over marine FM or NPS radio networks. One charter business requires completion of an Emergency Information Card by passengers, which authorizes recompression chamber treatment if necessary. Isle Royale NP staff includes Emergency Medical Technicians, some trained in administration of IV solutions. In-Park first aid training sessions for diving accidents are conducted according to personnel needs. Emergency medical care is provided as per National Oceanic and Atmospheric Administration (NOAA) and Department of Transportation (DOT) guidelines.

Immediate and efficient transport of diving accident patients to a recompression chamber is of utmost concern for maximum physical recovery. Prior to 1986, patients were taken to a private recompression chamber in Thunder Bay, Ontario, 35-40 statute air miles from Isle Royale. A private seaplane on contract to the National Park Service served as air ambulance. One Park ranger and local sport or commercial divers were trained in chamber operation. Treatment was provided by hospital medical doctors certified in hyperbaric medicine.

Since closure of the Thunder Bay recompression chamber, nearest treatment facilities are located in Milwaukee, Wisconsin and Minneapolis, Minnesota, over 300 statute air miles away. These 24-hour chambers are multi-place with professional hospital staff and heliports. Air transportation can be provided by U.S Coast Guard Search and Rescue helicopters, with a minimum 2.5-hour response to Isle Royale. The helicopters have hoist capabilities and flight paramedics trained in scuba diving emergency management. Other air ambulance alternatives are available, under constraints of limited availability or considerable transport time to recompression chambers. The Superintendent may designate a Park Public Affairs Officer to work with news media concerning diving accidents, other incidents or public information releases.

Scuba diving visitors are required to register upon entering the Park, at a convenient Ranger station. According to regulation, a dive cannot be initiated until the registration process is complete. Inherent dangers of cold water and shipwreck diving are explained at this time, either verbally or by distribution of a Scuba Diving brochure. Commercial charter boat operators are responsible for informing passengers of diving conditions, safety precautions and accident procedures.

Charter Boat Operations

Until 1980, scuba charter boats carrying passengers for hire at Isle Royale were operating in disregard to code of federal regulations and many U.S. Coast Guard requirements. 36 CFR 5.3 states that engaging in or soliciting any business in park areas, except in accordance with provisions of a permit or contract is prohibited. U.S. Coast Guard passenger for hire regulations detail equipment requirements, operator licensing and vessel inspections. Contemporary written and verbal accounts through the 1970s implicated many vessel owners with commercial operations at Isle Royale (Duluth Sunday News-Tribune, June 2, 1974; Isle Royale NP Memorandum, Shaver September 16, 1976; Aqua Center Newsletter, Aurora, Illinois, 5(4), 1977; Omaha World Herald, April 8, 1979).

Isle Royale National Park management tolerated this situation until the late 1970s, when commercial charter boat operation became an obvious impact on island facilities and diving sites. Liability insurance coverage for sport diving accidents and the quality of visitor experiences were of major concern. Park staff discussed instituting a permit system for business operations with scuba charter operators in 1978. The favorable response led to formal government solicitation for scuba diving services at Isle Royale NP. Proposed financial arrangements, operating plans, management and organization structures were detailed by interested parties in a lengthy application process. Operating plans included food preparation, equipment maintenance, training, reservation policies, on-site dive management, air compressor operation, passenger orientation programs, vessel and diving safety procedures.

Three concession permits were authorized in 1980 for charter boat transportation of scuba divers. Businesses were entitled with exclusive rights to provide this service for the permit period. Permits required U.S. Coast Guard operator licensing and conformance with safety regulations. Prohibited activities included artifact removal and planned dives over 140 feet. A divemaster or assistant instructor needed to be on board, with divers using power inflators, buoyancy compensators and submersible pressure gauges. First aid training and supplies, an oxygen delivery system and complete set of reserve diving gear were required. Minimum public liability and property insurance coverage was set at $500,000. Isle Royale NP staff regularly conducted visitor service and vessel inspections according to National Park Service guidelines.

Concession permits valid through 1985 were later issued to two charter dive boat businesses, who worked closely with Park personnel. Visitor complaints were minimal with services judged to be of high quality. Divers enjoyed a "wilderness" experience while pursuing their sport, as much as other Park users. Lack of developed facilities and mainland amenities was deemed a positive attribute by many divers, who wished to escape crowded vacation areas elsewhere. One concession developed a brochure providing passenger information and advertised nationally. Park Rangers investigated unauthorized dive-charter operation when suspected. One case led to expulsion and fining of a Canadian vessel owner for prohibited business operations.

Control over removal of shipwreck artifacts improved with sanctioned dive charter services. Commercial operators realized long term economic benefits of protecting resources for future charter divers to view. This led to preservation ethic development which was impressed upon diving passengers. Departing charter divers occasionally remarked that concession operators made them put an artifact back. Public knowledge of Isle Royale's high quality environmental and shipwreck diving experiences grew through literature exposure. Limited charter accommodations during peak visitor use weeks in July and August produced political pressure to expand services. Charter boat operators argued that plenty of bookings were available during other time periods. Requests from Thunder Bay, Ontario for authorization of Canadian charter operations added further concerns.

In 1986, because of questions regarding adequate supply of services, charter dive boat operations were allowed under commercial use license. Applications for commercial use licenses are greatly simplified, although most restrictions or regulations detailed under concession permit remain. Minimum insurance coverage for general and excess liability was raised to one million dollars. In-depth financial, management and operating plans are not required. The license is available to any qualified individual or business on a year by year basis, but may be revoked at any time by discretion of the Superintendent. Only two licenses were granted in 1986. The few licenses may be a result of increased liability insurance costs, which for one operation totaled over $12,000 to cover two boats during the 1986 operating season. Of interest is whether quality of visitor services and protection of underwater resources will match operations sanctioned under concession permits. Further information regarding commercial use licenses for diving charter boats is available from the Superintendent, Isle Royale National Park.

Interpretation of Submerged Cultural Resources

Popular accounts of Isle Royale shipwreck histories and scuba diving are found throughout local, regional and national publication sources. Recent magazine references include Sport Diver, Skin Diver, National Geographic, Treasure World, Michigan History, Inland Seas, Sierra, National Parks, Historic Preservation, Underwater USA, Port Cities and Lake Superior. Newspaper article sources span the Midwest, as exemplified by credits found in this publication. Other accounts of Isle

Royale's submerged cultural resources are found in diving club newsletters, books on Great Lakes shipwreck and diving histories and publications from professional underwater archeology organizations.

Isle Royale Shipwrecks by Fredrick Stonehouse was the first book exclusively detailing histories of the Island's sunken ships. Another volume entitled Above and Below, by Thom Holden, was introduced in 1985. Both books are available commercially and show moderate sales in comparison to other publications offered by the Isle Royale Natural History Association. The Isle Royale Natural History Association supports Park educational and interpretive objectives through funding of written materials such as books and brochures. Publications are offered at Park visitor centers or by mail order.

Isle Royale maintains a high-contact visitor registration program, both as a result of administrative decision and the limited entry points into the Park. "Nearly all visitors (99%) come in contact with Park staff through information services on the Island, on the RANGER III, or at the Houghton office" (Weber 1986:Part I). The Park provides a free scuba diving brochure to interested visitors upon request or at registration. This Scuba Diving brochure covers safety issues, regulations and brief histories of major shipwrecks. Visitors may also ask specific questions regarding shipwreck diving at Park visitor centers or ranger stations. Rangers (Visitor Services and Resource Protection Division personnel) are briefed on Park history and visitor use issues during seasonal training sessions. Evening slide and lecture programs about scuba diving or submerged cultural resources are conducted at Rock Harbor and Windigo, both are main visitor entry points. Scheduling and content is variable, depending upon needs or interests of the Park Naturalist Office and Park interpreters. Park interpreters are specifically responsible for educating visitors about Isle Royale through guided walks, lectures or audio-visual programs. The Park concession also participates in the visitor program by providing regularly-scheduled interpretive boat cruises during the summer months.

There is a relatively high participation of visitors in the interpretive opportunities provided by the Park visitor program. "Sixty-five percent of Park visitors participate in some form of conducted interpretive activity" (Weber 1986:Part I). The visitor program, for the most part is delegated to field personnel working under the East and West District Rangers. The Park Naturalist is responsible for Park-wide coordination of the interpretive program.

Historical information is collected and stored in the Isle Royale National Park Underwater Cultural Resources File. Research materials for this file have been donated by private collectors, Volunteers-in-Parks (VIPs) and other government agencies. A Park Historian is responsible for assembling, archiving and disseminating information concerning Isle Royale. Park interpreters use these materials in preparation of visitor programs about shipwrecks and scuba diving, as may public or private researchers. File documents have been provided to commercial charter boat operators for passenger orientation and interest. A limited amount of oral history recordings are available that mention shipwreck events or references to Isle Royale boating history. Taped oral interviews are completed by Park staff or VIPs under specific standards and programming. Recordings become property of the National Park Service.

Photos, slides and films of submerged cultural resources are also stored at Isle Royale NP for interpretive, law enforcement or other uses. Most were obtained from private photographers, but the addition of a Park underwater camera will aid NPS site documentation. Historical photos of Isle Royale boats and shipwreck events are included in this collection. (Loans of films, slide programs and other audio-visual resources are available from the Park Historian.)

A cultural resources site inventory, including underwater components, is prepared and updated by the Park Cultural Resources Specialist. Location and nature of archeological sites are confidential and excluded from release under the Freedom of Information Act (5 USC 552), by Archeological Resources Protection Act requirements (Public Law 96-95; 93 Stat. 712; 16 USC 470). Amendment to the National Historic Preservation Act of 1966 (Public Law 89-665; 80 Stat. 915; 16 USC 470) allows government land managers "to withhold from disclosure to the public, information relating to the location of sites or objects listed on the National Register whenever he determines that disclosure ... would create a risk of destruction or harm" (Cultural Resources Management Guideline NPS-28, Aug. 1985).

An educational technique showing promise for application to submerged cultural resources are Isle Royale Field Seminars. These courses are open to the general public and taught by professional instructors with academic credit available. Seminars on ecology, island folklore and wilderness photography were co-sponsored by the Isle Royale Natural History Association in 1986. Approval to conduct a field study in underwater exploration was granted to the Indiana University School of Health, Physical Education and Recreation in 1984. Students completed course work in underwater site documentation, research techniques and preservation ethics on shipwreck AMERICA. A boater's and diver's booklet, multi-image slide presentation, video production and underwater guide are planned for visitor use at AMERICA. Interest in a glass bottom boat concession or underwater "view boxes" has been expressed by Park staff and researchers. This equipment would allow non-divers to view shallow portions of shipwrecks or other submerged cultural resources areas.

In 1981, the NPS Submerged Cultural Resources Unit experimented with installation of an underwater interpretive trail on MONARCH. "It was felt that the knowledge gained by the Unit through its work on the site could be transmitted to visiting sport divers in such a way as to enhance the experience of diving a well-preserved, though disarticulated, shipwreck" (Murphy, et al. 1982:32-34). Plastic numbers were positioned to be visually unobtrusive and provide a safe, relatively easy route over the wreck site. These trail numbers were keyed to an illustrated site guide that discussed important shipwreck features. A second version of the MONARCH Illustrated Site Guide was produced in a plastic-laminated format so divers could take it underwater.

The MONARCH Underwater Interpretive Trail and the accompanying Guide were evaluated by divers in 1982 and 1983. The divers made the the following suggestions and observations:

1) Guide size should be limited to no more than 5 inches x 7 inches and a lanyard attached for easy handling. Depths are needed on the illustration with a shipwreck profile provided.

2) First-time divers on MONARCH seemed to most appreciate trail guidance and information provided. Photographers and divers familiar with the shipwreck resented use of trail numbers. Plastic numbers were recognized as being aesthetically poor (Isle Royale NP Memorandum, Brown July 22, 1983). Currently, most plastic trail numbers have been removed, but site guides are available at the Rock Harbor visitor center. The map on the site guide is apparently sufficient without the actual numbers being placed on the site.

Many sport divers consider visible interpretive devices, such as plastic trail numbers an intrusion, especially on intact shipwrecks. These feelings probably result from divers' perception of shipwreck diving as an act of exploration and discovery, even at well-known sites. Fantasy and history are interrupted by signs of present management. Although the trail numbering system was resented by some, divers generally expressed enthusiasm for the MONARCH Illustrated Site Guide. The wreck became more interesting and appealing because of increased diver understanding. An illustrated site guide may be especially relevant for dispersed sites such as MONARCH, CUMBERLAND, CHISHOLM and GEORGE M. COX, where wreck features are complex and confusing.

Law Enforcement

An undercover operation was conducted by NPS law enforcement officers in 1976. Contacts with unauthorized commercial dive charters and private boats produced recommendations for Isle Royale NP staff:

1) Continue checking and searching dive boats when appropriate. This activity "has their attention."

2) An average charter does not appear to be for artifacts; operators warn passengers not to collect and hold them to it. Friends of charter operators are suspected of completing most "rip-offs."

3) Conduct undercover or surveillance operations when necessary. Observation during diving should be continued.

4) A continuing and primary emphasis needs to be directed towards educating divers on National Park Service ethics (Isle Royale NP Case Incident Record, Tolley Sept. 2, 1976).

Since that time, informal discussions with divers and formal educational programs about preservation of submerged cultural resources have helped curtail removal of artifacts by visitors. Evidence of community ethic building is evident from increased willingness to report theft of material and artifacts from Isle Royale shipwrecks. Diver cooperation has assisted in identifying individuals suspected of artifact removal. One group of sport divers became directly involved in resource protection when rumors circulated that an attempt had been made to remove the KAMLOOPS auxiliary wheel. Working at approximately 175 feet of depth, these individuals fastened a six-foot length of chain to the stern navigation wheel. It was placed to hinder removal of the wheel, yet minimize photographic and aesthetic intrusion (Isle Royale NP Case Incident Record, Vrana Aug. 31, 1980).

Although artifact removal has been an important management concern, sport diving is allowed on all major shipwrecks from April 16 to October 31. No portions of these shipwreck sites are restricted from entry. Superintendent's Orders, dated April 1986, under provisions of 16 USC, Section 3 and Code of Federal Regulations (36 CFR 1.7), closed all land associated underwater archeological sites to diving use. This action will protect these fragile areas for future archeological research. Permits are required for boating (36 CFR 2.10 and 3.3), underwater diving (36 CFR 7.38 b), collecting research specimens (36 CFR 2.5), commercial photography (36 CFR 5.5 and 43 CFR 5.1), operation of air compressors and portable generators (36 CFR 2.12). Although permits are restrictive, they help control resource degradation and balance needs of various visitor groups using Park resources and offer managers an important control mechanism.

To reinforce preservation ethics, law enforcement patrols and visitor contacts are continued at dive sites and docking areas. Divers are required by regulation (36 CFR 3.23) to identify scuba activity by displaying a standard dive flag (white diagonal stripe on a red background). Patrols at irregular intervals appear to produce the best deterrence against resource violations. Park rangers with full law enforcement commissions can carry firearms, make arrests, execute warrants and conduct investigations of all types (NPS Law Enforcement Guideline NPS-9). Theft from underwater sites is investigated and documented on NPS Case Incident Records as preservation of natural, cultural or archeological resources (36 CFR 2.1 a). Private possession or use of metal detectors, magnetometers, side-scan sonars and subbottom profilers within Park boundaries is restricted by 36 CFR 2.1 a.

Law enforcement within Isle Royale's waters is shared by a number of agencies, although Isle Royale National Park retains exclusive jurisdiction over the submerged lands within 4 1/2 miles of the shoreline of Isle Royale, subject to certain reservations: control of submerged minerals, fisheries and fishing activities are reserved by the State of Michigan (Hobbs 1986:9). Searches of boats that originate and remain in U.S. waters are only initiated with consent or probable cause. Vessels coming from Canada and using Isle Royale NP resources may legally be searched without probable cause or reasonable suspicion of law violation, through U.S. Customs and Immigration regulations. A number of Isle Royale National Park rangers are designated U.S. Customs Officers. Canada Customs and Excise reserves the right to search boats entering Ontario from United States waters. Removal of government-owned artifacts from Ontario historic sites is strictly prohibited. Because of similar concerns and documented problems, Canada Customs and Excise has cooperated with Isle Royale NP efforts of shipwreck protection. The U.S. Coast Guard has some jurisdiction over boating activities on Lake Superior waters of the Park, because these waters are classified as navigable waters. Coast Guard responsibility includes licensing and inspecting commercial boats, search and rescue operations and maintenance of some aids to navigation (Hobbs 1986:10-11).

Artifact Recovery and Museums

For a short time, underwater artifact recovery was sanctioned by Isle Royale National Park management under two specific conditions.
1) A visible artifact was valuable in monetary or historic terms.
2) In addition, the artifact could easily be stolen, or damaged by visitor use or natural conditions. Park or sport divers were allowed to recover the item by getting specific clearance from the Chief Ranger and Cultural Resources Specialist. Specimens were to be exhibited in a Park museum.

Problems with this policy were immediately experienced. Park and sport divers removed many items without permission and "donated" them to headquarters staff at Mott Island. Divers' intentions were sincere, but individual perceptions of artifact value and vulnerability varied. In one instance, a Park employee randomly recovered over two dozen bottles and ceramics. These items were placed in a box and given to the Cultural Resources Specialist. Artifact provenience and context within the site was lost, as no archeological methods were used. This situation was resolved by instituting a standard operating procedure for artifact recovery. Cultural objects may not be removed from their natural setting by visitors or employees. "If the artifact has an obvious high monetary or special intrinsic value, the Cultural Resources Specialist will remove the object with proper documentation" (ISRO Standard Operating Procedure, April 1986). Form ISRO-40 is completed when artifacts are received by Park staff from well-intentioned visitors who remove and turn in artifacts.

Another issue involves artifact conservation and curation. Conservation capabilities at Isle Royale are minimal and difficult to obtain from other facilities. These concerns became especially evident in dealing with a stern spotlight from KAMLOOPS. Sport divers were granted permission to remove the supposedly brass fixture. When recovered, the badly rusted spotlight required days of cleaning and professional stabilization. Storage at a "temporary" museum is inadequate for large inventories of artifacts. Isle Royale NP's current inventory includes 3,638 cataloged specimens and 1,600 uncataloged items of all types (Weber 1986:Part IV). Plans for a museum at Rock Harbor Lighthouse have been mentioned in Park correspondence since the late 1960s, but as yet has not been completed. Visitors may view specimens housed in the Mott Island "temporary" museum by contacting Park staff. Exhibits and access are limited.

Private collectors of Isle Royale shipwreck artifacts occasionally return items to the Park. Conversion to a preservation ethic and loss of interest in their collection are usual reasons for this action. Prosecution for archeological theft is generally not pursued in these cases. Dinnerware from ALGOMA and MONARCH's bell were recently "donated" to Isle Royale NP by a past employee. A curatorial program including identification, accessioning and storage is completed for all artifacts. This is essential for cultural continuity and public accountability. Park staff is aware of other private Isle Royale artifact collections. Legal complications in addition to restricted abilities to properly store and exhibit cultural objects have quieted thoughts on reacquisition. "The condition of museum collections and records at Isle Royale reflect a need for continued training of staff in museum cataloging, record procedures, artifact stabilization, storage and exhibit planning and preparation" (Snyder 1986:14).

Unauthorized collecting of submerged cultural resources by professional archeologists or museum personnel has been suspected in a couple cases. Correspondence to Oshkosh Public Museum by Isle Royale Acting Superintendent Raftery in 1964 made such an accusation: "We think you should know that your unauthorized activities on the island as described in the newspaper articles have caused a great deal of concern not only here but also in our Regional and Washington offices. It has been determined that you should forward to this office all material collected by your group ..." (NPS Correspondence, Raftery Nov. 4, 1964). A more recent incident was reported by sport divers who were approached by an individual representing a regional marine museum. The divers were asked to recover artifacts from shipwrecks within the boundaries of Isle Royale National Park (NPS Correspondence, Morehead July 28, 1978). Both incidents are unresolved, but made Park staff aware of professional pressures to obtain submerged cultural resource specimens. Museum pressure for artifacts for display (sometimes even unauthorized artifact collection) is a recognized threat to submerged cultural resources in national parks.

Management Plans and Guidelines

The Isle Royale National Park "Statement For Management" outlines Park purpose and significance: "[H.R. 17005 U.S. Congress 1931] clearly indicates that the primary purpose of the land portion of the Park is for wilderness and preserving the wildlife, flora and basic resource in a primeval manner ... The intent of Congress ... was further defined with the passing of legislation in October 1976, designating Isle

Royale as a wilderness area" (Hobbs 1986:1,2). Although Isle Royale shipwrecks were recognized as a theme significant to the history and development of the Park, comprising "one of the most intact, well-preserved collection of modern shipwrecks to be found in North America ... The most significant cultural resources of the Island are the numerous aboriginal copper mines ... For the Lake Superior portion of the Park, it is evident from the legislative history that recreational power boating and fishing should be continued" (Ibid. 1986: 8,9,22). "The Lake Superior portion of the Park is designated as a Natural Environment Zone and is managed to provide for environmentally compatible recreational activities" (Snyder 1986:6).

Management objectives and issues influencing submerged cultural resources are also identified in the "Statement for Management." Park objectives include:

1) Cultural Resource Preservation: To preserve and manage sites of historic and prehistoric significance, on land or underwater.
2) Visitor Use: To foster an appreciation and understanding that the natural and cultural resources must be protected.
3) Interpretation: To interpret the natural and cultural resources of the Park to visitors whenever appropriate.
4) Visitor Safety: To provide the maximum amount of public safety possible while still recognizing that wilderness and recreational use has inherent and acceptable dangers and risks to personal safety (Hobbs 1986:48,49)

Major management issues involve:

1) Marine Sanctuary Designation: In 1983, the National Oceanic and Atmospheric Administration included Isle Royale National Park in a list of areas under review for possible study and inclusion into the Marine Sanctuary Program.
2) Water Diversion: Significant controversy has arisen regarding diversion of water from Lake Superior to western states.
3) Resource/Visitor Experience Protection: Innovative management techniques must continue to be employed in order to protect both the resource and visitor experiences.
4) Museum Environmental Control: At present, the Park museum storage facility does not meet professional curatorial standards set by the National Park Service (Hobbs 1986:41-47)

An Annual Statement for Interpretation and Visitor Services outlines basic information used in program planning, interpretive and visitor services programs and cost analyses. Current management concerns emphasize that an inventory of cultural resources at Isle Royale is incomplete. "Lack of data on the total scope of the resources (submerged as well as those above lake level) makes the problem of managing these resources difficult" (Weber 1986:Part I:II). Other needs identified include:

1) Preparation of a Cultural Sites Management Plan
2) Conservation work on the Park collection
3) Continued upgrading of the Boreal Research Station as a support base for scientists doing natural, cultural and social science research
4) Organization of information handling, data storage and analysis processes
5) Funding for the design and construction of cultural exhibits inside the Rock Harbor Lighthouse
6) Increased staffing for interpretation (Weber 1986:Part I:II)

Appendices to this document list Park cultural resources, visitor use data, oral history recordings and sources. Other interpretive standards, guidelines or inventories are also provided.

An action plan entitled Cultural Resources Management Plan and Environmental Assessment, was approved in 1986. "The purpose of this Resource Management Plan is to act as a dynamic guide for the continuous protection, management and maintenance of the Park's Cultural Resources" (Snyder 1986:3). National Register status for Isle Royale shipwrecks is acknowledged, as are concerns for land associated or unknown submerged archeological sites. "[Recreational scuba diving] threatens artifacts remaining in the shipwrecks and other cultural dump sites. Need to inventory in situ artifacts and devise a protection program so that artifacts remain in place" (Snyder 1986:17). The problems of completing a submerged cultural resources inventory and protection program are discussed, detailing possible alternatives. A recommended course of action suggests continued research by the Submerged Cultural Resources Unit in conjunction with Isle Royale National Park.

Superintendent John Morehead issued the first Isle Royale Scuba Diving Plan in 1977, when problems of sport diving safety and artifact protection became obvious. The plan guides Park operational diving and program administration. A detailed Scuba Diving Plan was prepared as ISRO Guideline 3 in February, 1984 and is continually revised. Contents include program purpose and responsibility, operation organization, training, equipment, emergency procedures, local policies and regulations. For a more complete examination of these topics, see the "Operational Diving Program At Isle Royale NP" section of this report.

Other Isle Royale National Park planning or study documents pertaining to submerged cultural resources and scuba diving are as follows:

1)	General Package Master Plan	approved 1963
2)	Historic Resource Study	underway
3)	Archeological Survey & Evaluation	underway
4)	Collection Management Plan	approved 1985
5)	Interpretive Prospectus	underway
6)	Visitor Protection Guideline	approved 1986
7)	Emergency Medical Services Plan	approved 1986
8)	Emergency Procedures Plan	approved 1985

Copies of these documents are available by writing the Superintendent, Isle Royale National Park.

Research Assistance

With increased attention given to Isle Royale shipwrecks by sport divers during the 1970s, Park management began investigating possible avenues of submerged cultural resources research. Proper research could provide information for visitor education programs and guide managers in complex decision-making processes.

The first shipwreck documentation project was funded by Northern Michigan University of Marquette, Michigan with National Park Service support. MONARCH, ALGOMA, AMERICA and GLENLYON were examined during the summers of 1978 and 1979. Project results included artist composite sketches, 35mm photo documentation and locational data (position, present condition, depths). An illustrated report, "Isle Royale Shipwreck Survey 1978," overviewed vessel history, wreckage discovered and methodology. Since shipwrecks were not closed to sport divers during the research, "it was determined [that] a conventional system of underwater griding and buoys could not be effectively used" (Northern Michigan University 1978:17,26,35). Site diagrams were produced by taking measurements from a single-point reference. A 1911 construction plan provided reference in plotting AMERICA's interior dimensions. Isle Royale National Park received artifacts recovered during diving operations. Using research materials and photography from the project, a multi-media slide program was produced. The NMU Isle Royale shipwreck presentation was shown to thousands of individuals in the Midwest. Isle Royale National Park currently maintains a copy.

Although Isle Royale shipwreck research interested Michigan State University staff, the National Park Service decided to continue such a survey "in-house." Benefits from direct administrative control, adherence to NPS philosophy and knowledge of Park operations were obvious. A project planning document (NPS Form 10-238 Development/Study Package Proposal) was developed in 1979 by Isle Royale NP with the following objectives:
1) Develop a basic resource inventory of the Submerged Cultural Resources of Isle Royale along topic lines (shipwrecks, mining, fishing, prehistory and other).
2) Provide professional assistance to Park Manager in the development of a model Cultural Resource Management plan for Submerged Cultural Resources.
3) Provide Park Manager with professional assistance in the development of a visitor use and resource protection strategy related to recreational diving in the Park.
4) Provide historical, cultural, and environmental data related to the interpretation of Submerged Cultural Resources.
5) Jointly develop a model legislative package for the establishment of a maritime history preserve in the waters surrounding Isle Royale.
6) Produce professional publication(s) of the results of the studies.
7) Develop a model plan for Servicewide use for the management of submerged cultural resources.

Underwater archeological research was completed by past members of the National Reservoir Inundation Study, renamed Submerged Cultural Resources Unit of the NPS Southwest Regional Office in 1980. This report concludes a study of Isle Royale submerged cultural resources by the SCRU from 1980 through 1986. In 1982, the SCRU hosted a training session on "Submerged Cultural Resources Management: Skills & Issues," at Isle Royale NP. It was the first National Park Service course dealing specifically with these resources. Participants came from the Ontario Ministry of Culture and Recreation, UNEXSO, State of Michigan Underwater Salvage Committee, Corps of Engineers, sport divers and throughout National Park Service areas. Shipwrecks of Isle Royale National Park were listed in the National Register of Historic Places as a thematic group in 1984, through efforts of the SCRU.

Great Lakes states have also exhibited an interest towards underwater cultural resource protection. Since Isle Royale visitors live predominantly in the Midwest, actions by state governments have influenced diver attitudes and behavior. Isle Royale National Park staff continually monitor regional developments that can influence Park operations. Of primary interest is Michigan's Underwater Salvage Law (Public Act 184 of 1980), "which protects artifacts contained on and in sunken ships as well as the ships themselves. The law further provides for establishment of bottomland preserves ... [and] forbids the taking of any artifact without permits from the Department of Natural Resources and Secretary of State" (Michigan Natural

Resources July/August 1982:13-15). Michigan State University promoted the concept of underwater park-preserves and enactment of the law. Economic benefits to local communities from visiting sport divers and protection of finite cultural resources were central reasons for such efforts. A variety of reports regarding Great Lakes submerged cultural resources and scuba diving are available from Michigan Sea Grant Publication Office, Ann Arbor, MI or Michigan State University Department of Park and Recreation Resources. The State of Wisconsin is currently proposing a similar law. Strong cultural resource preservation regulations, which specifically include underwater sites, have been instituted in Ontario, Canada for many years.

Scuba Diving Registration, Visitor Use Statistics and Surveys

The earliest Isle Royale National Park reference to scuba diver registration was found in correspondence from Superintendent C. E. Johnson on November 4, 1965: "We have, in fact, been somewhat concerned about the safety of those diving on the wreck [AMERICA] and have required that they obtain a permit to do so in order that we could provide some degree of control through a check on the adequacy of each individual's experience and equipment." Use of permit information to investigate possible law enforcement violations was shown by a 1966 report (Isle Royale NP Special Incident Report, Abrams July 18, 1966).

Scuba diver registration later became mandatory by Code of Federal Regulations (36 CFR 7.38). During the 1970s, an active diving permit system was recognized as an important means of visitor control and source of diving information. Permit requirements called for daily diving registration in 1974. Name, address, number of divers, dive location and date were filled out by the dive party leader, agreeing to comply with listed diving safety practices and site preservation regulations. In addition to this data, current permits call for information on dive boat used, an emergency phone number and a listing of proposed (planned) versus actual dive location. All divers in a party now provide information for permits, although they register only once per visit. During registration, Park rangers explain regulations, safety precautions and provide a brochure on Scuba diving at Isle Royale. Park rangers retain a copy of the original permit. Divers are requested to return their permit with corrections noted (i.e. actual data listed) before leaving the Park.

Scuba diving permits have provided important information to managers regarding visitor use. Superintendent C. E. Johnson in 1965 had "approximately 75 - 125 scuba divers exploring the wrecks each of the past three summers. Several times scuba diving clubs have come to the island as a group" (NPS Memorandum, Johnson March 25, 1965). A two-year evaluation of scuba diving was requested by NPS Assistant Director Gastellum in response to growing recreational use of Isle Royale shipwrecks:

> During the test period which covered the visitor seasons of 1968 and 1969, our registrations show that a total of 157 divers spent 603 diver days in the waters of Isle Royale. We are certain that additional unregistered divers participated in these activities as well. The registered divers indicated that they would dive on the following vessels: ALGOMA, EMPEROR, CONGDON, MONARCH, AMERICA, GLENLYON, COX and CUMBERLAND. In addition they indicated that they would be diving in the following locations: Blake Point, Washington Harbor, Mott Island, Menagerie Island, Malone Bay, Canoe Rocks, Siskiwit, Rock Harbor, North Gap and Circle Island (NPS Memorandum, Beattie July 30, 1970).

In 1976, 259 divers made 581 dives during the months of May, June and July. Survey research on Isle Royale scuba diving was conducted in 1980 by Michigan Technological University (Stinson 1981). Results were based on the return of 188 survey forms mailed to scuba divers registered with the Park in 1977 and 1979. Respondents used the following transportation methods:

Private boat	53%
Charter boat	43%
Rental boat	2%

Results and recommendations from the Stinson (1981) study are listed below.

Sport Diver Profile

The surveyed divers were separated into two groups based on whether or not they had indicated that they had done decompression diving while at Isle Royale.

The sport diver at Isle Royale is typically male, between the ages of 27 and 38 years, and has been diving five years or less.

One-half of these divers have logged more than 100 dives, predominately in freshwater. Two-thirds of the divers log between 11 and 50 dives per year, indicating active diving participation. More than half of the divers have made 10 or less dives below 100 feet. The decompression divers, as a group were significantly more experienced at diving than those divers who did not make a decompression dive while at Isle Royale.

Both groups were well experienced at cold water diving.

Two-thirds of the sport divers had some shipwreck diving experience before coming to Isle Royale and were aware of the Antiquities Act and its provisions protecting the shipwrecks of Isle Royale.

The Isle Royale Diving Experience

Diving at Isle Royale presents some logistical problems for the sport diver.

Nearly 85% of the divers had access to a portable [air] compressor for refilling scuba tanks during their trip to Isle Royale.

Wreck diving was the most frequently indicated diving activity at Isle Royale, with general sport diving and photography ranking far behind.

The sport diver visiting Isle Royale is very well equipped for the diving conditions at Isle Royale.

... more than 90% of the sport divers exceeded a depth of 60 feet while diving at Isle Royale. However, only 41% made dives for which they followed decompression procedures.

For these divers who did make dives below 100 feet or decompression dives, responses show a high degree of knowledge and preparation for that diving experience.

The shipwreck AMERICA was the most popular dive site at Isle Royale, followed by the COX, EMPEROR, CONGDON.

Locating dive sites was indicated as being something of a problem.

The survey respondents indicated they felt that they had received adequate information on diving conditions at Isle Royale prior to making their visit.

Conclusion

... the sport diver visiting Isle Royale is both well trained and well equipped for their diving experience at Isle Royale National Park.

The charter diving industry should take the lead in promoting education on diving hazards presented by the conditions at Isle Royale.

... most of the decompression diving is done by the diver who is not utilizing charter diving services.

... author could or would recommend ... the development of minimum equipment requirements for those divers who are planning decompression dives (Stinson 1981:3-4, 6-11).

Current Park management has recognized some general trends in scuba diving activity at Isle Royale. "During the sixties and seventies patterns joined showing significant changes of how the Park was being used. Backpackers were more numerous, lodge guests and boaters fewer in number. Specialty groups such as canoeists, scuba divers, sailboaters ... increased in number and became important users ... Recent declines, 1980-1985, have affected all user groups" (Hobbs 1986:26). "Divers have been consistent users of Isle Royale during the 1980s and have not diminished in number in proportion to overall visitation which is down" (Weber 1986:Part IV).

A study of Isle Royale scuba diving use was completed by the SCRU in January 1987. Information from all Isle Royale scuba diving permits issued during 1980 through 1986 was loaded into a relational-database computer program. Results from 2,801 divers completing 15,936 dives at Isle Royale are listed in the following tables. Some results are differentiated for divers using private or rental boats and divers using commercial dive charter boats.

1) Scuba Diver Length of Stay
   Charter Boats: 3.8 (1980) to 4.4 (1982 & 1986) days.
   Private Boats: 2.4 (1980) to 3.6 (1982) days.

2) Average Number of Divers per Permit
   Charter Boats: 6.2 to 6.8 Divers
   Private Boats: 3.0 to 3.8 Divers

3) Diver Days as a Percentage of Non-Lodge Overnights and Boater Overnights

"Diver Days" ranged from 2.5% (1980) to 4% (1984) of total yearly Isle Royale "NPS or Non-Lodge Overnights"

"Diver Days" ranged from 12% (1980 & 1983) to 18.5% (1984) of total yearly "Boater Overnights"

4) Number of Divers as a Percentage of Total Isle Royale NP Visitors and Total Boaters

"Number of Divers" ranged from 2.5% (1980-82) to 4% (1984) of total yearly "Isle Royale NP Visitors"

"Number of Divers" ranged from 11% (1983) to 17.5% (1985) of yearly "Total Boaters"

5) State of Origin (2801 Divers)

Minnesota	45.0%
Michigan	15.5%
Illinois	13.5%
Wisconsin	9.0%
Ontario	9.0%

6) Metropolitan Area of Origin (2049 Divers)

Minneapolis/St. Paul, MN	32.0%
Chicago, IL	12.0%
Duluth, MN	7.5%
Thunder Bay, ONT	7.0%
Detroit, MI	5.0%

7) Other Cities, Towns or Rural Areas of Origin (752 divers)

State	# Of Divers from Other Cities/Rural	% of State total (from #5)
Michigan	199	46%
Wisconsin	177	70%
Minnesota	88	7%
Illinois	52	14%
Ontario	49	20%

8) Dive Location Popularity (15,936 Dives on 37 Individual Sites)

AMERICA	30.0%
EMPEROR	26.0%
CHESTER CONGDON	14.0%
GEORGE M. COX	8.0%
MONARCH	6.5%
HENRY CHISHOLM	5.0%

The remaining four major shipwrecks and Five Finger Tug received 8.5% of total dives at Isle Royale NP. Other dive sites listed by geographical location had less than 2% of total dives.

9) Dives on Northside Shipwrecks

Scuba dives on EMPEROR, CHESTER CONGDON, MONARCH, KAMLOOPS and Five Finger Tug totaled 48.5% of total dives at Isle Royale NP.

10) Dives on Southwest End Shipwrecks

Scuba dives on AMERICA, GEORGE M. COX, HENRY CHISHOLM and CUMBERLAND totaled 47% of total dives at Isle Royale NP.

11) Dive Location by Transportation Type

Shipwreck	% Of Total Charter Dives	% Of Total Private Dives
AMERICA	31.0%	28.0%
EMPEROR	28.0%	23.0%
CHESTER CONGDON	13.0%	16.0%
GEORGE M. COX	8.5%	7.5%
MONARCH	6.5%	7.0%
HENRY CHISHOLM	5.5%	4.5%
CUMBERLAND	3.5%	3.5%
GLENLYON	2.0%	2.5%
Five Finger Tug	1.0%	0.2%
ALGOMA	0.5%	3.0%
KAMLOOPS	0.0%	2.5%
	99.5%	97.5%

12) Proposed Versus Actual Dives

Total Proposed Dives	3,959
Dives Actually Completed	3,584
Percentage Actually Completed	90.5%

EMPEROR showed the least variance between proposed (planned) and actual dives, while GEORGE M. COX, GLENLYON, KAMLOOPS and ALGOMA had the greatest variance.

13) Total Dives Per Year

1986	2258
1985	2703
1984	2758
1983	2324
1982	2127
1981	2085
1980	1681
Total	15,936

14) Most Popular Diving Months

August was the most popular scuba diving month for 4 years and July for 3 years. July and August registered between 63% (1986) and 89% (1983) of total yearly dives. July, 1982 had 49% of that year's total dives, the largest single month percentage. No other month besides June (1980 & 1986), July or August registered greater than 20% of a year's total dives. Permits showed scuba diving activity during months of April through October. A breakdown of monthly scuba diving in terms of transportation type showed July or August as the most popular commercial dive charter month for each year except June, 1986. Divers using private or rental boats visited Isle Royale predominately in July and August.

Management uses of statistical data in a relational format can be illustrated by examples from this study. EMPEROR and CHESTER CONGDON (located within 1 1/4 miles from each other) received 40% of total Park scuba dives during 1980 through 1986. A large percentage of that activity took place during July and August. Public safety information provided during diver registration should emphasize these shipwreck sites. Law enforcement patrols, including surveillance operations, may also be most cost effective on EMPEROR and CONGDON during July and August. The same suggestions are valid for AMERICA, located in the West District, which received 30% of the total Park dives for the study period.

Public relations information regarding scuba diving safety, accident protocol, Park regulations or other topics can be be disseminated more effectively when based on a statistical study. Metropolitan areas of Minneapolis/St. Paul and Duluth provide 87% of Isle Royale scuba divers from Minnesota. Use of mass media should concentrate on these cities. On the other hand, metropolitan areas of Milwaukee, Green Bay and Superior only provided 30% of Isle Royale scuba divers from Wisconsin. Broader based media with a more rural approach would be most appropriate here.

Over twice as many dives took place from commercial charter boats as from private or rental boats. A good working relationship with commercial dive charter operators is essential to accomplishing Park objectives of artifact protection, optimal diving accident response and excellent visitor safety records.

A final note is necessary regarding the Stinson Islé Royale visitor survey on scuba diving (Stinson 1981). This study ranked GEORGE M. COX as the second most dived site, which differs greatly from information presented here. The difference was probably due to a small sample size, bias in the survey sample or method of data tabulation used by the Stinson study.

A complete copy of the Southwest Cultural Resources Center Special Publication Isle Royale National Park Scuba Diving: A Visitor Use Study (Vrana and Panowski 1987), can be obtained from the Center. The report includes an overview of the relational-database program used, a description of data entry, detailed results and a summary of management uses for the results obtained through the study.

A survey of Great Lakes scuba divers conducted by the Michigan State University Department of Park and Recreation Resources may have validity for Isle Royale National Park. During the summer of 1978, scuba divers from Michigan, Ohio and Indiana were systematically selected

> to receive questionnaires aimed at eliciting information pertaining to the general characteristics, opinions and diving habits of the scuba diving population ... In general, divers have been involved in the sport for approximately four years, prefer a diving depth of 75 feet, and have invested approximately $500 in diving equipment. Shipwreck divers vary somewhat from these general patterns. They have been

diving for a greater number of years, have achieved higher levels of certification, and have invested more money in equipment than their non-shipwreck diving counterparts.

In considering the extent the State government should be involved in regulating activity around shipwrecks, shipwreck divers tend to show greater concern for Michigan's shipwreck resources than non-shipwreck divers. Although most divers favor some restrictions on salvaging shipwreck booty, shipwreck divers agree more strongly that designating certain areas as protected areas would help preserve these resources from further degradation (Lothrop 1979).

Dredging of Park Bottomlands

Dredging of Park bottomlands is accomplished by use of Isle Royale NP Maintenance Division equipment and personnel. Permits for dredging are acquired through application to the State of Michigan Department of Natural Resources, under provisions of The Great Lakes Submerged Lands Act (Public Act 247, 1955). A public comment period for adverse action is part of this process. U.S. Corps of Engineers regulations may also apply. Primary reasons for dredging include removal of accumulated materials around docks and construction projects having underwater components. Dredge spoil material is deposited in designated disposal sites shown on the permit. Work is supervised by the Isle Royale NP Facility Manager and Maintenance Foreman.

Strong cooperation between Maintenance and Ranger Division personnel is vital for protection of submerged cultural resources. Past problems with this relationship have lead to destruction of irreplaceable historic and/or prehistoric site information. Current Park policy calls for review of dredging permits by the Chief Ranger and Cultural Resources Specialist before initiation of the work project. On-site inspection for artifacts is accomplished prior to dredging or during removal of spoils.

Human Remains on Shipwrecks

A sensitive issue for Park managers involves the disposition of human remains on shipwrecks. Four Isle Royale shipwreck events resulted in loss of life. Remains range from bones of ALGOMA victims to fairly intact bodies aboard KAMLOOPS. A crewman's body discovered in 1975 on EMPEROR became a sport diving attraction. Later that year, an attempt by the National Park Service and a regional dive club to remove these remains was unsuccessful. Arrangements had been made to issue a death certificate with transfer to Canada Ministry of Transport officials for identification and notification of next of kin. Rumors circulated that divers were mutilating the body and disturbing it for photography. In response to these stories, a Thunder Bay, Ontario dive club removed the crewman's remains from EMPEROR in 1976. It was deposited in deep water, with comparison to burial at sea (Isle Royale NP Case Incident Record, Aug. 8, 1976 and Isle Royale NP Correspondence, Aug. 16, 1976).

Because of extreme depth, bodies aboard KAMLOOPS have been less of a serious issue with sport diving. Divers equipped for deep diving have occasionally returned with photographs or film of various human remains. In 1986, the NPS with assistance from the National Geographic Society videotaped an engine room torso with use of a Remote Operating Vehicle (ROV). As underwater technology progresses and increased depths become attainable by sport divers, bodies on KAMLOOPS may command the same attention as the EMPEROR incident. Although Isle Royale NP staff downplay human remains on shipwrecks, no policy regarding their disposition is acknowledged.

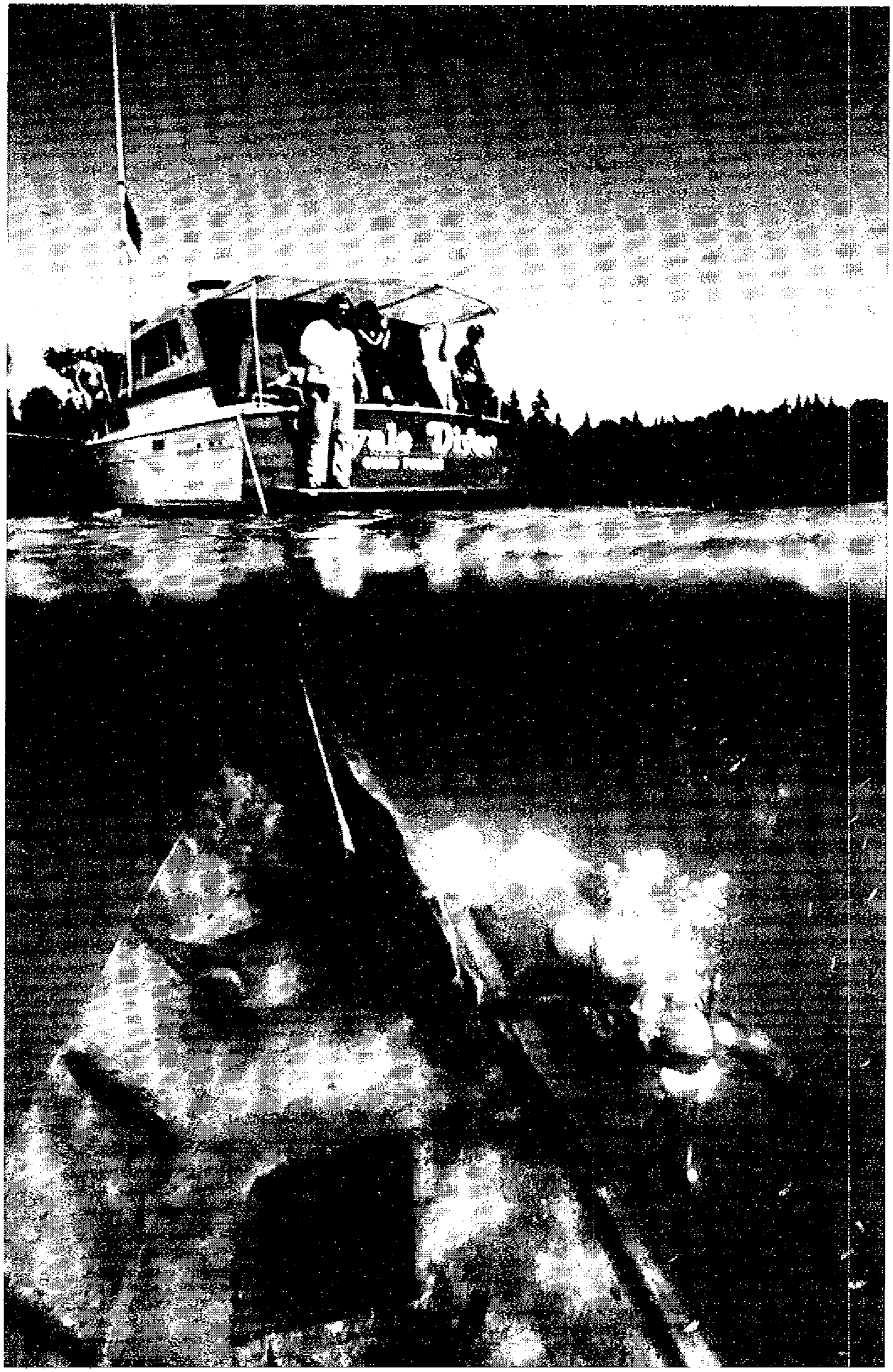


Fig. 7.1. Sport diving is a major visitor use category at Isle Royale National Park. A Visitor begins a descent on the wreck of AMERICA from a commercial charter boat. Photo by Mitch Kezar.

ISLE ROYALE NATIONAL PARK

NOTICE

This mooring was installed to provide safer diving and to minimize damage to submerged cultural resources by eliminating anchoring within the shipwreck area.

1. All divers must pre-register at any Ranger Station.
2. At least one capable operator should remain on the dive boat at all times.
3. Use of this mooring buoy is limited to registered divers during actual dive operations; not to be used overnight, during rough seas, high winds, or while fishing.
4. No more than three (3) boats at any one time on the mooring.
5. Check mooring lines and hardware during descent.
6. All shipwreck features, parts, artifacts, and debris are protected by Federal law. Please leave these for others to enjoy.
7. Report all diving accidents or illnesses immediately to park rangers. They can provide emergency care and arrange for transport to recompression chambers.

Fig. 7.2 This notice is fixed to mooring buoys over wreck sites at Isle Royale.

Fig. 7.3.

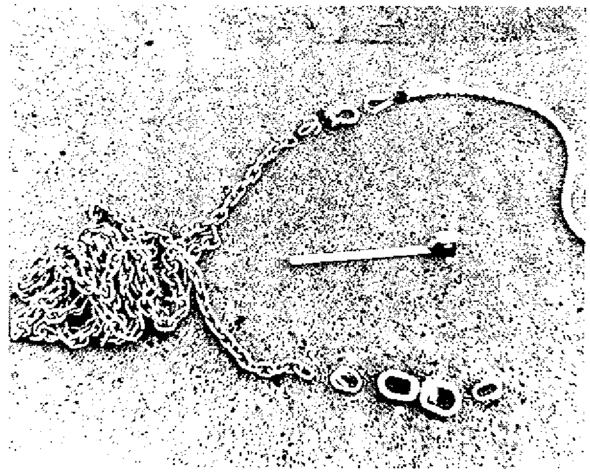


Fig. 7.4.

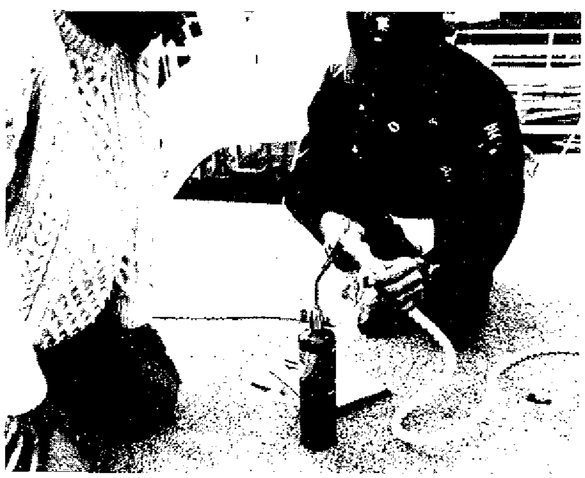


Fig. 7.5.

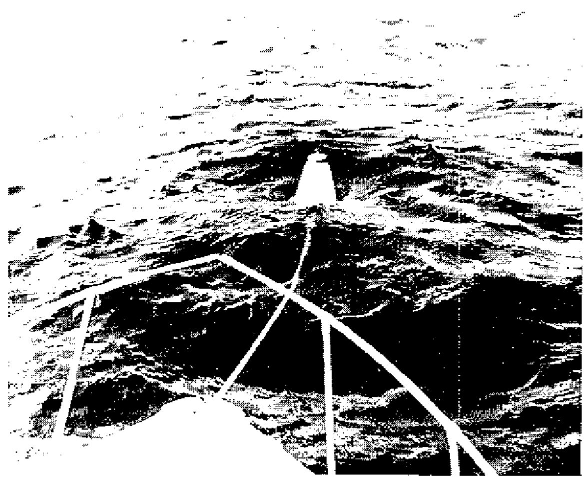


Fig. 7.6.

Fig. 7.3-7.6. District Ranger Jay Wells preparing buoy for placement on wreck site. 7.6- Buoy in use. NPS photo.

Fig. 7.7. "Underwater Mule" Park maintenance and protection staff designed this homemade lift apparatus to precisely place mooring buoy weights underwater. NPS photo by Joe Strykowski.

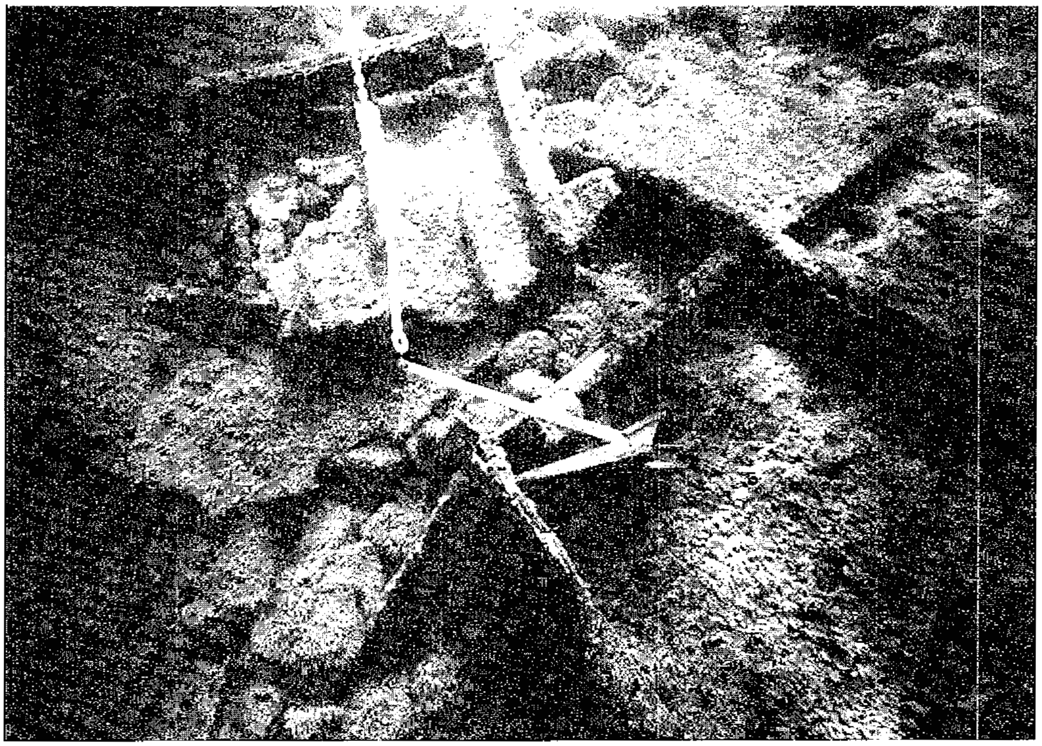


Fig. 7.8. Anchor damage on wreck sites is one of the adverse impacts that the mooring system helps mitigate. NPS photo.

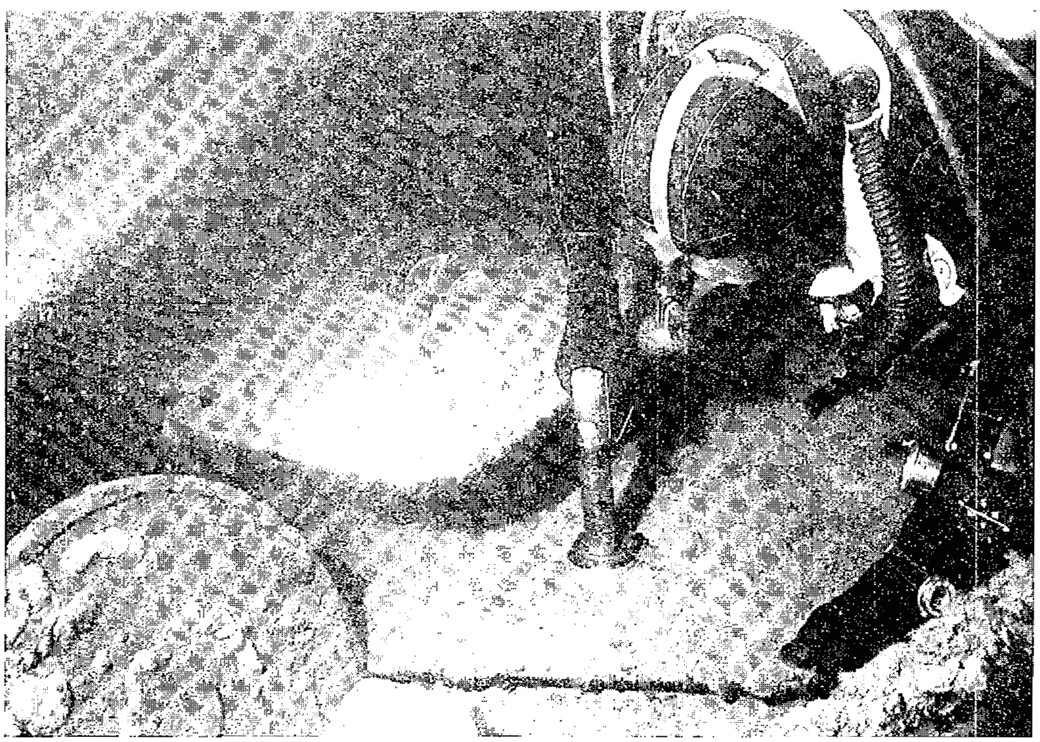


Fig. 7.9. Submerged Cultural Resource Unit diver placing a trail marker on site of MONARCH. NPS photo by Toni Carrell.

Fig. 7.10. Shipwrecks continue to be a part of the Isle Royale management experience. Park Rangers respond to "May Day" from passenger vessel Isle ROYALE QUEEN in 1982. Photo by Mitch Kezar.

CHAPTER VIII. CONCLUSION

Introduction

The Isle Royale project is over; this report marks the last official act of a prototype study of submerged cultural resources in a national park. Although there are exciting new possibilities for further research on submerged archeological sites at Isle Royale and other parks in the Great Lakes area, those happenings will comprise chapters of a different book, probably written by different people. It is incumbent upon us to share some observations from our seven years of part-time involvement with this project, beyond what can be gleaned from the informational and methodological presentations in the body of the report. This section begins with some reflections regarding what worked and didn't work in our experience at Isle Royale, followed by some management recommendations and a discussion of further research potential.

Retrospective

We made some right choices and some wrong ones in the conduct of this project. Among the former was the decision to be highly interactive with the Park Superintendent and staff; an important "right choice" that was instrumental in keeping our mistakes at a reasonable level. Isle Royale is not the place to work in a vacuum, regardless of the experience and technology you may have at your disposal. The knowledge gleaned from "locals," i.e. charter captains, sport divers and fishermen, about the whereabouts of sites, and tips on when and how to safely examine them, were invaluable.

Our decision to employ a "low tech" documentation system based on string and measuring tapes was partly a function of a modest budget. It proved, however, to be an effective approach in a remote Park where a demystified methodology allowed us to easily recruit off-duty rangers, maintenance personnel and volunteer sport divers to assist us in data gathering. The same low budget that helped us make the decision to "keep it simple" also forced us into short, intense field periods, typically running about 3 weeks each year for a total field time of 16 weeks. There was some advantage to short field seasons the first two years when we were still developing our strategies; it gave us time to reflect on our Isle Royale work while we were involved in many other field projects, and probably helped keep us from locking into approaches that were not efficient or cost effective. After the initial phase of the project, however, this proved to be of no advantage. Mobilization and demobilization activities absorbed precious field time; it doesn't take much more effort to mobilize for Isle Royale for two months than it does for two weeks. Also, the pressure to obtain a lot of information in a short time period stressed the researchers and made it an inviting option to push limits of safety and prudence to get the job done. The Lake is not famous for its forgiving nature, and, although we were fortunate to have had no serious accidents, future researchers are encouraged to develop funding parameters that permit longer, easier-going field sessions with ample time for recuperation between dives. It would also be advantageous to have a team that could work full time on the project, rather than three to four people able to devote only one-fourth time, which was the state of affairs for this study. If we had it to do over again and budget permitted working full time at Isle Royale, we would execute the operation in three to four years: one month in the field the first year, three months the second, and a one month follow-up the third year. Writing would be completed the fourth year.

Other approaches that proved effective included emphasizing the use of diving scientific illustrators in association with videotape as a documentation strategy. Although underwater still photography certainly played an important role in the final report presentation for this project, the prime information generators for the graphics were hard-swimming illustrators backed by analog image acquisition from video. The original video system used in the project was dependent on a hard-line cable to the surface and helmet communication to apprise the diver of what was actually being taped. The camera contained no monitor, so taping was in the blind. Although this approach was immediately anachronized when low-priced, self-contained color systems with underwater monitors became available in 1983, the old unit had already helped greatly in the analysis of many of the shipwreck sites.

Among the things that didn't work so well at Isle Royale was an attempt to obtain a good photographic image of the relationships of the three shipwrecks at Rock of Ages from an aerial perspective. Two days were spent in laying plastic jugs around the perimeter of the sites, with each site color-coded: a bright red for COX, white for CHISHOLM, etc. A seaplane was then hired to circle the lighthouse and reefs while research team members shot rolls of film and ran video cameras through ports in the aircraft. In short, the effort was a complete failure with the only benefit being that the principal investigator learned an expensive lesson about proportional size in aerial imagery. Milk jugs were magnitudes too small for the purpose. It would have been considerably more appropriate to use objects the size of milk cows to accomplish the objective. Future researchers are encouraged to try again, but be advised that the distances and light conditions at Isle Royale compel a project of greater scope than we had envisioned.

At the end of the Isle Royale project, the research team was given access to Remote Operated Vehicle (ROV) technology with which it heretofore had no experience. An ROV is a cable-tethered submersible robot that is operated from a surface vessel. NOAA Sea Grant funding enabled access to RV SEWARD JOHNSON for two days in 1985 with its ROV and submarine, SEA LINK. In 1986, the National Geographic Society contributed two miniaturized ROVs and a team of technicians to the Isle Royale project for a week. In the latter case the ROVs were deployed in tandem from a small (32') Park patrol boat; a contrast to the previous year's work with the 170-foot SEWARD JOHNSON. The difference in success and cost-effectiveness was remarkable, with the second year's activity being dramatically superior in both areas. SEWARD JOHNSON is an impressive research vessel, but its very size and complexity in configuration made it less useful in nearshore environments. Unfortunately, most shipwrecks don't occur in deep open water, far from dangerous reefs or underwater obstructions. Because of the concerns of the ship captain with reefs and the submarine operators' reluctance to "fly" near underwater entanglements, the limited vessel time had to be applied to our fourth level of priority --- a search for additional remains of ALGOMA. The vessel captain and vehicle pilots made professional judgments about the risks involved in the other sites and decided that they were not acceptable. This was partly due to the nature of the specific hardware they had on board, and partly because they felt more information was needed, such as comprehensive side-scan sonar coverage on the sites, before deployment of the submersible. The operation might be judged a failure, but, if so, it was an instructive failure. RV SEWARD JOHNSON could probably be a useful research tool at Isle Royale with some changes in approach gleaned from the problems experienced in 1985. Underwater archeology cannot just be tagged onto oceanographic ventures without significant communication between the archeologists and shipboard technical personnel in the early planning stages. There must be respect for the different constraints and needs that accrue from historic shipwreck investigations, from project conception through execution. With the right preparation and communication, the use of the manned submersible could provide important information obtainable in no other fashion.

In contrast to the difficulties experienced with SEWARD JOHNSON was the dramatic success that devolved in 1986 from the use of miniaturized ROVs operated from Park patrol boats. KAMLOOPS, which was the first priority for the 1985 investigations, was surveyed in 1986, and even penetrated by the ROV "pilots." Data generated from these remarkable machines helped answer many questions about the site and permitted the development of artists' perspective drawings.

It is hard to imagine that any future research on the deeper sites at Isle Royale would not involve use of miniature ROV technology after the utility and cost effectiveness of those machines were so dramatically demonstrated.

Management Recommendations

Isle Royale has fast become a prototype for the management of submerged archeological sites in parks and preserves in the United States. The Fathom Five Provincial Park in Tobermory, Ontario, is the only other administrative entity known that has taken an active, positive approach to the management of a large shipwreck population using a conservation ethic. Some states, such as Michigan, are experimenting with an underwater shipwreck preserve concept, and a few other nations, such as Australia, are experimenting with active shipwreck protection, onsite management and interpretation programs.

The key words are active, positive and conservation ethic. If any of those ingredients are missing, the value of the management effort is dubious. It is critical that the sport-diving public comes to learn that the National Park Service as an agency recognizes shipwrecks as historic entities and treats them as they would any comparable historic site on land. The same park concepts that work on dry land apply to underwater preserves. This means active monitoring and protection of sites, positive, open relationships with the sport-diving community and the practice of, as well as enforcement of, a conservation ethic. Merely designating preserves without follow-up through on-site management is of questionable value. Rhetoric used by commercial treasure hunting organizations in their bids to influence legislation and public opinion has focused on the apathy of various governmental agencies, state and federal, toward underwater sites management. Commercial treasure hunting organizations have also succeeded, in many cases, in convincing the diving public that they, rather than the "archeocrats" and managers in agency bureaucracies, are their natural allies. The false and ironic nature of that fanciful alliance is best dealt with by creating situations in which it is clear that the historic patrimony of a nation should be publicly owned, whether or not it happens to be wet. The bottom line is that shipwrecks in national parks will be there for present-day divers' children to dive on; those that have been destroyed by commercial salvage or slow attrition by weekend vandals will not.

Perhaps the most important management tool for shipwreck sites in parks is interpretation. The mooring buoy system presently being implemented at Isle Royale establishes beyond a shadow of a doubt, to the responsible as well as the ill-intentioned, that they are diving in a park. It also provides an additional degree of safety for the public, because the buoys can serve as spatial references in a sometimes disorienting underwater world. These same references provide a focus around which an interpretation program can be built. A variety of approaches can then be employed to enrich the visitor experience on the underwater cultural sites. It is crucial, however, that these interpretive devices be based on thorough research of the resources and balanced in their approach to target groups based on experience and capabilities.

The second aspect of a pro-active management approach to underwater sites is consistent, strict enforcement of antiquity violations. A judgmental estimate of the percentage of individuals who will behave lawfully and respond to a positive approach at Isle Royale is 90-plus percent. For those others for whom respect for historic sites must be a conditioned response, it is recommended that they be prosecuted to the full extent of the law when apprehended.

Finally, as a general observation, a number of options could and should be made plain to the diving community. The National Park Service's first obligation is to protect and preserve; if that mandate cannot be met through an open, positive relationship with any segment of society, it may choose more negative and restrictive approaches.

Land-associated sites were closed in 1986 by Superintendent's orders. This decision was made by Park management because the submerged components of land sites, largely untouched by divers so far, have considerable archeological value, and are very vulnerable to attrition from collecting. It was also felt that they presented a much less impressive experience to divers than shipwrecks, and the threats outweighed the potential benefits to the public. If the shipwreck resources suffer significant attrition from the increased accessibility and enhanced interpretive programs, then selective or complete closing of dive sites might be in order. Experience has shown that the easiest regulation to enforce on underwater sites is the most comprehensive. It may be difficult to prove a particular artifact came from a specific wreck, but it is easy to prove that someone has been diving in an area closed to that activity under the aegis of the Code of Federal Regulations.

It is very unlikely that such moves would ever have to be taken at Isle Royale given the excellent communication that exists between the diving public and the Park, but it is important that it be understood that restriction would be the only responsible option the Park would have if the situation got out of hand.

The documentation of KAMLOOPS from the ROV study in 1986 revealed the problems and benefits associated with the interactive philosophy that typifies Isle Royale management's open relationship with sport divers. The unblinking eye of the video camera panned over several areas where the ship had been vandalized by sport divers. The saddest example was the empty bracket where at one time the port running-light of KAMLOOPS was intact; it is now apparently a trinket in some diver's home, viewed only by friends, if at all. By contrast the ROVs also sent imagery back to the surface of a chain and lock that fixes the auxiliary steering wheel of KAMLOOPS to the ship. The chain had been attached by sport divers, of their own volition at considerable personal risk and expense, to help preserve the integrity and ambience of the extraordinary site.

This entire positive management approach is dependent on several realities at the Park level. Most importantly, the Superintendent and staff must be conscious of the nature and importance of the underwater historical-resource base at Isle Royale. To make this awareness into a commitment, it is critical that Park staff be encouraged to dive on, monitor, and be familiar with, each submerged site. The entire management approach, already begun in the Park and advocated here, is meaningless if there are no Park rangers capable of diving on the sites.

There are four separate references to Isle Royale National Park shipwrecks in the 1983 Subcommittee on Oceanography hearings in the U.S. Congress. The Park has been identified by many as a leader in the field of underwater sites management, including the Congressional Office of Technology Assessment in its 1986 report on preservation technology. There is a certain responsibility that devolves from this sort of trust, and it would be detrimental to submerged resources management, well beyond this one Park, if the ball is dropped.

A major shipwreck management issue at Isle Royale, which needs to be addressed more directly now that divers are increasing penetration activities on the deepest sites, is that of the disposition of human remains. The "Present Day Management" section of this report (Chapter VII) demonstrates clearly that Park managers have been sensitive to this question and have tried to deal with the problem informally using resources they had access to -- the diving community and their own Park divers. There has been an understandable reluctance to raise a thorny problem when it was receiving minimal attention, and a few discrete actions could eliminate the presence of remains in the most easily accessible areas of the wrecks.

This situation is changing, however, and the inescapable truth is that there are human remains in the Park that are subject to increasing disturbance and inappropriate treatment. Graphic proof of this was obtained when one of the ROVS on KAMLOOPS penetrated the engine room and recorded a sopified human body. The decision was made not to print the electronic images of the body in this report, because it was felt it would not convey information appropriate to an unrestricted audience and would comprise more spectacle than education. Unfortunately, the remains have a gruesome fascination because of their unusual state of preservation, and they invite abuse, some of which has been documented by Park rangers.

Our recommendation is that action eventually be taken to remove the remains and dispose of them in deeper water. If legal constraints compel the examination on the surface by a medical examiner or burial on land, only then should such action be taken. The presence of human remains in archeological sites has been the focus of much attention as it applies to Native Americans in prehistoric contexts (e.g. Keel 1986). Certainly in a situation where there may be living relatives of Canadian nationality involved, the correct treatment of such remains is similarly important. Retrieval of the deep-water remains would be a technically challenging and expensive undertaking, but one that might be accepted as a training mission by the U.S. Navy or large commercial firm that was interested in performing a public service while training its mixed-gas divers.

Other shipwreck sites where the question of proper disposal of human remains has been raised include naval vessels such as USS ARIZONA, USS MONITOR, and other Civil War and World War I and II vessels. For a discussion of this issue, the reader should refer to the paper by Dr. Winthrop Brainerd entitled "Recommendations Concerning the Proper Disposition of Human Remains in National Marine Sanctuaries" (Brainerd 1986).

The last general issue that will be discussed in this section is that of visitor safety. Should there be any modification in the present management strategies for preventing or reacting to diving accidents? For the most part, the answer is no. The Park has demonstrated a strong consciousness of this problem and has approached it realistically, and in accordance with all community standards for safety. It is important, however, that an ongoing program of training in the management of diving accidents is maintained at the Park, and it never becomes possible that an unanticipated personnel transfer could cripple the necessary emergency response capability. Some of the most serious sport diving in the United States takes place in this Park, and it is only prudent to keep intact a viable response capability to accidents.

It is also recommended that the buoy system (partially in place at the writing of this report) be fully installed, because of the extra measure of safety and control offered by this management approach. Buoys should not be installed on KAMLOOPS or the stern of CONGDON, because diving these sites should not be encouraged due to their extreme depth. The combination of cold water and dive targets beyond recognized sport-dive limits of 130 feet deep is bound to result in problems. The Park has made a reasonable exception by buoying the CHISHOLM engine in 140 feet of water. This site is a magnificent dive, and it can be enjoyed by circling the top of the engine at 110 feet. Although diving the deepest sites should be discouraged, it is not recommended that the areas be put off-limits to diving. 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. It should be made clear, however, that the same legal protection for the archeological integrity of the sites that applies on the shallow sites extends to the deeper ones.

The system of having divers sign waivers when they register that absolve the Park from carrying out deep-water body recoveries at Government expense should be considered. Although it is a grim prospect to have to burden a bereaved family with a heavy expense for body recovery, there is good rationale for it. The community standards of all sport diving agencies would prohibit making such dives, and it is unreasonable to expect the agency to absorb expenses for mixed-gas diving or support facilities to recover a diver from the bow of KAMLOOPS in over 250 feet of frigid water. Leaving them there is not a viable alternative either; prior experience at Isle Royale and with the Florida cave diving community indicates that a diving victim becomes a fascinating lure, in some macabre sense, that attracts attempts at recovery as long as it is there.

Future Research

The inevitable question arising when one has finished an inventory of known sites is: what about the ones that have not been found? It is safe to say that there is much potential for new submerged archeological discoveries at Isle Royale. The further one journeys in the direction of specificity on that issue, the more one begins to pay court to raw speculation.

The historical record clearly indicates that there was a considerable amount of past cultural activity that has not been accounted for in the archeological record; i.e. we have not found a good number of sites that should have left clear residues in the ground or on the lake bottom. The full spectrum of missing historic sites includes entire vessels that have been documented as lost near Isle Royale, as well as sections of the known vessels we have mapped (see Table 8.1).

Certainly many submerged areas associated with historic fishing, mining, and resort activity on land have not yet been located or even looked for. The prehistory of the archipelago is also a book that is yet to be written, and much of the residues of behavioral patterns preceding European contact will eventually be found underwater.

We can anticipate that in future years the remains of several ships will be discovered, either through a systematic survey by the Park Service or through the efforts of sport divers. A listing of potential sites is presented in this chapter, but at the writing of this report they only exist in the realm of the historical record. If and when their existence is confirmed, some of them will be important sites for archeological documentation. Perhaps none of the possibilities is more compelling to the maritime archeologist than finding MADELINE, or some other vessel tied to the early fur trade era. Mansfield (1899) lists a number of wooden vessels employed by Northwest Fur Company in the area during the later Eighteenth and early Nineteenth Centuries. The loss of one or more of these craft in their travel between Fort William and Sault Ste. Marie is possible. American Fur Company papers refer to the loss of MADELINE at Isle Royale in 1839.

Some other possibilities are particularly provocative because of the significance of the vessels; e.g., the schooner COMRADE, which vanished in 1890, possibly in the vicinity of Isle Royale. Certainly PRINDOC, if found, would be of value as an object of study and Park interpretation.

Research results for this report also indicate that significant portions of some of the major shipwrecks documented in this study have not been located in the main wreckage fields. Eventually, someone will find more of the bows of MONARCH and CUMBERLAND. Significant superstructure from a majority of the wrecks at Isle Royale is also still missing. The ALGOMA bow, although still elusive, may not prove to be the spectacular discovery that has long been anticipated. Analysis of the material record and a rereading of the historical record suggests that the bow may not be the dramatic intact two-thirds of the ship as popular lore would have it, but may actually be broken up in an area south and west of the stern wreckage field.

Other possibilities become compelling just because of the comparative ease of confirmation, should a moderate amount of time and effort be expended. The location of GEORGE HAND is so clearly indicated that the high probability areas could be examined by a research team in one or two days. Enough incidents have occurred in Washington Harbor that it would be well worth the effort to make one side-scan sonar pass through the harbor to Windigo and back out on the other side of the channel. Any historic shipwreck remains of even moderate size would probably be located with this technology, given the size and bottom configuration of the channel.

The reports by Milford Johnson, Sr. of torn and rust-stained nets being removed from some obstacle in approximately 200 feet of water off Captain Kidd Island definitely bear follow-up investigation through remote sensing or divers. If there is something one learns from long association with underwater archeological finds, it is not to discount the observations of local fishermen. A torn net is no small concern for a man who makes his living from fishing, and their observations about where such happenings occur are seldom based on idle fancy. Routine aerial flyovers by Park staff should also prove revealing, if the possibility of new wreck discoveries is always kept in mind.

The list of "possibles" is extensive, as Table 8.1 illustrates. The question of how to approach establishing management control over these sites is a dynamic one; the conditioning factors change over time. The options include conducting full scale in-house surveys, partial in-house surveys, contracting out such activities, encouraging discovery by sport divers, and on the other end of the scale, being totally restrictive about further new site discovery activities. The answer is not an easy one and depends largely on the nature of the relationship that exists between the Park and the diving community. The final deciding factor should always be "what is in the best interest of the resource and its long-term enjoyment," with all management decisions predicated on the answer to that question.

Perhaps the best strategy to adopt toward the diving community at the writing of this report is an open one, and one that de-emphasizes additional efforts by professionals, except in those cases where truly cost-effective "windows of opportunity" present themselves. Visiting divers should be encouraged to continue enjoying the wrecks in a safe manner, and those who have consistently demonstrated a conservation ethic and commitment to the management philosophy of the Park over the years should be encouraged to continue looking for new sites. Such discovery activity, however, causes certain risks to the resource; inevitably a "found" shipwreck is more subject to impact than one whose location is still a mystery. When something new is found, it should be made clear that the first to be notified is the Park management, and any indications that this trust has been violated should be dealt with firmly. Divers should be encouraged to conduct their searching activities through a Park staff designate of the Superintendent. Although it is sometimes a difficult regulation to enforce, divers should be reminded that engaging in search for antiquities on federal land without a permit is a violation of federal law. Towing remote-sensing instruments behind a boat could reasonably be construed as engaging in such activity. If the searching is being done with good intentions, why not do it openly and under permit? If necessary, it should be noted that 36 CFR, Part 2, Section 2.1 (7) specifically prohibits "possessing or using a mineral or metal detector, magnetometer, side-scan sonar, other metal detecting device, or subbottom profiler" in national parks, except during officially authorized activities.

Even after all these caveats, the final recommendation would be to "go for it" in partnership with the sport diving community. The discovery of new shipwreck sites by the Park, or persons or groups working with the Park, is probably in the best interest of the resource base, because it increases the likelihood that newly discovered sites will be brought under management control before they can be severely vandalized. The key to this approach is to allow the thrill of discovery by well-meaning amateurs who are doing so in a framework permitting the agency to exercise management control and stewardship of a site once it is discovered.

Table 8.1. Listing of Isle Royale Shipwrecks and Other Casualties.

LISTING OF ISLE ROYALE SHIPWRECKS AND OTHER CASUALTIES*

VESSEL NAME	OFFICIAL NUMBER	DESCRIPTION	OWNER/MANAGER	PLACE AND DATE BUILT	RELATION TO ISLE ROYALE
MADELINE	None Issued	Wooden Schooner	American Fur Company	LaPointe, WI 1839	Lost at Isle Royale in 1839
SISKAWIT	None Issued	Wooden Schooner	American Fur Company	Probably LaPointe, WI 1839 - 1840	Grounded, 1840 in Siskiwit Bay Recovered in 1841 by JOHN JACOB ASTOR.
LAMPLIGHTER	U.S. Gov.	Wooden Schooner	U.S. Lighthouse Board	Youngstown, NY 1852	Grounded at Isle Royale September, 1857
GEORGE HAND	100998 U.S.	Wrecking Tug	Gilbert & Curry Algonac, MI	Buffalo, NY 1858	Sank at Little Schooner Island August, 1886
ALICE CRAIG	None Issued	Wooden Schooner	Frank Boutin Bayfield, WI	Milan, OH 1858	Grounded on Menagerie Is. October, 1884
JOHN JEWETT	13414 U.S.	Wooden Schooner	Moses Stone Detroit, MI (prob.)	Vermilion, OH 1866	Grounded in Grace Harbor October, 1898
CUMBERLAND	None Issued	Wooden Steamer	Lake Superior Navigation Co. Toronto, Ont., Canada	Port Robinson, Ont., Canada 1871	Sank on reef near Rock Of Ages July, 1877
MAPLE LEAF	None Issued	Wooden Schooner	R.D. Pike Bayfield, WI	Bayfield, WI 1872	Grounded, lost masts/cabin off Isle Royale Sept. 1872
MAGGIE McRAE	None Issued	Wooden Schooner	Capt. J.C. Graham	Dalhousie, Ont., Canada 1872	Reported lost 10 miles off Thunder Cape May 1888.
GOLDEN EAGLE	85213 U.S.	Wooden Work Tug	J. Croze Houghton, MI	Sandusky, OH 1872	Grounded on reef between Grace & Washington Har. August 1892
NORTHERN BELLE	130099 U.S.	Wooden Schooner	James Malone Isle Royale, MI	LaPointe, WI 1877	Sank at Wright Island Winter of 1884-85
CHRIS GROVER	125677 U.S.	Wooden Schooner	M. Daniels Marquette, MI	Lorain, OH 1878	Lost anchor and 600 feet of cable off Passage Is. or Hog Is. November 1895

Table 8.1. (Continued).

2

VESSEL NAME	OFFICIAL NUMBER	DESCRIPTION	OWNER/MANAGER	PLACE AND DATE BUILT	RELATION TO ISLE ROYALE
HENRY CHISHOLM	95610 U.S.	Wooden Steamer	M.A. Bradley Line Cleveland, OH	Cleveland, OH 1880	Sank on reef near Rock Of Ages October, 1898
OSCEOLA	155063 U.S.	Wooden Steamer	Ward's Detroit and Lake Superior Line, Detroit, MI	Bay City, MI 1882	Grounded on Mott Island November, 1898
CONRADE	34132 U.S.	Wooden Schooner Barge	J.C. Gilchrist Cleveland, OH	Buffalo, NY 1883	Lost between Keweenaw Peninsula and Isle Royale September, 1890
ALGOMA	85766 Canada	Steel Steamer	Canadian Pacific Railway Montreal, Quebec, Canada	Kelvinhaugh, Scotland 1883	Sank at Mott Island November, 1885
A.B. TAYLOR	106257 U.S.	Wooden Steamer	Rogers & Bird Saugatuck, MI	Saugatuck, MI 1884	Grounded on Menagerie Is. July, 1890
ST. ANDREW	90694 Canada	Wooden Steam Barge	Playfair & White Canada	St. Catharines, Ont., Canada 1885	Grounded on Passage Island September, 1900
HARLEM	95972 U.S.	Steel Steamer	Western Transit Co. Buffalo, NY	Wyandotte, MI 1888	Grounded on Harlem Reef November, 1898
MONARCH	96843 Canada	Wooden Steamer	Northern Navigation Co. Ontario, Canada	Sarnia, Ont., Canada 1888	Sank at Blake's Point Palisades December, 1906
GEORGE ROGERS	86064 U.S.	Wooden Steam Tug	J.A. Moore Dollar Bay, MI	Toledo, OH 1889	Grounded near Glenlyon Shoal June, 1907
NORTHERN QUEEN	130436 U.S.	Steel Steamer	Mutual Transit Co. Buffalo, N.Y.	Cleveland, OH 1889	Grounded on reef near Rock Of Ages September, 1913
SAINTE MARIE (1)	116574 U.S.	Steel Barge	T.L. Durocher Company Detour, MI	Detroit, MI 1893	Grounded at Isle Royale 1926
GLENLYON	81427 Canada	Steel Steamer	Great Lakes Transportation Co., Midland, Ont., Canada	West Bay City, MI 1893	Sank on Glenlyon Shoal November, 1924
CENTURIAN	126984 U.S.	Steel Steamer	Cleveland Cliffs Iron Co.	W. Bay City, MI 1893	Grounded five miles west of Menagerie Is. Oct. 1895
JOHN B. TREVOR	77173 U.S.	Steel Whaleback Steamer	Pittsburg Steamship Co.	West Superior, WI 1895	Grounded between Grace Harbor and Rainbow Cove October, 1909

Table 8.1. (Continued).

3

VESSEL NAME	OFFICIAL NUMBER	DESCRIPTION	OWNER/MANAGER	PLACE AND DATE BUILT	RELATION TO ISLE ROYALE
FRANK ROCKEFELLER	121015 U.S.	Steel Whaleback Steamer	Pittsburg Steamship Co.	West Superior, WI 1896	Grounded on Rainbow Cove with steel barge MAIDA November, 1905
CITY OF BANGOR	127139 U.S.	Steel Steamer	Lake Transit Co. Bay City, MI	W. Bay City, MI 1896	Grounded on Menagerie Is. Reef December, 1915
MAIDA	92844 U.S.	Steel Schooner Barge	Pittsburgh Steamship Co.	West Superior, WI 1898	Grounded at Rainbow Cove November, 1905
AMERICA	107367 U.S.	Steel Steamer	Booth Fisheries Co. Delaware	Wyandotte, MI 1898	Sank near North Gap June, 1928
GEORGE M. COX	150898 U.S.	Steel Steamer	Isle Royale Transportation Co. of Arizona	Toledo, OH 1901	Sank on reef near Rock Of Ages May, 1933
PRINDOC	116578 Canada	Steel Steamer	Paterson Steamships Ltd. Fort William, Ont., Canada	West Bay City, MI 1901	Sank off Passage Island June, 1943
LUZON	141783 U.S.	Steel Steamer	Morrow Steamship Co. Cleveland, OH	Chicago, IL 1902	Grounded on Passage Island October, 1923
BRANSFORD	3925 U.S.	Steel Steamer	W.A. & A.H. Hawgood Cleveland, OH	W. Bay City, MI 1902	Grounded on Brandsford Reef November, 1909
WILLIAM T. ROBERTS	202866 U.S.	Steel Steamer	American Steamship Co. Buffalo, NY	Wyandotte, MI 1906	Grounded near Blake's Point May, 1917
SIR THOMAS SHAUGHNESSY	203170 U.S.	Steel Steamer	Jenkins Steamship Co.	Wyandotte, MI 1906	Grounded on Passage Island November, 1909
CHESTER CONGDON	204526 U.S.	Steel Steamer	Continental Steamship Co. Minnesota	South Chicago, IL 1907	Sank on Congdon Shoal November, 1918
DUNELM	123950 Canada	Steel Steamer	Inland Navigation Co. Hamilton, Ont., Canada	Sunderland, England 1907	Grounded on Canoe Rocks December, 1910
DANIEL B. MEACHAM	205349 U.S.	Steel Steamer	Frontier Steamship Co. Tonawanda, NY	Ecorse, MI 1908	Grounded on Passage Island July, 1908

Table 8.1. (Continued).

4

VESSEL NAME	OFFICIAL NUMBER	DESCRIPTION	OWNER/MANAGER	PLACE AND DATE BUILT	RELATION TO ISLE ROYALE
EMPEROR	126654 Canada	Steel Steamer	Canada Steamship Lines Montreal, Quebec, Canada	Collingwood, Ont., Canada 1910	Sank on Canoe Rocks June, 1947
STANLEY	212665 U.S.	Wooden Fish Tug	John E. Johnson Isle Royale, MI	Two Harbors, MN 1914	Sank (probably intentional) near Star Island Early 1930s
DAGMAR	213130 U.S.	Wooden Gas Boat	Brazell Motor Freight Co. Grand Marais, MN	Beaver Bay, MN 1914	Lost 1/2 mile northeast of Chippewa Har. June 1935
PEGGY BEE	224145 U.S.	Wooden Yacht	Homer W. Bleckley New York, NY	Watervliet, NY 1917	Burned and sank in Washington Harbor August, 1928
AH-WA-NESHA	240064 U.S.	Wooden Gas Boat	Holger Johnson & Otto Olsen Isle Royale, MI	West De Pere, WI 1922	Abandoned at Chippewa Harbor 1955
KAMLOOPS	147682 Canada	Steel Steamer	Canada Steamship Lines Montreal, Quebec, Canada	Haverton Hill, England 1924	Sank near Kamloops Point December, 1927
FINGERLING	Unknown	Wooden Cabin Cruiser	Park Visitor	Unknown Circa Late 1940s	Burned and sank off Blake's Point 1946
Airplane Frame	U.S.	Float Plane	Unknown	Unknown	Sank off Siskiwit Mine June, 1935
PC 782	U.S. Gov.	Steel Steamer	U.S. Naval Reserve Training Vessel	Unknown	Grounded at entrance to Malone Bay May, 1949
Unknown	U.S. Gov.	Wooden Motor Launch	U.S. Coast Guard Passage Island, MI	Unknown	Burned and sank in Passage Is. Cove 1949
Five Finger Tug	Unknown	Wooden Work Tug	Michigan Tag #66 (1920)	Unknown	Located in Five Finger Bay 1976
Unknown	Unknown	Paint and rust found in fishing nets off north side of Captain Kidd Is. Reported in 1976 by a park commercial fisherman.			

*Compiled by Ken Vrana with assistance from Thom Holden

NOTES: The listing is restricted to vessels with actual or potential remains lying on bottomlands within Lake Superior boundaries of Isle Royale National Park. Mishaps noted as grounded indicate that vessels were later removed from Isle Royale National Park. Name given is based upon vessel listing or contemporary accounts at time of loss or accident. Information was assembled from primary and secondary sources and is not a complete listing of Isle Royale vessel casualties or accidents.

BIBLIOGRAPHY

Abert, J. J.
1848 Commerce on the Lakes and Western Rivers. Letter from the Secretary of War, January 12, 1848. House Ex. Doc. No. 19. 30th Congress, 1st session.

Adams, Charles C.
1909 An Ecological Survey of Isle Royale, Lake Superior. Report of the University of Michigan for the Geological Survey, 1908. Wynkoop, Hallenbech, Crawford, Lansing.

Adams, James T. (editor)
1940 Dictionary of American History. Charles Scribner's Sons, New York.

Aitken, Hugh G. J.
1954 The Welland Canal Co. Cambridge, Massachusetts.

Albion, Robert G.
1938 Square-Riggers on Schedule. Princeton University, Princeton.

American Bureau of Shipping
1900 Rules for Building and Classifying Vessels. American Bureau of Shipping, New York.

1902 1902 Record of American and Foreign Shipping. American Bureau of Shipping, New York.

1917 Rules for Building and Classifying Vessels, 1914-1917. American Bureau of Shipping, New York.

American Fur Company Letters
1834-35 Microfilm copies from the New York Historical Society Collection, Glenn Black Laboratory of Archeology, Ohio Valley-Great Lakes Ethnohistory Archive, Indiana University.

Ancient Workings
1849 Lake Superior Journal 5(6):2. On file Marquette Public Library, Marquette.

Anderson, Romola and R. C. Anderson
1963 The Sailing Ship. Bonanza, New York.

Andrews, Frank
1910 Grain Movements in the Great Lakes Region. U.S. Department of Agriculture, Bureau of Statistics, Bulletin 81. Government Printing Office, Washington, D.C.

Andrews, Israel D.
1852 Report on the Trade and Commerce of British North American Colonies and upon the Trade of the Great Lakes and Rivers. Communication from the Secretary of the Treasury. U.S. Senate, Washington, D.C.

Arthurs, David
1982 Field notes and maps of Star Island reconnaissance survey on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Ashburn, T. Q.
1925 Transportation on Inland Waterways. Transactions of The Society of Naval Architects and Marine Engineers 33:67-90.

Avery, Thomas
1974 The Mystery Ship From 19 Fathoms. Avery Color Studios, Autrain, Michigan.

Babcock, W. I.
1899 System of Work in a Great Lakes Shipyard. Transactions of the Society of Naval Architects and Marine Engineers 7:173-188.

Baggley, George W.
1927 Report to Director, July 28, 1937. Document on file, National Park Service, Washington, D.C.

Baier, Louis A.
1955 Contributions of the Department of Naval Architecture and Marine Engineering to Great Lakes Shipping. University of Michigan, Ann Arbor.

Baker, W. A. and Tre Tryckare
1965 The Engine Powered Vessel. Crescent, New York.

Ballert, Albert G.
1962 Bibliography, Great Lakes Research Checklist. Great Lakes Commission, Ann Arbor.

Barkhausen, Henry N.
1947 Great Lakes Sailing Ships. The Ships and Sailing Albums Book 2. Kalmbach, Milwaukee.

Barnaby, K. C.
1962 The Institution of Naval Architects 1860-1960. Allen and Unwin, London.

1964 A Hundred Years of Specialized Shipbuilding. Hutchison, London.

Barry, James P.
1973 Ships of the Great Lakes. 300 Years of Navigation. Howell-North, Berkeley.

Barton, John Kennedy

1914 Naval Reciprocating Engines and Auxiliary Machinery; Textbook for the Instruction of Midshipmen at the U.S. Naval Academy. 3rd ed. rev. by H.O. Sticknay. Annapolis.

Bass, George

1966 Archaeology Under Water. Fredrick A. Praeger, New York.

1983 A Plea for Historical Particularism in Nautical Archaeology. In Shipwreck Anthropology, edited by Richard A. Gould, pp. 91-104. School of American Research/University of New Mexico Press, Albuquerque.

Bastian, Tyler

1961 Trace Element and Metallographic Studies of Prehistoric Copper Artifacts in North America A Review. In Lake Superior Copper and the Indians, edited by J. B. Griffin, pp. 151-175. University of Michigan Museum of Anthropology Papers 17, Ann Arbor.

1963 Prehistoric Copper Mining in Isle Royale National Park, Michigan. Ms. thesis, University of Utah.

Bearss, Edwin C.

1966 Hardluck Iron Clad. The Sinking and Salvage of the Cairo. Louisiana University Press, Baton Rouge.

Beasley, Norman

1930 Freighters of Fortune: The Story of the Great Lakes. Harper & Brothers, New York.

Beckles, Henry aka Beckles, Wilson

1900 The Great Company 1667-1871, 2 vols. Smith, Elder & Company, London.

Benson, Barbara E.

1976 Logs and Lumber: The Development of the Lumber Industry in Michigan's Lower Peninsula, 1837-1870. Unpublished Ph.D. dissertation. University Microfilms, Ann Arbor.

Blue Book of American Shipping

1900 Marine Review Publishing, Cleveland.

Board of Engineers for Rivers and Harbors

1930 Transportation on the Great Lakes. Transportation Series No. 1. War Department. Government Printing Office, Washington, D.C.

Board of Lake Underwriters

1866 Rules Relative to the Construction of Lake Sail and Steam Vessels. Matthews and Warren, Buffalo.

Bowen, Dana Thomas

1940 Lore of the Lakes. By the Author, Datona Beach.

1952 Shipwrecks of the Lakes. By the Author, Daytona Beach.

Boyer, Dwight
1968 Great Ships of the Great Lakes. Dodd, Mead and Company, New York.

1971 True Tales of the Great Lakes. Dodd, Mead and Company, New York.

1977 Ships and Men of the Great Lakes. Dodd, Mead and Company, New York.

Brady, Edward M.
1960 Marine Salvage Operations. Cornell Maritime Press, Cambridge.

Brainerd, Winthrop
1986 Recommendations Concerning the Proper Disposition of Human Remains in National Marine Sanctuaries. Ms. on file, National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, Washington, D.C.

Brown, Oliver G.
1910 Report of Inspection, Passage Island Light, Lake Superior, Michigan. U.S. Department of Commerce and Labor, Bureau of Light-Houses, Washington, D.C.

Brown, W. Russell
1945 Ships at Port Arthur and Fort William. Inland Seas 1:45-51.

Bryan, William
1896 The Western River Steamboat. American Society of Mechanical Engineers Transactions 17:386-397.

Bryant, H. C., Thomas C. Vint, and John D. Coffman
1935 Report on Isle Royale, Part 1 Isle Royale Administration and Personnel Inspections and Investigations by Headquarters Officers, July 15, 1935. Document on file, National Park Service, Washington, D.C.

Bryce, George
1900 The Remarkable History of the Hudson's Bay Company, Including that of the French: Traders of North-Western Canada and of the North-West, XY, and Astor Fur Companies. London.

Bureau Veritas International Reporting of Shipping
1913 Rules and Regulations for the Building and Classification of Steel Vessels Intended for Inland Navigation. Bureau Veritas International Reporting of Shipping, London.

Burke, John A.
1975 Barrels to Barrows, Buckets to Belts: 120 Years of Iron Ore Handling on the Great Lakes. Inland Seas 31(4):266-277.

Butler, B.S. and W. S. Birbank
1929 The Copper Deposits of Michigan. U.S. Geological Survey Professional Paper 144, Washington, D.C.

Carrell, Toni
1983 Shipwrecks of Isle Royale National Park, Thematic Group Nomination to the National Register of Historic Places. National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

1986 Management Strategies for Shipwrecks on Submerged Public Lands. In Underwater Archaeology: The Proceedings of the Fourteenth Conference on Underwater Archaeology, edited by Calvin R. Cummings, p. 44. Special Publication 7. Fathom Eight, San Marino.

Carvel, John L.
1950 Stephen of Linthouse: A Record of Two Hundred Years of Shipbuilding 1750-1950. Alexander Stephen and Sons, Glasgow.

Celler, L. Craig
1975 Classified Structure Field Inventory Report and Historic Structure Worksheet. Documents on file, Isle Royale National Park, Houghton.

Chadwick, F.E.
1891 Ocean Steamships: A Popular Account of Their Construction, Development, Management and Appliances. Charles Scribner's Sons, New York.

Channing, Edward and Marion F. Lansing
1909 The Story of the Great Lakes. MacMillan, New York.

Chapelle, Howard I.
1935 The History of American Sailing Ships. Bonanza Books, New York.

1936 American Sailing Craft. Bonanza Books, New York.

1951 American Small Sailing Craft. W. W. Norton, New York.

1967 The Search for Speed Under Sail 1700-1855. Conway Maritime Press, London.

Christian, Sarah B.
1932 Winter on Isle Royale: A Narrative of Life on Isle Royale During the Years of 1874 and 1875. Private publication on file, Isle Royale National Park, Houghton.

Civilian Conservation Corps
1936-41 Camp Siskiwit Log. Document on file, Isle Royale National Park, Houghton.

1939 Civilian Conservation Corps Report, January 5, 1939, Part 1: Isle Royale Publicity, Statistics, Entertainment. Document on file, National Park Service, Washington, D.C.

Clowes, G. S.
1927 Catalogue of the Collections in the Science Museum, South Kensington. Water Transport Sec. II. Merchant Steamers. His Majesty's Stationery Office, London.

Cochrane, Timothy
1978 Memorandum to files re: George Mead Lumber Company logging operations on Siskiwit Bay, 1935-36. Document on file, Isle Royale National Park, Houghton.

1982 The Folklife Expressions of Three Isle Royale Fishermen: A Sense of Place Examination. Unpublished Master's thesis, Western Kentucky University, on file, Isle Royale National Park, Houghton.

1983 A Study of Folk Architecture on Isle Royale: The Johnson/Holte Fishery. Ms. on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Cockrell, Wilburn A.
1980 The Trouble with Treasure: A Preservationist View of the Controversy. American Antiquity 45:333-39.

1982 Archaeology, Sports Diving and Shipwrecks. In: Underwater Archaeology: The Proceedings of the Eleventh Conference on Underwater Archaeology edited by Calvin R. Cummings, pp. 124-129. Special Publication 4. Fathom Eight, San Marino.

1983 A Trial Classificatory Model for the Analysis of Shipwrecks. In Shipwreck Anthropology, edited by Richard A. Gould, pp. 207-218. University of New Mexico Press, Albuquerque.

Conary, Kate E. K.
1939 Interview in Daily Mining Gazette, June 21, 1939.

Cotter, John L.
1968 Handbook for Historical Archeology, Part I. Cotter, Wyncott, Pennsylvania.

Croil, James
1898 Steam Navigation and its Relation to the Commerce of Canada and the United States. William Briggs, Toronto.

Cumberland, B.
1913 Canoe, Sail and Steam: Early Navigation on the Great Lakes. Canadian Magazine 42:85-92.

Cummings, Calvin R.
1978 The Southwest Region Model for National Park Service Cultural Resources Management. Paper presented to the annual meeting of American Anthropological Association, Los Angeles. Ms. on file, National Park Service, Southwest Cultural Resources Center, Santa Fe.

1981 Cultural Resources Management: A Statement of Concerns from a Conservation Archeology Perspective. Journal of Field Archaeology 8(1):95-98.

1983 Defined Professional Criteria for Underwater Archaeology. In Proceedings of the Alaskan Marine Archeology Workshop, pp. 111–124. Alaska Sea Grant Report 83–9. University of Alaska, Fairbanks.

1986a Underwater Archeology and Maritime Preservation: Issues and Concerns. A statement prepared for the Workshop "Technologies for Underwater Archeology and Maritime Preservation" Office of Technology Assessment, U.S. Congress, Washington, D.C. Ms. on file, National Park Service, Southwest Cultural Resources Center, Santa Fe.

1986b Research Programs for the Management of Cultural Resources in Marine Protected Areas. Paper presented to International Marine Protected Areas Seminar, June 1–12. In Proceedings, in press.

1986c A Matter of Ethics. In Underwater Archaeology: The Proceedings of the Fourteenth Conference on Underwater Archaeology, edited by Calvin R. Cummings, pp. v–ix. Special Publication 7. Fathom Eight, San Marino.

Calvin R. Cummings and Edward F. Miller

1987a Policies for the Management of Historical and Cultural Resources. National Oceanic and Atmospheric Administration (NOAA), Marine and Estuarine Management Division, Washington, D.C.

1987b Guidelines for Submitting Applications for Archaeological Research Permits in National Marine Sanctuaries. National Oceanic and Atmospheric Administration (NOAA), Marine and Estuarine Management Division, Washington, D.C.

Curr, Robert
1907 Lake Shipyard Methods of Steel Ship Construction. Marine Review, May 30: 40–42.

1908 Shipbuilding on the Great Lakes. Transactions of the Society of Naval and Marine Engineers 16:195–209.

Curtis, W. H.
1919 The Elements of Wood Ship Construction. McGraw Hill, New York.

Curwood, James O.
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.

Davis, Charles G.
1933 The Built-Up Ship Model. 1980 reprint, Edward W. Sweetman, Largo, Florida.

Delgado, James P.
1986 National Historic Landmark Study: USS MONITOR. Ms. on file, National Park Service, Washington, D.C.

1987a Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places. Bulletin 20. National Park Service, Washington, D.C.

1987b (editor)
Maritime Preservation Edition. The Journal of the Association for Preservation Technology 9(1).

Denny, Archibald
1897 The Design and Building of a Steamship. Cassier's Magazine August:393-405.

Desmond, Charles
1935 Naval Architecture Simplified. Rudder, New York.

Detroit Historical Publishing Company
1877 Marine History of the Lake Ports. Detroit Historical Publishing, Detroit.

Dickinson, J. N.
1967 The Canal at Sault Ste. Marie, Michigan: Inception, Construction, Operation, and the Canal Grant Lands. Unpublished Ph.D. dissertation, University of Wisconsin.

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 F.
1958 The Salvager: The Life of Captain Tom Reid on the Great Lakes. Ross and Haines, Minnesota.

Donovan, Frank R.
1966 River Boats of America. Crowell, New York.

Dorin, Patrick C.
1979 The Lake Superior Iron Ore Railroads: The World's Heaviest Trains. Bonanza Books, New York.

Dornfield, A. A.
1957 Steamships: A Hundred Years Ago. Chicago Historical Society New Series 4:148-156.

Dorr, E.P.
1876 Rules for Construction, Inspection and Characterization of Sail and Steam Vessels. By the Author, Buffalo.

Dustin, Fred
1932 A Summary of the Archeology of Isle Royale, Michigan. Papers of the Michigan Academy of Science, Arts and Letter 16:1-16.

1946 Isle Royale Place Names. Michigan History 16(4):681-722.

1957 An Archeological Reconnaissance of Isle Royale. Michigan History 41:1-34.

Eccleston, E. C.
1941 Report to Chief, Park Operations Division. Document on file, National Park Service, Washington, D.C.

Edwards, V.B. and Fred C. Cole
1945 Water Transportation on Inland Rivers. In Historical Transactions 1893-1941, pp. 400-422. Society of Naval Architects and Marine Engineers, New York.

Eliot, John L.
1985 Isle Royale: North Woods Park Primeval. National Geographic 167(4):534-550.

Engman, Elmer
1976 Shipwreck Guide to the Western Half of Lake Superior. Innerspace, Duluth.

Ericson, Bernard
1962 The Evolution of Ships on the Great Lakes, Part I: Early History, Great Lakes and Great Rivers and Eastern Canadian Section. The Society of Naval Architects and Marine Engineers, Pittsburgh Steamship Division, Cleveland.

Estep, H. Cole
1918 How Wooden Ships Are Built. Penton, Cleveland.

Evans, William H.
1967 Days of the Steamboats. Parents Magazine.

Fairbairn, William
1863 On the Construction of Iron-Plated Ships. Transactions of the Institution of Naval Architects 4:1-15. London.

1865 Treatise on Iron Ship Building: Its History and Progress. Longmans, Green, London.

Feltner, Charles E. and Jeri B. Feltner
1982 Great Lakes Maritime History: Bibliography and Sources of Information. Seajay Publications, Dearborn.

Finn, J. Leo
1979 Old Shipping Days in Oswego. Oswego County Board of Supervisors, Oswego.

Fitch, Charles H.
1888 Report on Marine Engines and Steam Vessels in the U.S. Merchant Service. U.S.Department of the Interior, Census Office, Washington, D.C.

Fite, Gilbert C. and Jim E. Reese
1965 An Economic History of the United States. Houghton Mifflin, Boston.

Fletcher, Daniel O.
1960 A Study of Package Freight Carriers on the Great Lakes. Unpublished Ph.D. dissertation. University Microfilms, Ann Arbor.

Fletcher, R. A.
1910 Steamships: The Story of Their Development to the Present Day. Sidwick and Jackson, London.

Fowles, Otton
1925 Sault Ste. Marie and its Great Waterways. G.P. Putnam's Sons, New York.

Fox, George R.
1911 An Ancient Copper Workings on Isle Royale. Wisconsin Archaeologist 10:75.

Franchere, Gabriel
1939 Journal of his Voyage in the BREWSTER to Grand Portage, Isle Royale and the Anse in August, 1839. Microfilm on file, Michigan Technological University Library, Houghton.

Frederickson, Arthur C. and Lucy F. Frederickson
1961-63 Ships and Shipwrecks in Door County Wisconsin, 2 vols. Sturgeon Bay, Wisconsin.

Gale, Phil
1987 Interview recorded by Toni Carrell and Ken Vrana, March 17, 1987. On file National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Gilmore, James
1956 The St. Lawrence River Canals Vessel. The Society of Naval Architects and Marine Engineers, Montreal.

Gjerset, Knut
1928 Norwegian Sailors on the Great Lakes. Norwegian American Historical Association, Northfield.

Goodrich, Carter
1961 Canals and American Economic Development. Columbia University, New York.

Gould, Richard A. (editor)
1983 Shipwreck Anthropology. University of New Mexico, Albuquerque.

Graham, C. S.
1958 The Transition from Paddle-Wheel to Screw Propeller. Mariner's Mirror 44:45-46.

Greenhill, Basil
1980 Schooners. Naval Institute, Annapolis.

Greenwood, J.O.
1973 Namesakes II: A Sequel to Namesakes of the Lakes. Freshwater Press, Cleveland.

Haber, Gordon
1962-65 Field report on Cemetery Island. Ms. on file, Isle Royale National Park, Houghton.

Hakala, D. Robert
1955 Isle Royale Primeval Prince: A History. Ms. on file, Isle Royale National Park, Houghton.

Hall, Henry
1880 Report on the Ship-Building Industry of the United States. U.S. Tenth Census, vol. 8:1-276. Dept. of the Interior, Washington, D.C.

Hall, John W.
1870 Marine Disasters of Western Lakes During the Navigation of 1869. Wetunis, Detroit.

Hall, Stephen P.
1976 Duluth-Superior Harbor Cultural Resources Study. U.S. Army Corps of Engineers, St. Paul District, St. Paul.

Hamilton, Frank E.
n.d. Notes on PURITAN/GEORGE M. COX. Ms. on file, Richard J. Wright Collection, Bowling Green State University, Bowling Green, Ohio.

Harrison, John MacLean
1974 The Fate of the GRIFFON. The Shallow Press, Chicago.

Hatcher, Harlan
1944 The Great Lakes. Oxford University, London.

1945 Lake Erie. Bobbs Merrill, New York.

1950 A Century of Iron and Men. Bobbs-Merrill, New York.

Hatcher, Harlan and Erich A. Walter
1963 A Pictorial History of the Great Lakes. Crown Publishers, New York.

Havighurst, Walter
1944 The Long Ships Passing. MacMillan, New York.

1966 The Great Lakes Reader. Macmillan, New York.

Heden, Karl E.
1966 Directory of Shipwrecks on the Great Lakes. Bruce Humphries, Boston.

Henry, Alfred J. and Norman B. Conger
1907 Meterological Chart of the Great Lakes. Summary for the Season of 1906. U.S. Dept. of Agriculture, Weather Bureau, No. 2. Government Printing Office, Washington, D.C.

Heyl, Erik
1965-69 Early American Steamers. 6 vols. By the Author, Buffalo.

Hill, Ralph N.
1953 Sidewheeler Saga. A Chronicle of Steamboating. Rinehart, New York.

Hill, Reubin
1987 Interview recorded by Toni Carrell and Ken Vrana, February 3, 1987, re: Lake Superior small craft construction on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Hoagland, Henry E.
1917 Wage Bargaining on the Vessels of the Great Lakes. University of Illinois, Urbana.

Hoge, Anna B.
1984 Interview recorded by Bruce Weber, July 19, 1984, re: Passage Island Lighthouse on file, Isle Royale National Park, Houghton.

Hodge, William
1884 The Pioneer Steamboats on Lake Erie. Bigelow Brothers, Buffalo.

Hohman, Elmo P.
1956 History of the American Merchant Seaman. Shoestring Press, Hamden, Connecticut.

Holden, Thomas R.
1974 Park Interpretation as an Environmental Communication Process with a Sample Interpretive Booklet Text on the Maritime Disaster History of Siskiwit Bay, Isle Royale, Lake Superior. Unpublished Master's thesis, University of Wisconsin, Madison, on file, Isle Royale National Park, Houghton.

1976 On The Rocks Isle Royale Style. Nor'Easter 1(1):2-4.

A Shallow Grave for the AMERICA, The Nordic Diver 1(2):1-5).

1985 Above and Below: A History of Lighthouses and Shipwrecks of Isle Royale. Isle Royale Natural History Association, Houghton.

Holecek, Donald F. and Susan J. Lothrop
1980a Attitudes of a Scuba Diving Population Concerning Government Regulation of Underwater Resources. Michigan Sea Grant Technical Report, Ann Arbor.

1980b *Shipwreck vs. Nonshipwreck Scuba Divers: Characteristics, Behavior, and Expenditure Patterns.* Michigan Sea Grant Technical Reprort, Ann Arbor.

Holecek, Donald F. and E. Thomas Smiley
1982 *Management Guidelines for Michigan's Great Lakes Bottomland Preserves.* Michigan Sea Grant, Ann Arbor.

Holte, Ingeborg
1984 *Ingeborg's Isle Royale.* Women's Times, Grand Marais.

Houghton, Jacob
1896 Letter to George A. Newett, Ishpeming, Michigan, November 22, on file, Isle Royale National Park, Hougton.

Hruska, Robert
1987 Personal correspondence to Ken Vrana 19 January 1987, re: Oskosh Public Museum activities on Isle Royale in 1964, on file, Isle Royale National Park, Houghton.

Huber, N. King
1975 *The Geologic Story of Isle Royale National Park.* Geological Survey Bulletin 1309. Government Printing Office, Washington, D.C.

Hull, William J. and Robert W. Hull
1967 *The Origin and Development of the Waterways Policy of the United States.* National Waterways Conference, Inc., Washington, D.C.

Hulse, Charles A.
1981 *A Spatial Analysis of Lake Superior Shipwrecks: A Study in the Formative Process of the Archaeological Record.* Unpublished Ph.D. dissertation, Michigan State University. University Microfilms, Ann Arbor.

Hulse, Charles A. and Donald F. Holecek
1979 *Underwater Parks Symposium Proceedings. Extension Bulletin E-1350. Michigan State University, E. Lansing.*

Humins, John H.
1985 The American Fur Company in the Old Northwest Territory. *Michigan History* 69(2):24-31.

Hunter, Louis C.
1949 *Steamboats on the Western Rivers: An Economic and Technological History.* 1969 reprint, Octagon, New York.

Hutchinson, G.H.
1914 The Handling of Coal at the Head of the Lakes. *American Society of Mechanical Engineers Transactions* 35:283-339.

Inches, H. C.
1951 Wooden Shipbuilding. *Inland Seas* 7:3-12.

1962 The Great Lakes Wooden Shipbuilding Era. The Great Lakes Historical Society, Vermillion, Ohio.

Inland Lloyds
1882 1882 Vessel Classification of the Inland Lloyd's American Hulls. Printing House of Matthews, Northrup and Company, Buffalo.

1890 Inland Lloyds Vessel Register. Inland Lloyds, Buffalo.

Innes, Harold A.
1930 The Fur Trade in Canada. New Haven.

Isle Royale
1854 Lake Superior Journal 10(4):2. On file Marquette Public Library, Marquette.

International Shipmasters Association Directory.
1925 International Shipmasters Association, Cleveland.

Ives, William
1847 Survey Notes and Plats of the 1847 Survey of Isle Royale. Microfilm on file, Michigan Technological University Library, Houghton.

Jackson, Charles T.
1849 Report on the Geological and Mineralogical Survey of the Mineral Lands of the United States in the State of Michigan. 31st Congress, 1st Session, House Ex. Doc. No. 5, vol. 3, Pt. 2.

Johns, Edgar
1965 Interview recorded by L. Rakestraw, September 30, 1965, on file, Isle Royale National Park, Houghton.

Johnson, Milford Jr.
1986 Interview recorded by Ken Vrana, August 23, 1986, on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

1987 Interview recorded by Toni Carrell and Ken Vrana, February 3, 1987, on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Johnson, Myrtle
1986 Interview recorded by Ken Vrana, August 23, 1986, on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Johnson Brothers Brochure
ca. 1940 Launch and Boat Service, Rock Harbor, Isle Royale. On file National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Johnston, Paul
1983 Steam and the Sea. Peabody Museum of Salem, Salem.

Kasson, John F.
1976 Civilizing the Machine: Technology and Republican Values in America 1776-1900. Grossman, New York.

King, Franklin, A.
1984 Two Harbors: Minnesota's First Iron Ore Port. The Nor'easter 9(5):1-4.

Keel, Bennie
1979 A View from the Inside. American Antiquity 44(1):164-170.

1985 White Paper: Disposition of Human Remains. National Park Service, Washington, D.C.

Klein, L.
1841 Notes on the Steam Navigation Upon the Great Northern Lakes. American Railroad Journal 12.

Labadie, C. Patrick
1981 Inventory of Screw Steamers Built Upon the Great Lakes, 1840-1880. Ms. on file, C.P. Labadie Collection, Duluth.

1982a Preliminary Analysis of Great Lakes Lumber Steamers. Ms. on file, C.P. Labadie Collection, Duluth.

1982b Sketch and measurements of STANLEY, Star Island, June 8, 1982. Document on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

1984 Nineteenth Century Bulk Freighters on the Great Lakes System. Ms. on file, C.P. Labadie Collection, Duluth.

Labaree, Benjamin W. (editor)
1975 The Atlantic World of Robert G. Albion. Wesleyan University Press, Middletown.

Landon, Fred
1955 The End of Coastal Steamer Service on Georgian Bay. Inland Seas 11(1):68-70.

1970 Engines Salvaged from Lake Depths Powered the MANITOBA. Inland Seas 26(4):313-315.

Lane, Alfred C.
1898 Geological Report on Isle Royale. Michigan Geological Survey 6(1). Michigan Geological Survey, Lansing.

Lapham, J. A.
1869 Disasters on the Lakes. Papers Relative to Losses of Vessels on the Lakes. HR Doc. 10, 41st Congress, 2nd Session.

Laurent, Jerome K.
1983 Trade, Transport and Technology: The American Great Lakes, 1866-1910. The Journal of Transport History 4(1):1-24.

Lavelle, Omer
1974 *Van Horne's Road: An Illustrated Account of the Construction and First Years of Operation of the Canadian Pacific Transcontinental Railway.* Railfare Enterprises, Montreal.

Lavery, Brian
1984 *The Ship of the Line: Volume II: Design, Construction and Fittings.* Conway, London.

Lee, William E.
1983 Letter from Ontario Ministry of Tourism and Recreation, Old Fort William, Thunder Bay, re: Northwest Fur Company activities on Isle Royale, on file, Isle Royale National Park, Houghton.

Lenihan, Daniel J.
1983 Rethinking Shipwreck Archaeology: A History of Ideas and Considerations for New Directions. In *Shipwreck Anthropology*, edited by Richard A. Gould, pp. 37-64. University of New Mexico Press, Albuquerque.

1983 Managing Shipwrecks in Parks and Preserves. *Trends in Historic Preservation* 20(2):29-31.

1986 The CUMBERLAND/CHISHOLM Site: The Results of a Non-destructive Archaeological Investigation at Isle Royale National Park. In *Underwater Archaeology: The Proceedings of the Fourteenth Conference on Underwater Archaeology*, edited by Calvin R. Cummings, pp. 105-106. Special Publication 7. Fathom Eight, San Marino.

Lenihan, Daniel J. (editor)
1974 *Underwater Archeology in the National Park Service: A Model for the Management of Submerged Cultural Resources.* National Park Service, Santa Fe.

Lenihan, Daniel J., Toni Carrell and Larry Murphy
1981 Report on a One-Week Field Trip to Test and Evaluate Underwater Archeological Research Approaches for Use at Isle Royale in the 1981 Field Season. Ms. on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Lidfors, Kate, Thom Holden, Ellen Maurer, Jerry Livingston and Larry Murphy
1982 Report of a Two-Day Underwater Survey of Selected Historical Sites at Apostle Islands National Lakeshore with Considerations for Future Research. Ms. on file, National Park Service, Submerged Cultural Resources Unit, Santa Fe.

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, University of Michigan. University Microfilms, Ann Arbor.

Little, John J.
1978 Island Wilderness: A History of Isle Royale National Park. Unpublished Ph.D. dissertation, University of Toledo. On file Isle Royale National Park, Houghton.

Log Chips
1983 Institute for Great Lakes Research, Bowling Green State University, Bowling Green, Ohio.

Luckenbach, Lewis
1945 American Bureau of Shipping 1862-1943. In Historical Transactions 1893-1943. Society of Naval Architects and Marine Engineers, New York.

Lumby, John R.
1974 Historic Fort William. Mika, Belleville, Ontario.

Lytle, William M. and Forrest R. Holdcamper
1952 Merchant Steam Vessels of the United States, 1790-1868. The Steamship Historical Society of America, Staten Island.

Maass, Carol
1982 Undesignated Cultural Sites Inventory Forms. Document on file, Isle Royale National Park, Houghton.

1984 Isle Royale Interim Cultural Sites Inventory. Document on file, Isle Royale National Park, Houghton.

MacElwee, Roger S.
1921 Economic Aspects of the Great Lakes, St. Lawrence Ship Canal. Ronald Press, New York.

MacLean, Harrison John
1974 The Fate of the GRIFFON. Sage/Swallow, Chicago.

Maginnis, Arthur J.
1892 The Atlantic Ferry: Its Ships, Men, and Working. London.

Mahan, John and Ann Mahan
1985 Return to Passage Island. Lakeland Boating June:47-50.

Malone, John M., Sr.
1986 Interview recorded by Dave Snyder on January 19, 1986, re: Isle Royale Lighthouse on file, Isle Royale National Park, Houghton, Michigan.

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, Chicago. 1972 reprint, Freshwater, Cleveland.

Marshall Cavendish Publications
1975 The History of the Sailing Ship. Arco, New York.

Martin, Patrick E.
1985 Report on Isle Royale prehistoric pot. Ms. on file, Isle Royale National Park, Houghton.

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, Ann Arbor.

McCannel, R.
1932 Shipping on Lake Superior: Shipping out of Collingwood. Papers and Records, Number 28. Ontario Historical Society, Ontario.

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, Extension Bulletin E-1350, edited by Charles A. Hulse, pp. 54-56. Michigan State University, East Lansing.

McDonald, W. A.
1959 Composite Steamers Built by Detroit Drydock Company. Inland Seas 15(2):114-116.

McDowell, W.
1961 The Shapes of Ships. Rev. Ed. Hutchinson, New York.

McLuckie, Jane A.
1976 Minong Mine Historic District. National Register of Historic Places Nomination. Washington, D.C.

McPhedran, Phillip
1952 Cargoes on the Great Lakes. MacMillan, Toronto.

McVey, T. J.
1938-41a Camp Inspection Report. NP-2, May 31, 1938; NP-1, June 1938; NP-1, August 17, 1939; NP-2, August 27, 1940; J. C. Reddock, Camp Inspection Report, NP-2, August 23,24, 1941; NP-3, August 24, 1941. Documents on file, National Park Service, Washington, D.C.

1938-41b CCC Camp Educational Report. May 31, 1938; June 1,1938; August 16, 1939; August 17, 1939; August 25, 1940; August 27, 1940; unsigned CCC Camp Educational Report, August 24, 1941. Documents on file, National Park Service, Washington, D.C.

McWilliam, Scott

1983 The Gray Oak. A Report Covering Observations Made During Archaeological Investigations in 1982. North Central Region Report 14. Heritage Branch, Ministry of Citizenship and Culture, Thunder Bay, Ontario.

1984 Record of Dive Form, Isle Royale National Park, September 29, McCargoe Cove. Document on file, Isle Royale National Park, Houghton.

1985 Record of Dive Form, Isle Royale National Park, August 11, Siskowit Mine. Document on file, Isle Royale National Park, Houghton.

Menz, Katherine B.

1983 Historic Furnishings Report, Sleeping Bear Point Life-Saving Station, Sleeping Bear Dunes National Lakeshore, Frankfort, Michigan. Branch of Historic Furnishings, Harpers Ferry Center, National Park Service, Harpers Ferry.

Merritt, Glenn

1965 Oral history tape recorded by Lawrence Rakestraw, September 28, 1965 on file, Isle Royale National Park, Houghton.

Meyer, John R., Merton J. Peck, John Stenason, Charles Zwick

1959 The Economics of Competition in the Transportation Industries. Harvard University Press, Cambridge.

Miller, Quenton M.

1986 Letter to Park Historian on file, Isle Royale National Park, Houghton.

Mills, James Cook

1908 Giant Ore Carriers on the Great Lakes, Cassier's Magazine 35:109-119.

1910 Our Inland Seas: Their Shipping and Commerce for Three Centuries. A.C. McClurg & Co., Chicago. 1976 reprint, Freshwater Press, Cleveland.

Mitchell, C. Bradford and Kenneth R. Hall

1975 Merchant Steam Vessels of the United States 1790-1868, The Lytle-Holdcamper List. Steamship Historical Society of America, Staten Island, New York.

Moe, Elvis

1987 Interview recorded by Toni Carrell and Ken Vrana, March 16, 1987. On file National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Montreal Register

1839-50 Bureau of Marine Fisheries, Public Archives of Canada, Ottawa, Ontario.

Morehead, John M.
1981 Shipwrecks of Isle Royale: A Manager's Perspective. In Underwater Archaeology: The Proceedings of the Eleventh Conference on Underwater Archeology, edited by Calvin R. Cummings, pp. 63-67. Special Publication 4. Fathom Eight, San Marino

Morison, Elting E.
1966 Men, Machines, and Modern Times. MIT Press, Cambridge.

Morrison, John H.
1903 History of American Steam Navigation. Argosy-Antiquarian Ltd. New York.

1905 Iron and Steel Hull Steam Vessels of the United States, 1825-1905. Steamship Historical Society of America, Salem.

1958 History of America's Steam Navigation. Stephen Doyl Press, New York.

Muckelroy, Keith
1978 Maritime Archaeology. Cambridge University Press, Cambridge.

Murphy, Larry
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 Anthropology edited by Richard A. Gould, pp. 65-90. University of New Mexico Press, Albuquerque.

Murphy, Larry and Allen R. Saltus, Jr.

1981 Phase II Identification and Evaluation of Submerged Cultural Resources in the Tombigbee River Multi-Resource District, Alabama and Mississippi. Report of Investigations, No. 16, Office of Archaeological Research. University of Alabama, Tuscaloosa.

Murphy, Larry, Dan Lenihan and Toni Carrell
1982 Underwater Archeology of Isle Royale National Park. An Interim Report Covering the 1981 Field Season. National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Murphy, Rowland W.
1966 The Four Welland Canals. In: The Great Lakes Reader, edited by W. Havighurst, pp. 391-396. Collier Macmillan, London.

Musham, H.A.
1946-60 Early Great Lakes Steamboats 1816-1830. American Neptune 6:1-18; 7:1-24; 8:1-24; 17:89-104; 20:79-103.

Neu, Irene
1953 The Building of the Sault Canal: 1952-1955. Mississippi Valley Historical Review 40(1): 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. U.S. Dept. of the Treasury, Bureau of Statistics, Washington, D.C..

Nordby, Larry V.
1987 Preliminary analysis of artifact clusters resulting from Star Island reconnaissance survey, June 1982. Ms. on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

North, Douglass C.
1961 The Economic Growth of the United States 1790-1860. Prentice-Hall, New York.

Northern Michigan University
1978 Isle Royale Shipwreck Survey. Ms. on file, Isle Royale National Park, Houghton.

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. U.S. Government Printing Office, Washington, D.C.

Oldham, Joseph R.
1897 Shipbuilding and Transportation on the Great American Lakes. Cassier's Magazine August:499-512.

1907 American Lake and Ocean Steamship Models. Cassier's Magazine January:229-240.

Opheim, Lee Alfred
1972 Twentieth Century Shipwrecks in Lake Superior. Unpublished Ph.D. dissertation, Saint Louis University. University Microfilms, Ann Arbor.

Paasch, Captain H.
1890 Illustrated Marine Encyclopedia. W&J Mackay, Chatham, Great Britain. Nd. reprint, Argus Books, Watford, Herts, England.

Pankhurst, J. F.
1893 The Development of Shipbuilding on the Great Lakes. Transactions of the Society of Naval Architects and Marine Engineers 1:252-262.

Patterson, Susan S.
1976 Canadian Great Lakes Shipping: An Annotated Bibliography. University of Toronto, Ontario.

Pomeroy, Lawrence A.
1946 The Bulk Freight Vessel. Inland Seas 2(3):191-200.

Pred, Allan
1970 Toward a Typology of Manufacturing Flows. In: Economic Geography: Selected Readings, edited by Fred E. Dors and Lawrence M. Sommers, pp. 267-286.

Purdy, T. C.
1883a Report on Steam Navigation in the United States. U.S. Tenth Census, vol. 8:655-724. Dept. of the Interior, Washington, D.C..

1883b Report on the Canals of the United States. U.S. Tenth Census, vol. 8:725-764. Dept. of the Interior, Washington, D.C.

Rakestraw, Lawrence
1964 Historical Background and Documentation for Historical Base Map of Isle Royale. Ms. on file, Isle Royale National Park, Houghton.

1965 Historic Mining on Isle Royale. Isle Royale Natural History Association in cooperation with the U.S. Department of Interior, National Park Service, Houghton.

1967a Post-Columbian History of Isle Royale, Part I: Mining. Ms. on file, Isle Royale National Park, Houghton.

1967b Post-Columbian History of Isle Royale, Part II: Fishing. Ms. on file, Isle Royale National Park, Houghton.

1968 Commercial Fishing on Isle Royale 1800-1967. Isle Royale Natural History Association in cooperation with the U.S. Department of Interior, National Park Service, Houghton.

Ratigan, William
1960 Great Lakes Shipwrecks and Survivals. Eerdmans, Grand Rapids.

Ridgley-Nevitt, Cedric
1981 American Steamships on the Atlantic. University of Delaware Press, Newark.

Robinson, Orrin W.
1938 Early Days of the Lake Superior Copper Country. Houghton.

Rogers, C. C.
1892 The Water Route from Chicago to the Ocean. Scribner's Magazine. March:287.

Rosenberg, Nathan
1972 Technology and American Economic Growth. Harper and Row, New York.

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 Shipbuilding on the Great Lakes, U.S.A. Transactions of the Institution of Naval Architects 51:220-232.

Salmond, John A.
1967 The Civilian Conservation Corps, 1933-1942: A New Deal Case Study. Duke University Press, Durham.

Saltus, Allen R., Jr.
1982 Cultural Resources Survey of a Portion of the Northeast Cape Fear River and Report on the Test Excavation to Evaluate the Steamship SPRAY. North Carolina Department of Cultural Resources, Raleigh.

1986 Submerged Cultural Resource Investigation of the Western Portion of the Maurepas Basin with Intensive Underwater Surveys at Hoo Shoo Too Landing, 16EBr60, Colyell Bay, Catfish Landing, and at the Mouth of Bayou Shene Blanc. Southeatern Lousiana University Center for Regional Studies, Hammond.

Schiffer, Michael B.
1976 Behavioral Archaeology. Academic, New York.

Schuette, Katie
1979 Kamloops Goes Missing No Longer. Anchor News. May/June.

Scott, Emmett Hoyt
1924 Unpublished memoirs on file, Indiana University, Lilly Library, Bloomington.

Scovill, Douglas H., G.J. Gordon and K.M. Anderson
1977 Guidelines for the Preparation of Statements of Environmental Impact on Archeological Resources. In Conservation Archaeology: A Guide for Cultural Resource Management Studies, edited by Michael B. Schiffer and George J. Gumerman, pp. 43-62. Academic Press, New York.

See, Horace
1891 The Building of the Steamship in America. Engineering Magazine May.

Shaw, Cornelius G.
1847 Unpublished diary. C. G. Shaw Papers, Michigan Historical Collections, University of Michigan, Ann Arbor. On file Isle Royale National Park, Houghton.

Shelvin, Charles
1937 Report to the Director on Observations and Recommendations for Isle Royale National Park (Proposed), February 17, 1937. Document on file, National Park Service, Washington, D.C.

Sivertson, Stanley
1987 Interview recorded by Toni Carrell and Ken Vrana, February 2, 1987, re: Lake Superior small watercraft on file, National Park Service, Southwest Cultural Resources Center, Submerged Cultural Resources Unit, Santa Fe.

Slyker, Francis J.
1958 Reinforced Wooden Vessels on the Great Lakes. Telescope Magazine, Great Lakes Maritime Institute.

Smiley, E. Thomas and Donald F. Holecek (editors)
1982 Aquatic Park Management: Symposium Proceedings. Michigan Sea Grant, Ann Arbor.

Smith, Edgar C.
1938 A Short History of Naval and Marine Engineering. University Press, Cambridge.

Smith, William E.
1932 Letter dated October 2, to Superintendent Stoll, regarding burials at Cemetery Island, on file, Isle Royale National Park, Houghton.

Spratt, H. Philip
1951 Transatlantic Paddle Steamers. Glasgow.

Standard, W. L.
1947 Merchant Seamen: A Short History of Their Struggles. International Publishers, New York.

Stanton, Samuel W.
1962 Great Lakes Steam Vessels. Meriden Gravure, Meriden, Connecticut.

Stonehouse, Frederick
1974 Isle Royale Shipwrecks. Harboridge Press, Marquette.

Storey, Dana A.
1971 The Building of a Wooden Ship. Barre Publishers, Barre, Massachusetts.

Superintendent's Orders
1986 Part I, Section 1.5 (a)(1). Document on file, Isle Royale National Park, Houghton.

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. Mining Journal, Marquette.

Tanner, Henry S.
1840 A Description of the Canals and Railroads of the United States Comprehending Notices of all the Works of Internal Improvements throughout the Several States. T.R. Tanner and J. Disturnell, New York.

Taylor, George R.
1951 The Transportation Revolution 1815-1860. Holt, Rinehart and Winston, New York.

Thompson, Douglas G.
1983 The ANNIE FALCONER Archaeological Survey and Salvage Project 1982. P.O.W. Kingston Ltd. and Ontario Heritage Foundation, Toronto.

Towle, Edward L.
1964 Bibliography on the Economic History and Geography of the Great Lakes-St. Lawrence Drainage Basin. University of Rochester, Canadian Studies Program. Ms. on file, Michigan State Library, Detroit.

Trimble, George
1907 The Rose Pilot's Handbook: Useful Pertaining to Great Lakes. Riverside, Port Huron, Michigan.

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. House Document No. 277, 55th Congress, 2nd Session:1-106.

Tuttle, Charles R.
1873 A General History of the State of Michigan. Tyler, Detroit.

University of Michigan
Archaeological Survey of Isle Royale National Park. Site Survey No. 20IR29. Ms. on file, University of Michigan, Ann Arbor.

U.S. Army Corps of Engineers
1975 Final Environmental Impact Statement: Operation and Maintenance Activities Two Harbors, Minnesota, Lake Superior. U.S. Army Corps of Engineers, St. Paul.

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
1977 Marine Casualty Report: S.S EDMUND FITZGERALD: sinking in Lake Superior on 10 November 1975 with loss of life. U.S. Coast Guard Marine Board of Investigation Report and Commandant's Action, Washington, D.C..

U.S. Department of Commerce
1981 *United States Coast Pilot 6: Great Lakes*. National Oceanic and Atmospheric Administration, Washington, D.C.

U.S. Department of the Interior, Geologic Survey
1926 *The Geologic Story of Isle Royale National Park, Geological Survey Bulletin 1309*. Superintendent of Documents, No. I 19.3:1309, Washington, D.C.

U.S. Department of the Interior, National Park Service
1945 *Isle Royale Rules and Regulations, Fishing, Hunting and Trapping*. Title 36, Chapter I, Part 34 Sections 34.1-34.4. Washington, D.C.

U.S. Department of the Navy
1970 *Dictionary of American Naval Fighting Ships*. Vol. 5. Government Printing Office, Washington, D.C.

U.S. Engineer Department
1848 *Commerce of the Lakes and Western Rivers*. 30th Congress, 1st Session. House ex. doc. 19, vol. 3:516-51.

1930 *Transportation on the Great Lakes*. Transportation Series No. 1. The Board of Engineers for Rivers and Harbors, War Department. Government Printing Office, Washington, D.C.

U.S. Light-House Establishment
1789-1871 *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 1789-1871*. Government Printing Office, Washington, D.C.

1873 *Annual Report of the U.S. Light-House Establishment*. 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. Secretary of the Treasury
1872 *Steam Vessels in the United States*. HR Doc. 138, 42nd Congress 2nd Session.

U.S. Shipbuilding Color Adjustment Board
1918 *Decision as to Wages, Hours and other Conditions in Atlantic Coast, Gulf and Great Lakes Shipyards*. October 1, 1918. Washington, D.C.

Van der Linden, Peter J.
1984 *Great Lakes Ships We Remember*. Freshwater Press, Cleveland.

Van Riemsdijk, J. T. and Kenneth Brown
1980 *The Pictorial History of Steam Power*. Octopus Books, London.

Vrana, Kenneth
1980 Record of Dive Form, Isle Royale National Park, June 3, Siskowit Mine. Document on file, Isle Royale National Park, Houghton.

1983a Record of Dive Form, Isle Royale National Park, August 8, Ghyllbank dock remains, Windigo. Document on file, Isle Royale National Park, Houghton.

1983b Record of Dive Form, Isle Royale National Park, October 7, Cemetery Island. Document on file, Isle Royale National Park, Houghton.

1984a Record of Dive Form, Isle Royale National Park, July 16, September 4, McCargoe Cove. Document on file, Isle Royale National Park, Houghton.

1984b Record of Dive Form, Isle Royale National Park, August 29, McCargoe Cove. Document on file, Isle Royale National Park, Houghton.

1984c Record of Dive Form, Isle Royale National Park, September 23, Siskowit Mine. Document on file, Isle Royale Natinal Park, Houghton.

Walker, Augustus
1902 Early Days on the Lakes. Publications of the Buffalo Historical Society 5:287-323.

Walker, Fred
1984 Song of the Clyde: A History of Clyde Shipbuilding. W.W. Norton, London.

Walsh, George Ethelbert
1899 American Lake Shipping and Casualties. Cassier's Magazine April:499-507.

Ward, Charles
1909 Shallow Draught River Steamers. Transactions of the Society of Naval Architects and Marine Engineers 17:79-106.

Warner, Thomas D. and Donald F. Holecek
1975 The Thunder Bay Shipwreck Survey Study Report. Ms. submitted for the Recreation Research and Planning Unit, Department of Park and Recreation Resources, Michigan State University.

Weber, Bruce E.
1981 Oral History Standards - Isle Royale National Park. Ms. on file, Isle Royale National Park, Houghton.

1982 Isle Royale's Submerged Resources. The George Wright Forum 2(4):52-54.

Wells, Homer Jr.
1938 History of Accidents, Casualties and Wrecks on Lake Superior. U.S. Army, Corps of Engineers, Duluth.

Wheeler, Robert C., Walter A. Kenyon, Alan R. Woolworth and Douglas A. Birk
1975 Voices from the Rapids. Minnesota Historical Society, St. Paul.

White, William H.
1899 The Progress in Steam Navigation. Presidential address before the Mechanical Section of the British Association for the Advancement of Science, 1899. Smithsonian Report on file, San Francisco Maritime Museum.

Whittier, Bob
1983 Paddle Wheel Steamers and Their Giant Engines. Seamaster Boats, Duxbury.

Williams, David
1909 Shipping on the Upper Lakes. In Papers and Records of the Huron Institute 1:43-59. Huron Institute, Collingwood.

Williams, E. B.
1962 The Great Lakes Iron Ore Carrier. Paper presented at the Spring Meeting of the Society of Naval Architects and Marine Engineers, 1962. Duluth, Minnesota.

Williams, Ralph D.
1907 Commerce of the Great Lakes in 1905. In: The Saint Marys Falls Canal, edited by Charles Moore, pp. 189-205. Semi-Centennial Commission, Detroit.

Williamson, Samuel H.
1977 The Growth of the Great Lakes as a Major Transportation Resource, 1870-1911. Research in Economic History 2:173-248.

Winkelmann, A.
1978 Shipping Casualties Resulting in Total Loss on the Great Lakes (From 1870 to 1970). Ms. on file, National Park Service, Submerged Cultural Resources Unit, Santa Fe.

Wolbrink, Donald and George Walling
1937 Isle Royale Resorts: A Report Prepared at the Request of Chief Architect Thomas C. Vint Covering the Condition of Present Developments and Making Recommendations for their Future Development. In Pre-Park Survey of Isle Royale. Ms. on file, Isle Royale National Park, Houghton.

Wolff, Julius F.
1979 The Shipwrecks of Lake Superior. Lake Superior Marine Museum Association, Duluth.

Workman, James C.
1945 Shipping on the Great Lakes. In Historical Transactions 1893-1943 pp. 363-388. The Society of Naval Architects and Marine Engineers, New York.

Wright, Richard J.
1970 Freshwater Whales: A History of the American Ship Building Company and Its Predecessors. Kent State University, Kent.

1973 _Inventory of Shipwrecks within Michigan Coastal Waters._ Michigan Department of Natural Resources and Northwest Ohio-Great Lakes Research Center, Bowling Green, Ohio.

Young, Anna G.
1957 _Off Watch._ Toronto.

Periodicals:

Ashland Press, Ashland, Wisconsin
Benton Harbor Daily Palladium, Benton Harbor, Michigan
Calumet News, Calumet, Michigan
Canadian Railway and Marine World
Cleveland Herald, Cleveland, Ohio
Cleveland Leader, Cleveland, Ohio
Cleveland News, Cleveland, Ohio
Cleveland Plain Dealer, Cleveland, Ohio
Cheboygan Tribune, Cheboygan, Michigan
Chicago Inter Ocean, Chicago, Illinois
Chicago Herald and Examiner, Chicago, Illinois
Chicago Tribune, Chicago, Illinois
Cobourg Star, Cobourg, Ontario
Daily Mining Gazette, Houghton, Michigan
Detroit Free Press, Detroit, Michigan
Detroit Daily News, Detroit, Michigan
Detroit Marine Historian, Detroit, Michigan
Detroit Telegram, Detroit, Michigan
Duluth Daily Tribune, Duluth, Minnesota
Duluth Evening Herald, Duluth, Minnesota
Duluth Minnesotian, Duluth, Minnesota
Duluth News Tribune, Duluth, Minnesota
Fort William Daily Times Journal, Fort William, Ontario
Glasgow Herald, Glasgow, Scotland
Holland City News, Holland City, Michigan
Houghton Daily Mining Gazette, Houghton, Michigan
Keewenaw Miner, Calulmet, Michigan
Kingston Gazette, Kingston, Ontario
Lake Carriers Association, Cleveland, Ohio
London, Ontario, Free Press, London, Ontario
Manistee News Advocate, Manistee, Michigan
Marine Engineering, Cleveland, Ohio
Marquette Daily Mining Journal, Marquette, Michigan
Meaford Monitor, Meaford, Ontario
Minneapolis Star, Minneapolis, Minnesota
Montreal Gazette, Montreal, Canada
New Orleans Times-Picayune, New Orleans, Louisiana
New York Times, New York, New York
Nordic Diver, Inner Space Society, Duluth, Minnesota
Ontonagon Herald, Ontonagon, Michigan
Owen Sound Advertiser, Owen Sound, Ontario
Owen Sound Daily Sun Times, Owen Sound, Ontario
Owen Sound Times, Owen Sound, Ontario
Portage Lake Mining Gazette, Portage, Michigan

Port Arthur Daily News, Port Arthur, Ontario
Port Arthur Herald, Port Arthur, Ontario
Port Arthur News Chronicle, Port Arthur, Ontario
Port Arthur Sentinal, Port Arthur, Ontario
Port Huron Times, Port Huron, Michigan
Sarnia Observer, Sarnia, Ontario
Sault Daily Star, Sault Ste. Marie, Ontario
Scanner, Toronto Marine Historical Society, Toronto, Ontario
Skillings Mining Review, Duluth, Minnesota
Superior Evening Telegram, Superior, Wisconsin
Thunder Bay Sentinental, Thunder Bay, Ontario
Toledo Blade, Toledo, Ohio
Toronto Daily Star, Toronto, Ontario
Toronto Globe and Mail, Toronto, Ontario
Toronto Mail, Toronto, Ontario
Toronto World, Toronto, Ontario
Traverse City Record Eagle, Traverse City, Michigan
Winnepeg Free Press, Winnepeg, Manitoba
Wisconsin State Journal, Milwaukee, Wisconsin

Management Documents Cited in Chapter VII
(On file, National Park Service Submerged Cultural Resources Unit, Santa Fe)

1) Cultural Resources Management Guideline, NPS-28, National Park Service, August 1985

2) Isle Royale National Park Wilderness Study, 92d Congress, 1st Session, House Document No. 92-102 Part 3, April 29, 1971, U.S. Government Printing Office, Washington.

3) Federal Register, Vol. 49, No. 4, Friday, January 6, 1984, Rules and Regulations, Pgs. 1016-1034, U.S. Government Printing Office, Washington

4) Federal Register, Vol. 49, No. 104, Tuesday, May 29, 1984, Notices, Pg. 22416, U.S. Government Printing Office, Washington

5) Shipwrecks Of Isle Royale National Park, Thematic Group Nomination to the National Register of Historic Places, Toni Carrell, September 1983, National Park Service.

6) Code of Federal Regulations 36, Parks, Forests, and Public Property, Parts 1 to 199, U.S. Government Printing Office, Washington: 1985

7) Shipwreck Mooring Buoy Project, Isle Royale National Park, Resources Management Report #7, Jay Wells, January 1985

8) Isle Royale SCUBA Diving Plan, Isle Royale National Park, ISRO Guideline 3, February 1984

9) Cultural Resources Management Plan and Environmental Assessment, Isle Royale National Park, David L. Snyder, September 1986

10) The Shipwrecks of Isle Royale: A Management Prospective, Conference on Underwater Archeology, Albuquerque, NM, John M. Morehead, National Park Service, January, 1980

11) The Isle Royale SCUBA Diving Plan, Isle Royale National Park, November, 1977

12) Isle Royale Summer Visitor Study - Phase Two Diving Survey: Isle Royale National Park, Robert C. Stinson, Michigan Technological University, 1981

13) Standard Operating Procedures, Superintendent's Orders, Isle Royale National Park, Thomas O. Hobbs, April, 1986

14) 1965 Interim Report - S.S. AMERICA Salvage Operation, AMERICA Salvage, Inc., James R. Marshall, November 22, 1965

15) Task Directive, Shipwreck Study, National Park Service, Southwest Cultural Resources Center, Santa Fe, NM, February, 1981

16) Application For Research Grant to the National Park Service by Northern Michigan University, Roy E. Heath, January, 1980

17) Application For Research Grant to the National Park Service by Northern Michigan University, Roy E. Heath, December, 1978

18) Isle Royale Shipwreck Survey, Northern Michigan University, 1978

19) Diving Accident Checklist/List of Recompression Chambers, Isle Royale National Park, August, 1986

20) Statement of Requirements Fact Sheet Under Which a Concession Permit Will Be Negotiated for the Continued Operation of Scuba Charter Service at Isle Royale National Park, National Park Service, October, 1981

21) Shipwrecks of Isle Royale - A Research Proposal, Donald F. Holecek and Charles E. Cleland, Michigan State University, November, 1978

22) Characteristics, Expenditure Patterns and Attitudes Of A Great Lakes SCUBA Diving Population - Clients For Underwater yark-Historical Preserves In The Great Lakes, Susan J. Lothrop, Michigan State University, March, 1979

23) A Prospectus For Class #E471 Underwater Exploration: An Interpretive Project on the America, Charles Beeker, Indiana University, 1984

24) Annual Statement For Interpretation and Visitor Services, Isle Royale National Park, Bruce E. Weber, September, 1986

25) Statement For Management, Isle Royale National Park, Thomas O. Hobbs, May, 1986

26) Isle Royale National Park SCUBA Diving: A Visitor Use Study, Unpublished Document, National Park Service Submerged Cultural Resources Unit, Kenneth J. Vrana and Bruce Panowski, 1987

27) Law Enforcement Policy and Guideline, NPS-9, National Park Service, April 1984, Amended March, 1986

28) Diving Management Guideline, NPS-4 (Draft), National Park Service, December, 1985

29) 1986 Visitor Use Data Summary, Isle Royale National Park, 1986

30) Backcountry Visitor Abstract 1986, Isle Royale National Park, 1986

31) 1986 SCUBA Program Report, Isle Royale National Park, Jay Wells, December, 1986

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

☆ U.S. GOVERNMENT PRINTING OFFICE:1987-775-488/65149