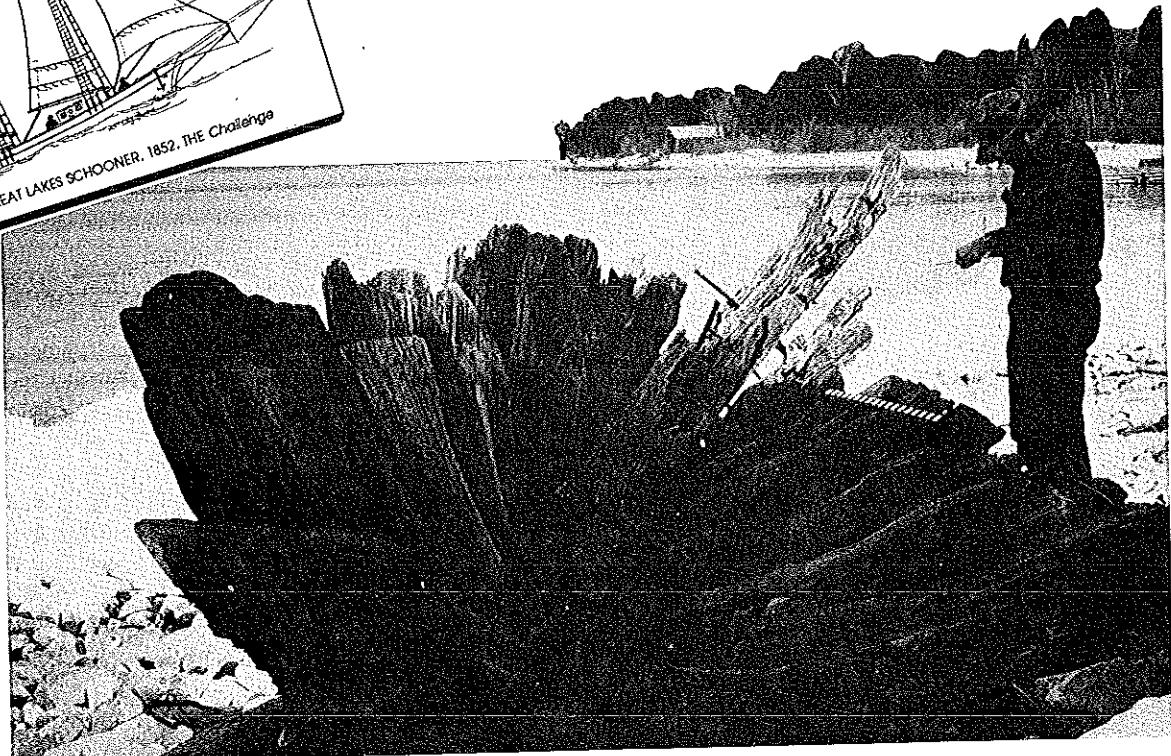
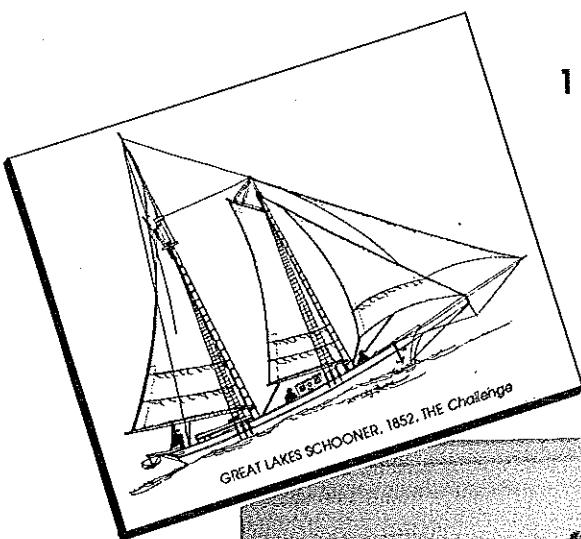


---

# Survey of Submerged Cultural Resources in Northern Door County

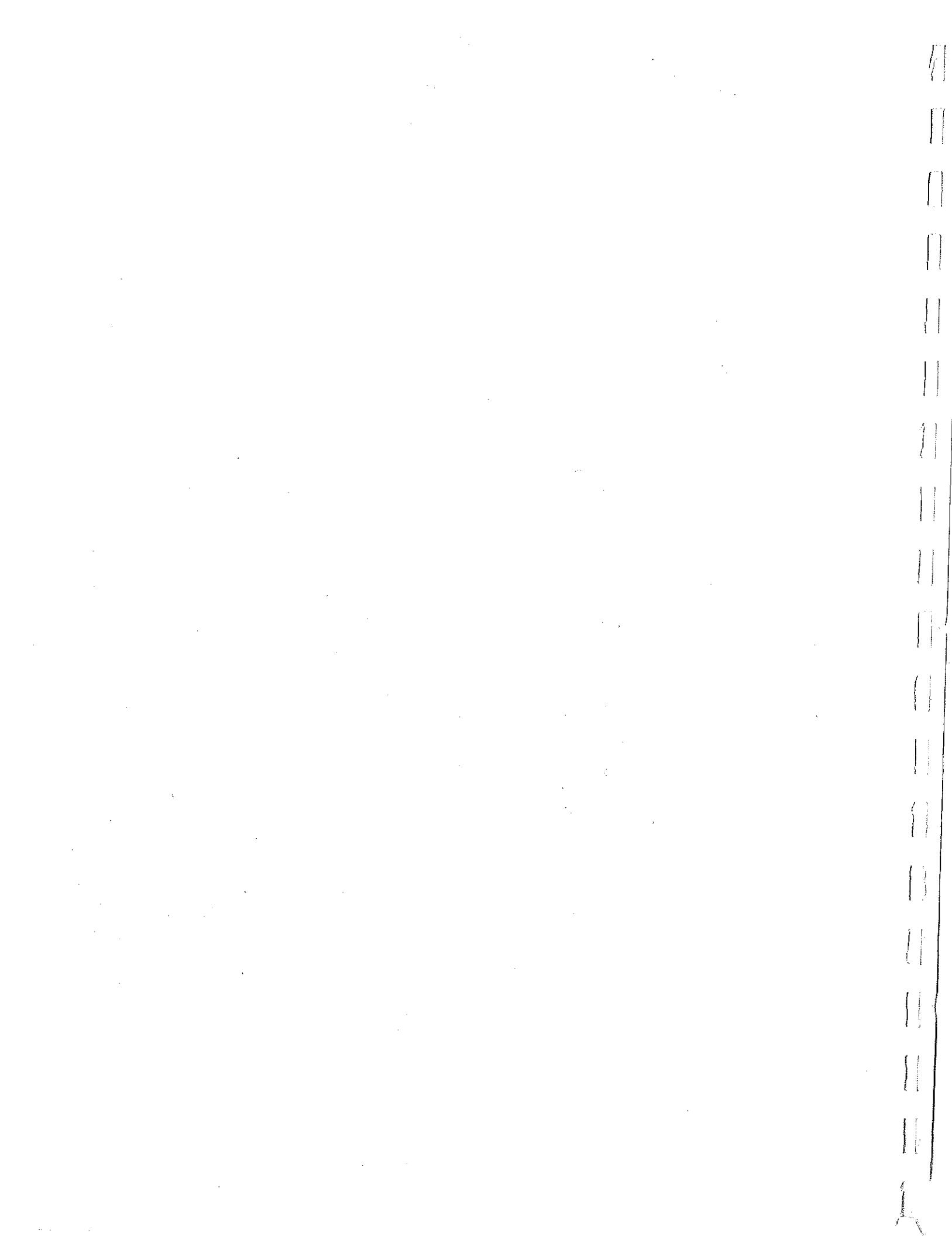
---

1988 FIELD SEASON REPORT



DAVID J. COOPER ° UNDERWATER ARCHEOLOGY  
PROGRAM ° DIVISION OF HISTORIC PRESERVATION  
° STATE HISTORICAL SOCIETY OF WISCONSIN °

J U N E 1 9 8 9



#### ACKNOWLEDGEMENTS

I am most indebted to all the following individuals for their contributions to the planning and execution of the 1988 submerged cultural resource survey, and for assistance in preparing this report. I am also grateful to the East Carolina University Department of History Program in Maritime History and Underwater Research for jointly funding, equipping, and staffing a portion of the project, and to University of Wisconsin Sea Grant Program for the generous loan of their research vessel ORION to this survey effort.

#### Research Consultants

Dr. Richard Boyd, Inland Sea Underwater Consulting

Mr. James Delgado, National Park Service

Dr. Walter M. Hirthe, Marquette University

Mr. C. Patrick Labadie, U.S. Army Corps of Engineers Canal Park Marine Museum

#### Survey Team 1, R/V ORION

Brad Rodgers, Staff Archeologist, East Carolina University

Kurt Knoerl, East Carolina University

Lynn Nichols-Harris, East Carolina University

David Tennessean, University of Wisconsin-Madison

#### Survey Team 2, NEPTUNE II, Capt. William Shastal

David Anderson, Volunteer

Russ Bellman, Volunteer

Keith Hackett, Volunteer

Rex Koderl, Volunteer

Cameron McCarthy, Volunteer

Linda Pfeiffer, Volunteer

Phil Pfeiffer, Volunteer

Dr. Karl Pitts, Volunteer

#### Survey Team 3, NEPTUNE II, Capt. William Shastal

Dan Aerts, Volunteer

Dr. Richard Boyd, Volunteer

Dr. Carl Corey, Volunteer

Toni Derion, Volunteer

Janice Edison, Volunteer

Harold Martin, Volunteer

Valerie Martin, Volunteer

Dave Neudek, Volunteer

State Historical Society of Wisconsin

Dr. H. Nicholas Muller III, Director  
Jeff Dean, State Historic Preservation Officer  
Dr. Joan Freeman, State Archeologist  
Robert Birmingham, Staff Archeologist  
Judy Patenaude, Graphic Artist  
David Tennessen, Research Assistant and Graphics  
Henry Wend, Research Assistant

University of Wisconsin-Madison

Dr. Robert Ragotzkie, Director, UW-Sea Grant Program  
Mr. Al Miller, Sea Grant Advisory Services Coordinator  
Dr. Lynn Frederick, Sea Grant Advisory Services Field Agent  
Mr. Jim Buchholtz, UW-Marine Studies Center

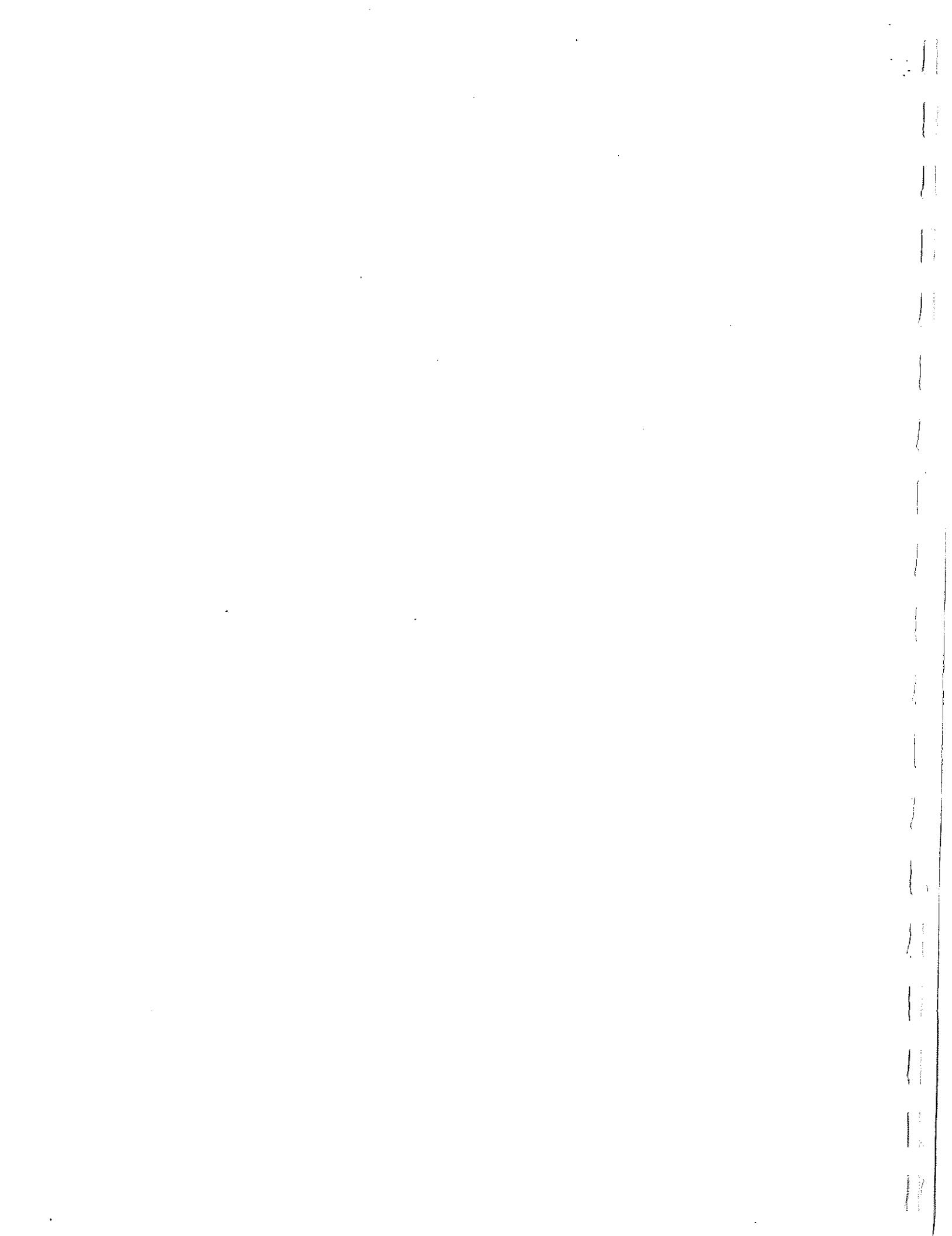
This report is respectfully dedicated to State Representative Lary J. Swoboda,  
whose concern for preservation of Wisconsin's submerged cultural resources  
provided the legislative initiative to make this program possible.

Photo Credits:

Figures 8, 15, and 22 courtesy Milwaukee Public Library. All other figures  
courtesy State Historical Society of Wisconsin. Cover design: Judy Patenaude,  
State Historical Society of Wisconsin. Cover photo: Robert Birmingham, State  
Historical Society of Wisconsin.

## TABLE OF CONTENTS

	PAGE
List of Illustrations . . . . .	iv
Introduction. . . . .	1
Research Methodology. . . . .	3
Geographical Overview . . . . .	10
Maritime Historical Overview. . . . .	13
Site Surveys	
A. Sch. WINFIELD SCOTT . . . . .	24
B. Scow-Bark CHERUBUSCO. . . . .	34
C. Sch. BOAZ . . . . .	43
D. Pilot Island NW Site. . . . .	50
E. St.s. R.J. HACKETT. . . . .	78
F. St.s. LOUISIANA . . . . .	92
General Management Recommendations. . . . .	105
Bibliography. . . . .	110



LIST OF ILLUSTRATIONS

FIGURE	PAGE
1. Door County and Surrounding Waters . . . . .	4
2. Death's Door and Northern Islands. . . . .	7
3. Whaleback Shoal and Hedgehog Harbor. . . . .	8
4. WINFIELD SCOTT Site Plan . . . . .	27
5. Sch. WINFIELD SCOTT, Cross-Sectional Views . .	30
6. CHERUBUSCO Site Plan . . . . .	37
7. BOAZ Site Plan . . . . .	46
8. A.P. NICHOLS (right), J.E.GILMORE (left), and remains of scow-schooner FOREST (between dock in foreground and GILMORE) ashore on Pilot Island, October 1892 . . . . .	61
9. Inverted bottom of A.P. NICHOLS; note centerboard trunk and flush keel . . . . .	61
10. Pilot Island NW Site Plan. . . . .	64
11. Port side and rail of NICHOLS, overlain by inverted bottom . . . . .	67
12. Iron knee, A.P. NICHOLS. . . . .	67
13. Keyed scarphs, A.P. NICHOLS ceiling, section H. . . . .	70
14. Section G; scow bow construction, probably from FOREST . . . . .	70
15. St.s. R.J. HACKETT, circa 1892-1905. . . . .	83
16. HACKETT floors and port bilge keelson; note close spacing of floors . . . . .	83
17. R.J. HACKETT Site Plan . . . . .	84
18. Scarph joints in keelson and rider, amidships viewed from port side. . . . .	85
19. Steeple engine; note Neo-Classical columned framing . . . . .	85
20. HACKETT air pump for steeple engine. . . . .	86
21. Diver David Anderson inspects propeller shaft, thrust bearing and braces, and flywheel . . . . .	86

22.	St.s. LOUISIANA, circa 1889 . . . . .	95
23.	Disarticulated bow section. . . . .	95
24.	LOUISIANA Site Plan . . . . .	96
25.	Iron cross-bracing. . . . .	99
26.	Athwartships bilge ceiling, port side . . . . .	99
27.	Forward engine mount (foreground), bilge pump pipe at left, keelsons and "trunk" for stanchions visible rear center. . . . .	102
28.	Fore and aft cylinders, viewed from port side . . . . .	102

## INTRODUCTION

In January 1988, the Wisconsin state legislature provided initial funding for the State Historical Society to conduct a pilot study of state underwater archeological resources, with an eye to improving the management and protection of historic shipwreck sites and developing shipwreck sites as recreational areas. This pilot underwater archeology program was dovetailed with new state and federal efforts to protect and manage submerged cultural resources in Wisconsin, via the 1988 state Omnibus Historic Preservation Act, and the federal Abandoned Shipwreck Act of 1987. The latter act charges the states with the protection of historic shipwreck sites, and new state archeology law (44.47 Stats.) provides for stricter penalties for those who damage or destroy underwater archeological and historical sites on state-owned lands (including the bottoms of the Great Lakes).

Shipwrecks are an important repository of information relating to Wisconsin's maritime heritage, and are of great interest to divers, tourists, and scholars for their recreational and historical value. However, these sites have been subject to extensive looting and uncontrolled salvage in the past thirty years, thus destroying much of their historical and archeological value, as well as their recreational appeal. The state is now faced with the need to address the management of shipwrecks as finite resources with sometimes overlapping historical, recreational, and commercial values.

Marine preserve areas were initially proposed as being an economically attractive means of managing shipwreck sites for a combination of historical, recreational, and commercial uses. States such as Michigan, Vermont, and

Florida have already undertaken inventories and surveys to identify and manage state submerged cultural resources, and have developed marine preserve systems as a means of protecting sites of historical and archeological interest, as well as enhancing their usage through recreation and tourism. Such preserves have succeeded in protecting important resources, have generated considerable public interest in shipwreck preservation and recreation, and have had significant positive impact on local economies.

Field survey of archeological resources targeted for management is vital for identifying the nature, location, condition, and management requirements of individual sites. With increasing public and governmental interest in the economic benefits of marine preserves has come an increased demand for archeologically evaluated shipwreck sites for inclusion in proposed preserve areas. The following report is the result of initial reconnaissance-level field survey of submerged historic shipwrecks in one proposed marine preserve area, the waters of northern Door County. The report discusses the research design and methodology necessary for the evaluation of submerged cultural resources, and documents the nature, location, and significance of selected historic shipwreck sites in the northern Door County area.

## RESEARCH METHODOLOGY

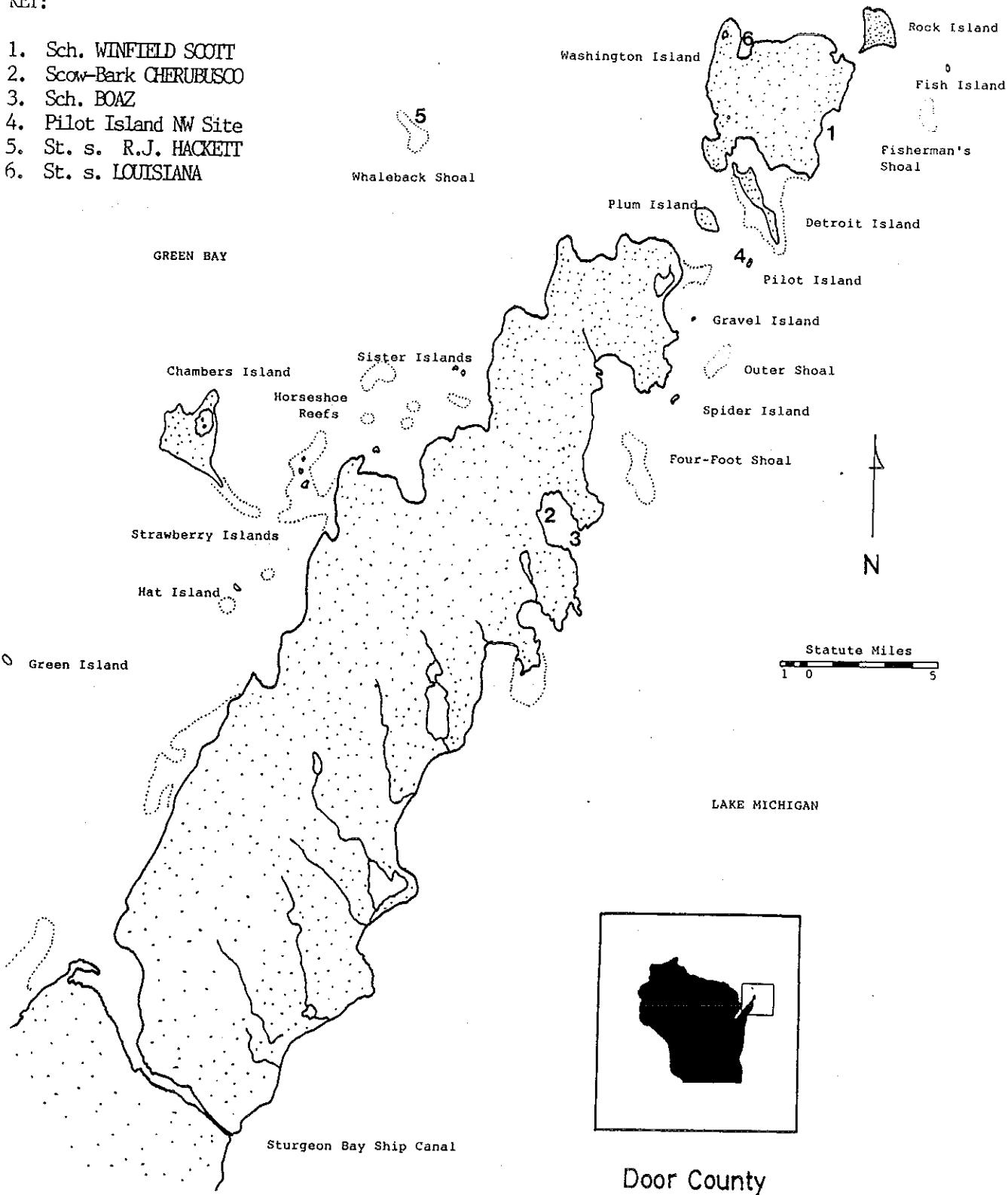
Field survey planning was preceded by a historical literature search of historic shipwreck sites in state waters, and this literature research and inventorying will be an important and ongoing program function. Six months of initial historical research identified sixty-one historic shipwreck losses in the immediate vicinity of northern Door County (Figure 1), and subsequent research has identified some 700 historical shipwreck sites statewide. Secondary literature sources and interviews with sport divers, charter operators, and fishermen produced a good deal of follow-up information on which sites were known, what was known about them, and produced preliminary assessments regarding site integrity, environment, and potential significance.

The initial inventory of sites for Door County identified important concentrations for follow-up field archeological survey, and identified known sites which would be immediately accessible to researchers without the need for expensive and time consuming remote-sensing search and survey. Due to budgetary and time constraints, it was opted to prioritize those sites which were known, popular dive destinations, allowing researchers to evaluate the currently used and known resources for past and future human and environmental impacts, as well as management potential. Secondary priority was placed on those sites which were easily accessible, and could provide baseline archeological data on lake vessel types and construction, Great Lakes shipwreck deposition patterns, and site formation processes. Such contextual information enables cultural resource managers to better evaluate a site's relative significance in local, regional, and national history, and to predict site integrity and depositional parameters which can influence archeological determinations and management requirements for a broader scope

Figure 1

KEY:

1. Sch. WINFIELD SCOTT
2. Scow-Bark CHERUBUSCO
3. Sch. BOAZ
4. Pilot Island NW Site
5. St. s. R.J. HACKETT
6. St. s. LOUISIANA



After NOAA Chart 14902 North End of Lake Michigan

*S. Cagan*

of cultural resources.

Therefore, each site was approached with a package of management questions, some specific to the site itself (location, environment, parameters, integrity, extant features, artifacts) and some general questions which placed the site in its broader context as a resource (historical significance, archeological potential, recreational potential, management requirements).

Research objectives had the following intents:

Phase I Archeological Survey.

1. Determine site location, environment, and parameters through visual survey of extant elements, features, and artifacts.
2. Document and map exposed remains using trilaterated survey points and an onsite (submerged) datum or using an offsite (surface) datum, transit and electronic distance meter.

Phase II Archeological Evaluation.

1. Document using still photos, underwater video, and measured sketches those architectural and archeological elements which are diagnostic of (a) vessel type (b) vessel age (c) vessel construction style and method (d) vessel propulsion (e) vessel use (f) vessel identification (through comparison with inventory records of historically-known vessel losses) (g) vessel cargo (h) shipboard human activity broadly indicative of occupation, status, ethnicity, subsistence or other questions allied with the study of maritime anthropology and Great Lakes social and economic history.

2. Provide a preliminary assessment of a site's environmental and cultural context for determining its historical significance and archeological potential (according to National Register of Historic Places criteria) as well as recreational potential, and management requirements.

#### Survey Operations

Field research was directed by the state underwater archeologist, who was assisted by seventeen sport diver volunteers and by a team of researchers from East Carolina University, Greenville, North Carolina. The former group received orientation and on-the-job training in the techniques of archeological documentation and underwater survey. The latter group participated in the survey work as an adjunct to their graduate field school training in the East Carolina University Program in Maritime History and Underwater Research. As such, this phase of the research was jointly funded by the State Historical Society and East Carolina University. Also, University of Wisconsin-Sea Grant loaned their research vessel ORION to the joint survey effort and provided assistance with project planning.

Five survey areas were selected for initial reconnaissance; Death's Door Passage (Plum and Pilot Island), Whaleback Shoal, Washington Island, North Bay, and Sturgeon Bay (Figures 2 and 3). Field crews investigated eleven sites in the five survey areas, comprising the remains of at least fourteen separate nineteenth century sail and steam vessels. The vessels included two wooden-hulled bulk carrier steamers, a scow-schooner, a scow-bark, a tandem-centerboard schooner, a pre-Civil War offset-centerboard schooner, three barges, and components of at least five other sailing vessels (probably schooners).

Figure 2.

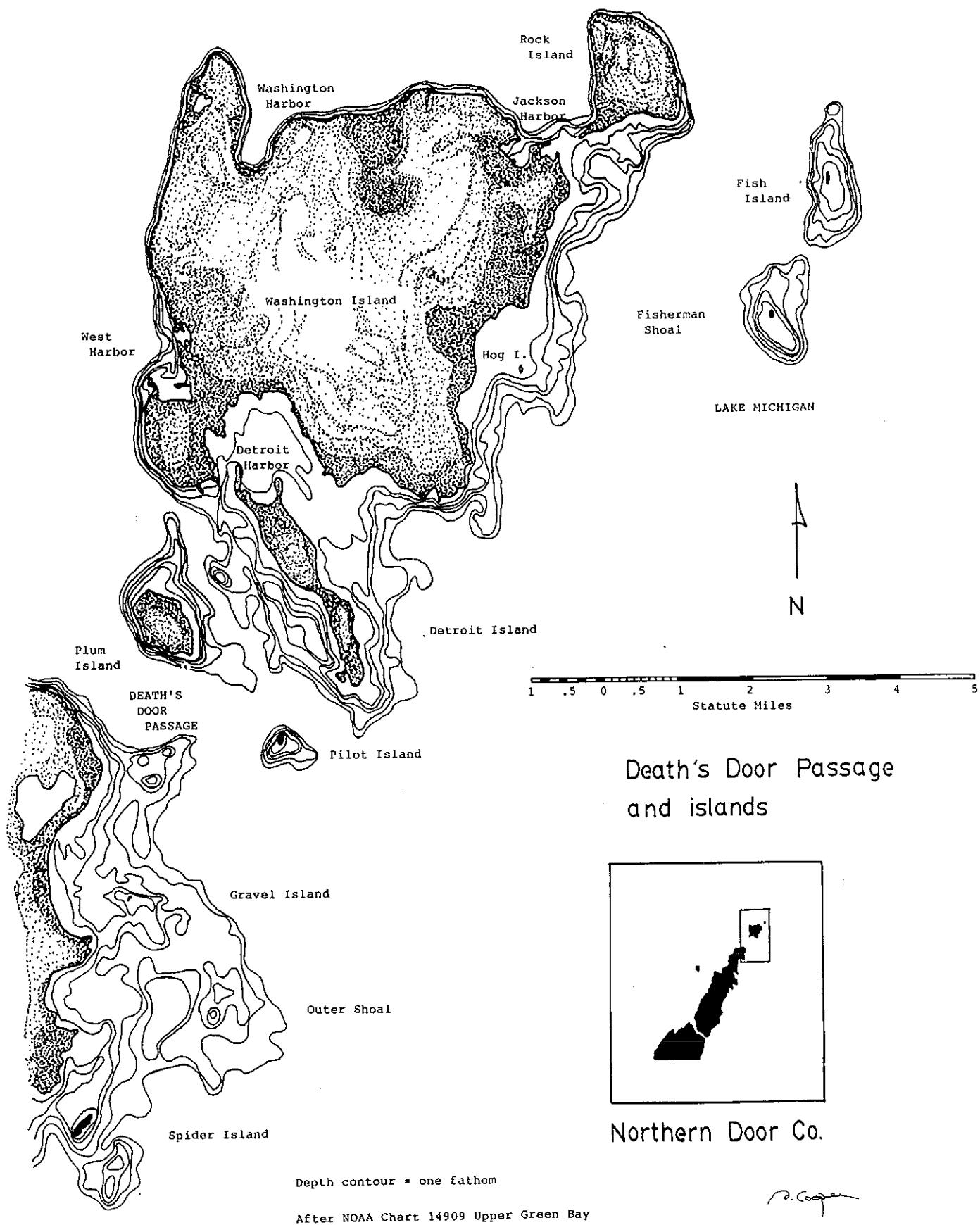
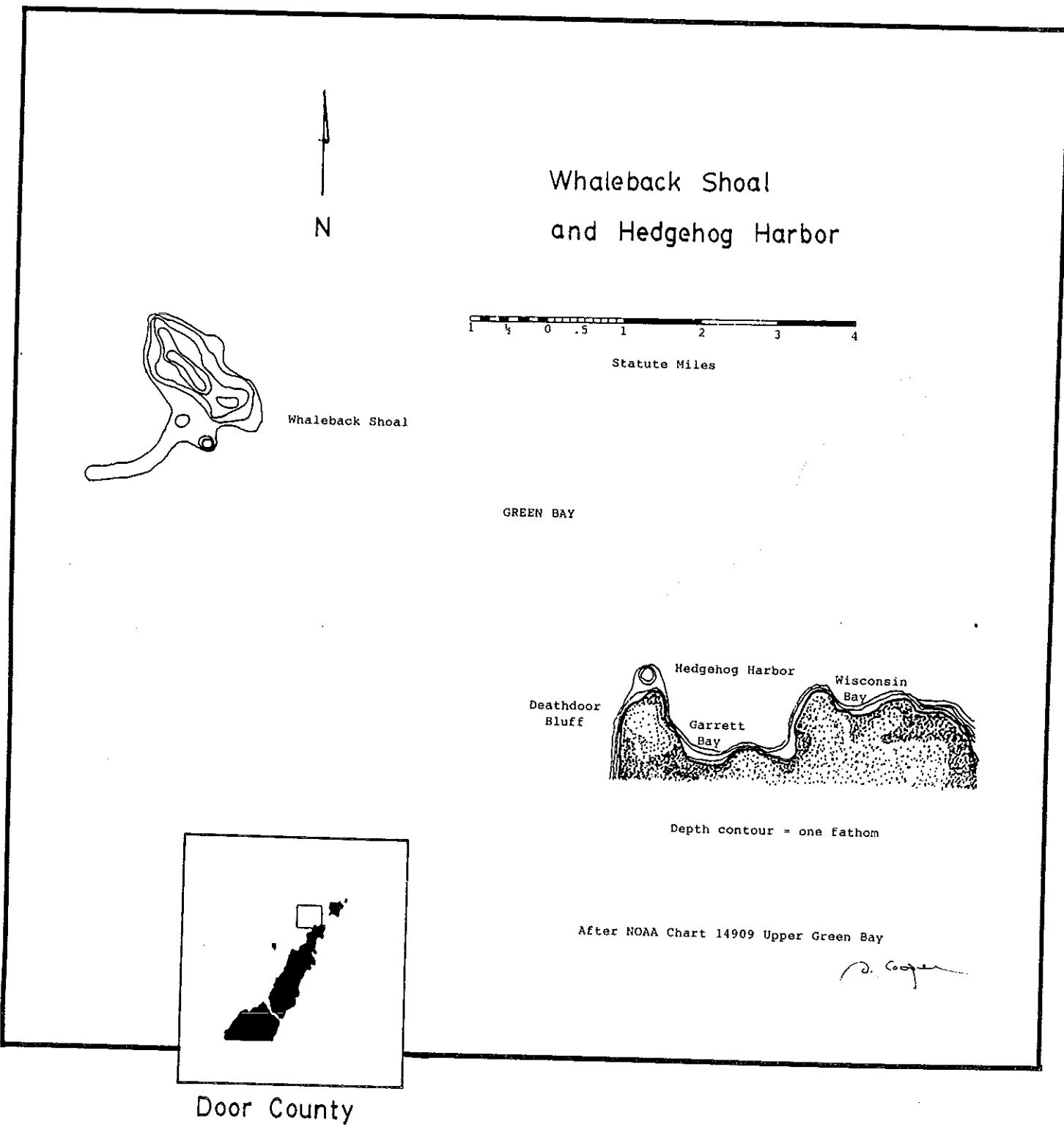


Figure 3.



Vessel remains were photographed and locations were noted on U.S.G.S. topographic maps. Six of these sites were selected for preliminary Phase II survey and documentation, and recommendations for a more complete evaluation of the site is included following the conclusion of the 1988 work. Two sites were surveyed at each Washington Island and North Bay and one site was surveyed at each Whaleback Shoal and Death's Door. Examination of a second Death's Door site was cancelled due to foul weather in the wake of hurricane Gilbert which ended the 1988 field season.

## GEOGRAPHICAL OVERVIEW

The Door Peninsula consists of a rocky promontory jutting northeast out into Lake Michigan from northeastern Wisconsin. It is bounded on the east by the waters of Lake Michigan and on the west by the waters of Green Bay. It is approximately eighty-four miles long (from its base to the north shore of Rock Island) and between three and ten miles wide, with a total shoreline of about two-hundred miles (Holand 1917:5; Mason 1966:1).

The peninsula consists of a high cuesta of Niagara dolomite with a thin soil covering. The dolomite was formed in the Silurian period of the Paleozoic when a shallow sea covered parts of what is now Wisconsin. Dolomite is formed from lime deposited in water from shells, corals, and precipitated by some plants. This lime forms calcium carbonate or limestone ( $\text{CaCO}_3$ ). Over millions of years, magnesium (probably from groundwater) is added to form calcium magnesium carbonate or dolomite [ $\text{CaMg}(\text{CO}_3)_2$ ] (Peterson 1965:55).

The dolomite deposits range from 450 to 800 feet in thickness. As the dolomite is very erosion resistant, it forms the highlands characteristic of western Door County. The dolomite ridge in Door County rises abruptly from the waters of Green Bay on the peninsula's west side forming into sheer bluffs, and runs east in gently sloping ledges towards Lake Michigan, where the terrain is characterized by low, swampy shores. The Lake Michigan shoreline consists of a gradually sloping sand bottom, and the bays on this side are generally shallow, with sand-silt bottoms. The abrupt topography of the Green Bay side produces deeper bays with steeply sloping rocky bottoms and dolomite ledges. The surrounding islands parallel the peninsula somewhat in geography, with highlands to the west (in the case of Rock and Washington Islands), and

with generally rocky bottoms and steep shelving on the Green Bay side, and shallower sloping terrain towards Lake Michigan. The smaller islands in Death's Door Passage (Plum, Pilot, and Detroit) are generally rockier and flatter, with rocky bottoms dropping off to sand.

The peninsula was originally heavily wooded with numerous species of softwoods and hardwoods including beech, maple, ash, oak, ironwood, elm, pine, hemlock, cedar, basswood, spruce, balsam fir, and poplar (Holand 1917:5; Martin 1881:5). As a detailed discussion of native vegetation, climate, and geology is outside the scope of this report, Mason (1966), Martin (1932), and Curtis (1959) should be referred to for additional description.

Mineralogically, lake bottom sediments are considered "immature". Sand grains (formed from quartz, feldspar, augite, horneblende, hypersthene, and olivine) exhibit a low degree of rounding from water action; they are relatively angular. The lake sands are derived from glacial drift, and lake gravels are formed from glacial till and eroding rock cliffs. These sands and gravels constitute the littoral (inshore) shelf. The deeper profundal lake zone bottom is made up of clays and glacial muds. Coring of the Lake Michigan bottom at a depth of 923 feet has indicated that the deep lake bottom is formed of an overlying ten foot strata of gray clay, interspersed with color bands of jet black. This is underlain by a substrata of red clay. Other lake sediment components include organic detritus, with humus (a product of lignin deterioration) forming the primary component (Hough 1958:66-67,70; Singley 1988:5,62).

Lake waters are fresh, with 118 parts per million of dissolved solids, opposed to ocean water with 35,000 parts per million. The surface of Lake Michigan is

located 580 feet above sea level, and is virtually without tidal action. Lake Michigan surface water averages 32 degrees Fahrenheit in the winter and can reach 70 degrees Fahrenheit in the summer. A spring overturn of lake water occurs when bottom and top temperatures equalize at 39.2 degrees Fahrenheit. Warmed surface waters are then allowed to mix vertically with colder bottom waters due to the actions of wind and currents. In summer, the surface water continues to warm, becoming less dense, leaving the cold bottom water to settle. No vertical mixing of water takes place in the summer. In fall, a cooling of the surface waters produces a fall overturn, again at 39.2 degrees Fahrenheit (Hough 1958:3,50,60-61).

In addition to seasonal water temperature fluctuations, shallow sites on the lake bottom are subjected to both wave and ice action. While studies indicate that the depth of wave action is a function of wave length, the precise formula has not been agreed upon. One study indicates that wave action affects the bottom to a depth equal to the wave length, another indicates that this affect only extends to a depth equal to half the wave length. It has also been asserted that the maximum depth of "vigorous wave abrasion" is approximately twenty-five feet. Therefore shallow sites existing within this zone may be impacted to a degree by wave action. Additionally, winter ice can impact shallow sites. Solid sheets formed over the site in winter can break up, and inshore ice shoves and wind can push floes across the surface of the bottom, affecting protruding wreckage and structures (Hough 1958:33,49). Additional information on lake geomorphology may be found in Larsen (1985) and Dirst (1987).

## MARITIME HISTORICAL OVERVIEW

The recorded history of water-borne commerce on the Great Lakes begins with the French explorers and traders of the seventeenth century. Though Jacques Cartier discovered New France (Canada) in 1534, the upper Great Lakes remained unexplored by whites until 1615 when Samuel de Champlain discovered Lake Huron while exploring the French River region. Jean Nicolet is believed to be the first European explorer in the area later to become Wisconsin, arriving in 1634. In 1654, a French trading expedition settled the area of the present city of Green Bay. While the arrival of European trade goods and commerce began important changes in Wisconsin, the French had little interest other than fur trading. As relatively few posts were built, and virtually no intensive farming or logging was conducted, the interior remained largely unexplored by Euro-Americans apart from the Jesuit missionaries (Gara 1962:1,5,12).

The canoe was the major form of lake transportation for the first sixty-four years of French exploration. These were adopted from the native peoples of the region, and were constructed of birchbark laced onto cedar frames with spruce roots, using pine gum for caulking. The small craft were easily portaged and useful on narrow streams, but only carried one to two people (Cuthbertson 1931: 3,5,7-9).

The French enlarged the canoe design to a length of thirty-three feet or more. These were known as "canot de maitre," or "grand canot." They were referred to by size as being five or six fathom canoes. Developed for military and fur trade purposes, they has a capacity of 4,000 to 8,000 pounds, including crew and cargo (Ibid:12-14; Mansfield 1899:I:387-388).

Few if any advances were made in shipping technology until 1678, when fur trading attracted a colorful and enterprising Frenchman, Rene Robert Cavalier Sieur de La Salle, a soldier, sailor, and explorer. Motivated by fears of Anglo-Dutch competition in the Great Lakes fur trade, La Salle sought to extend French occupation by establishing new posts and forts, as well as stepping up the volume of trade. To assist this French expansion, La Salle recognized the need for larger vessels, able to carry more furs (Cuthbertson 1931:16,18-19).

La Salle brought a small ship onto Lake Ontario, undertaking the first voyage on November 18, 1678. This small vessel was probably one of the four built at Fort Frontenac prior to 1678 for the trade between the Fort and Niagara. These ships were most likely similar to an English pinnace in design, of about forty-five foot length, twelve to thirteen foot beam, and six foot depth of hold (Ibid:40-43). The following winter, a new ship was constructed on the Niagara River for La Salle. Named the GRIFFON, she was built of green timber and was launched by late spring or early summer. It seems to have been similar in design to a Dutch galleot, with a high poop, rounded stern, and the ability to carry heavy cargoes through shoal water. She was armed with five guns, and measured about sixty tons. Her dimensions were probably around seventy foot length, sixteen foot beam, and eight foot depth of hold (Ibid:32,44-46).

The GRIFFON entered Lake Erie August 6, 1679 and headed uplake for "an island at the entrance to Green Bay approximately forty leagues from Michilimackinac," presently believed to be modern day Rock Island (Mason 1986:17-20). Excavations at Rock Island (Mason 1986) of a multi-component proto-historic and historic Native American occupation show evidence of French

trade goods and of a small palisaded post contemporary with La Salle's expedition. At La Salle's rendezvous point the GRIFFON unloaded a cargo of supplies and shipwright's tools, and departed on September 18. Shortly thereafter a storm swept the area, and she was never seen again. Her final resting place remains a mystery, but it is believed that she foundered or was driven ashore by the storm somewhere in northern Green Bay or Lake Michigan. La Salle himself was not with the vessel, and continuing his explorations he entered the Illinois River in 1679 and founded Fort St. Louis in 1680 (Cuthbertson 1931:34-38).

With the passing of the GRIFFON, the development of lake shipping came to a standstill for almost fifty years. Two schooners were built on Lake Ontario in 1726 for the Frontenac-Niagara trade, and by 1741, four such vessels were recorded in service. One of the earliest upper Great Lakes vessels was a 25-ton ship built at Sault Ste. Marie on Lake Superior in 1735 by a French miner, Sieur de la Ronde. She was to be used to carry copper from the small mining concerns developing in the Superior region. Other types of watercraft began seeing use on the Great Lakes in the eighteenth century, including bateaux (large, flat-bottomed skiffs which were oared, poled, or sailed), as well as double-ended oared craft similar to contemporary whaleboats (Ibid:50-51,54-60,85-88; Labadie and Murphy 1987:43; Mansfield 1899:I:390).

French occupation of the Great Lakes region ended with the Seven Year's War and the signing of the Treaty of Paris in 1763. The French ceded to the British all of New France, including Canada as well as all lands east of the Mississippi. A British Army post was established at Green Bay between 1761 and 1763 (Cuthbertson 1931:3-5,16). In 1784, the British government granted permission to build and operate commercial ships on the lakes (previous

vessels had been for military use in the Seven Years War, and for military transport). With this, the 40-ton sloop BEAVER was launched at Detroit in 1785, and saw merchant service on Lakes Michigan, Huron, and Erie. The 70-ton sloop OTTER of the Montreal-owned North West Company was built and launched at Sault Ste. Marie in the same year for service on Lake Superior (Ibid:125-128; Labadie and Murphy 1987:43).

The experiences of the eighteenth-century indicated that the fore and aft sailing rig was the ideal rig for the Great Lakes, both for merchant and naval vessels. Sudden lake squalls discouraged the use of square sails, which could not be taken in quickly. Additionally, the fore and aft rig was easier to work to windward, and could be handled by fewer men (Cuthbertson 1931:58,128). Economy was important on the frontier, and the ability to sail in any wind was important on the lakes, with their variable airs, shoal waters, and lack of sea room. The British Deputy Surveyor General Collins reported to Lord Dorchester in 1788;

Gales of wind or squalls rise suddenly upon the lakes, and from the confined state of the waters, or want of sea room (as it is called), vessels may in some degree be considered as upon a lee shore, and this seems to point out the necessity for their being built of such construction as will best enable them to work to windward. Schooners should perhaps have the preference as being safer than sloops (Ibid:129-130).

The schooner was the favored lake rig until the decline of commercial sail on the Great Lakes. Lake vessels carried a large sail area in proportion to their hulls, as midsummer lake winds were uncertain, and often very light.

Frequently, a square topsail was carried by sloops and schooners to augment the fore and aft sails while running before the wind. The gaff-rigged topsail became the classic lake rig in the nineteenth century. A yard was mounted at the hounds (below the cross-trees) of the foremast, and a large course or "runner" was set. In later times a new sail came into use, the "raffee." This was a triangular topsail footed on the yard and spread up to the mast truck (Ibid:128-129; Mansfield 1899:I:233). The raffee, while not unique to the Great Lakes, saw much of its service here. It was also used in British coastal schooners in the 1860's, where it was also called a raffee (Hirthe and Hirthe 1986:115).

Another peculiarity of lake vessels was the almost universal use of the centerboard, which was found in schooners, sloops, barks, and even brigs. The invention of the centerboard has been credited to a British Royal Navy lieutenant named Schank, who apparently used these while constructing naval vessels in Boston in 1774 and on Lake Champlain in 1776. Built of oak planks and weighted with lead or iron, the centerboard, a cousin to the Dutch leeboard, was set on a pivot and lowered through a trunk in the bottom of the hull to resist drifting to leeward while under sail. This greatly improved the windwardliness of sailing vessels, and had the further advantage that it could be raised in shoal water. These boards were either set through the keel or offset to one side (Cuthbertson 1931:236-237; Labadie and Murphy 1987:48).

The land including modern day Wisconsin was ceded by the British to the United States following the American Revolution as part of the new Northwest Territory. According to the Treaty of Paris (1783) all British northwest posts were to be turned over to U.S. troops "with all convenient speed." The British were somewhat slow to leave, and the terms of the Treaty of Paris

regarding British evacuation of northwest posts were reiterated in Jay's Treaty of 1794 (Gara 1962:26,29).

Lake commerce saw a great increase following the American Revolution, and the entrance of the Americans into the western lakes region. The post-War of 1812 period, in addition to freeing lake shipping from military attack, brought extensive migration and settlement, with attendant commerce from developing industry and agriculture. Formal possession of the Wisconsin area was not taken until 1816, when the American army post of Fort Howard was built at Green Bay. The early forts were centers of society, commerce, and education, and preceded civilian settlement in the movement west (Ibid:41; Martin 1881:3).

The fur trade in Wisconsin was gradually eclipsed by mining, agriculture, and lumbering, all of which required new and more extensive transportation networks for supplies and marketing. The Black Hawk War in 1832 drove the Sac and Fox Indians from Wisconsin, opening up new lands, and calling attention to the rich territory around the upper Great Lakes. The post-war period saw a good deal of immigration into Wisconsin, Illinois, and Indiana. Half of these immigrants came by water, and an estimated 90% are said to have come from Europe (Gara 1962:46; Mansfield 1899:I:183). Navigational improvements such as canals helped lake products reach a wider market. The opening of the Erie Canal in 1826 between Buffalo and Albany connected the Great Lakes to the Atlantic Ocean, via the Hudson River and New York City., thereby opening a crucial artery for incoming and outgoing trade and immigration. In 1829, four of the five Great Lakes were connected by navigable waterways with the opening of the Welland Canal around Niagara Falls, allowing passage from Lake Ontario to Lake Erie. (Cuthbertson 1931:202,205,208,231-220).

Steamboats began appearing on Lake Michigan around 1826, mostly as pleasure excursions to the scenic waters of Green Bay, which then as now, were valued for their natural beauty. Government-chartered steamers first put in their appearance at Chicago with the Black Hawk War, and the harbor of this city received its first improvements by the federal government in 1833 (Hartshorne 1924:17; Mansfield 1899:I:184). By this time, there were eleven steamers running on Lakes Michigan, Erie, and Huron. Of the 61,485 passengers they carried to and from Buffalo, 42,956 were headed west. By 1834, forty-eight steamers were running from Buffalo to Green Bay and Chicago, and regular steamship lines between Buffalo and Chicago began in 1839. 30,945 immigrants arrived in Wisconsin in 1840, and by 1850 305,391 persons immigrated to Wisconsin, arriving almost exclusively by lake vessels (Mansfield 1899:I:184-185,188-189).

The first known Euro-American settler in Door County was Increase Claflin, who settled at Little Sturgeon Point in 1835, moving north to Fish Creek in 1844. Fishing and lumbering became important businesses in Door County; the forests provided lumber for railroad ties, telegraph poles, shingles, fenceposts, and cordwood, while the lakes provided trout and whitefish for salting, and sturgeon for smoking. With no railroad and few roads, settlements tended to grow up around harbors with good anchorages for incoming vessels (Martin 1881:6-7,10-15). While much of the immigration by steamboat filled the developing urban areas like Milwaukee and Chicago, much of the pre-Civil War sailing vessel traffic was characterized by the supply of small lakeshore settlements and fishing camps. Typically, manufactured goods and supplies were brought from eastern ports, and raw materials, fish, and lumber were shipped out to the urban centers. The log of the schooner GAZELLE for 1838 documents just such trade with fishing camps at Death's Door, Fisherman's

(Whitefish) Bay, and Twin Rivers (Cooper 1988:34-37). Archeological evidence for early fishing activity and settlement at North Bay and Whitefish Bay has been documented by Mason (1966:30), Omwake (1965) and Dirst (1987). Despite failing western land speculation and the Panic of 1837 (which hindered investment in the territory) Wisconsin achieved her statehood in 1848. The opening of the Sault Ste. Marie canal in 1849 allowed for the passage of vessels from Lake Huron to Lake Superior, connecting all five Great Lakes with navigable waterways. Increased settlement and production produced a demand for larger lake vessels, and improvements in the Welland Canal in 1846 and in the St. Lawrence River allowed larger vessels to move freely about the lakes. In 1849, the barkentine EUREKA set sail to California with a load of Cleveland gold rush prospectors, via the Welland and St. Lawrence Canals (Cuthbertson 1931:235,248-249; Gara 1962:68-69,94,118).

However, increased shipping created a general need for improvements to lake navigation and harbors. Lighthouses, buoys, and other navigational aids needed to be established on the many hazardous shoals and islands, harbors required improvement, and lifesaving stations were a necessity. The Chicago River and Harbor Convention in 1847 brought the issue of lake improvement to a level of national interest, and its 2,315 delegates represented some nineteen states and included such notables as Abraham Lincoln and Horace Greeley. Several successful federal river and harbor bills in succeeding years allocated national funds for navigational improvements to the Great Lakes (Mansfield 1899:I:201-203; Odle 1951:106-108,115).

The demand for larger vessels and improvements to harbors and canals brought about a steady evolution in Great Lakes vessels, both sail and steam. While brigantines and barkentines saw some early use on the lakes, the construction

of larger, heavily constructed gaff-topsail schooners eclipsed the use of most alternate rigs (Cuthbertson 1931:230-231, 241). From about 1850 on, full, three-masted schooners began to appear as the most popular American coastal trader, both on the Great Lakes and elsewhere. With the construction of the CHALLENGE in 1852 at Manitowoc, Wisconsin, a new type of schooner hull was seen on the lakes, the clipper-model, incorporating a schooner rig and a centerboard. The CHALLENGE was characterized by a sharp bow, full hull, flat bottom, and great speed (reportedly thirteen knots). At this time, many of the earlier two-masted schooners experienced a rig change to three masts, while brig and bark rigs were changing to schooner rigs (Chapelle 1982:260, 268-269; Hirthe and Hirthe 1986:vii).

The schooner has been called the most important American sailing rig, both in greatest total tonnage built, and tonnage of cargo carried. They were used mostly for rapid, short voyages with a quick cargo turnover. They dominated the American coasting trade, and the efficiency of this rig combined with a clipper-model hull is proven by the long existence of these vessels, which were used commercially in the United States well into the twentieth century. Needing only a small crew and handy in confined waters, the schooner actually increased in use at a time when other rigs were disappearing (Chapelle 1982:158, 219-220). Detailed discussion of schooner evolution and development may be found in Chapelle (1982), Greenhill (1980), Labadie and Murphy (1987), and MacGregor (1984).

Another improvement was being made at this time, but one which would in a large measure doom lake-borne commerce: the railroad. The first railway locomotive had arrived in Chicago in 1837 (ironically by schooner), and by the 1850's, railroad lines skirted much of the lake shores, connecting the major

points of commerce. Initially, the railroads were used for passenger transport, as they were not subject to the winter close of navigation (November to April) that hampered lake-borne commerce. With additional lines and better equipment, railroads began to take a larger share of the bulk transportation trade (Mansfield 1899:I:191).

Most of the new sailing vessels were being built specifically for bulk cargo carrying: general merchandise and passengers seems to have been a matter of serendipity. Common bulk cargoes were ore, timber, grain, and coal. Coal was shipped west from Erie and Cleveland to fuel western stoves, factories, and steamboats. Iron ore shipments came from the Marquette, Menominee, Gozebic, Vermilion, and Mesaba ranges. Most shipments went east via Lake Superior to the iron foundries of Ohio and Pennsylvania; relatively little ore was shipped on Lake Michigan, save for ore from Escanaba and shipments for Chicago (Mansfield 1899:I:547,555).

Lake Michigan commerce consisted largely of grain and timber, contributing heavily to the rise of many lake cities. Chicago and Milwaukee were large shippers of grain and importers of lumber for building and expansion. Chicago's first grain elevator was built in 1839, replacing this hand-operated version with a steam elevator in 1848. The mechanization of the grain trade was important for the efficient handling and shipping of this commodity. Vessels of increasingly greater capacity began to be constructed, and the average grain vessel capacity had risen from 12,000 bushels in 1848 to 70,000 bushels in 1873 (Andrews 1910; Cooper 1988:41-43; Mansfield 1899:I:526-530; Odle 1951).

Lumber was a commodity always in demand, and was a convenient and important

cargo for lake schooners. Chicago first began importing lumber in 1833, and thereafter became a huge market for building materials. By 1884-1885 there were around 500 steamers, schooners, and tow barges in the Great Lakes lumber trade, hauling approximately 8,000 cargoes per year (Mansfield 1899:I:514,518,520). Transportation had always been a major problem in the lumber industry. In 1913 it was estimated that, "transportation of forest products to mill or market represents 75% or more of the total delivered cost of raw materials exclusive of stumpage value." Costs for actual harvesting were relatively minor (Rector 1953:15,20-23,25). By 1856, Chicago was the main U.S. lumber wholesaler. Production in the lake states rose from 2 3/4 billion board feet of pine in 1869 to 5 billion board feet in 1879 and to 7 billion board feet in 1889. By 1900, most of the accessible pineries in Wisconsin and Michigan had been logged out (Ibid:57-60).

The decline of the Great Lakes lumber industry and the passage of bulk grain, ore, and coal hauling first to steam vessels and then to railroads was to a great degree the passing of the age of sail on the Great Lakes. Metal-hulled steamers and the railroads competed for the existing bulk cargo and passenger trade, and the schooners became barges or headed for the boneyards. Passenger trade and package freight eventually disappeared from the lakes. At the present time, ". . . only the bulk freighters have survived in service . . . [and] . . . the only representatives of the many vessels that once plied the Great Lakes are the shipwrecks that lie beneath their surfaces (Labadie and Murphy 1987:61)."

SITE SURVEYS

Schooner WINFIELD SCOTT

Vessel History

The WINFIELD SCOTT was a two-masted schooner, wooden-hulled, of 255 41/95 tons (old measure), built at Cleveland, Ohio in 1852 by William Jones. She was readmeasured as 213.46 total (or gross) tons following a new tonnage measuring system introduced in 1864 (Hirthe and Hirthe 1986:xi; U.S. Treasury Department 1874:63-71), and was assigned official number 10225 with the advent of official vessel numbering in 1866 (U.S. Treasury Department 1874:5).

Little enough is currently known of her operating history (this is fairly typical for the many working schooners which sailed the Great Lakes), though she is known to have been involved in a collision with the bark LOTUS at Chicago in 1869 (Milwaukee Sentinel 12/08/1869 p.2,c.4); not an altogether rare event in that crowded lake port. Her last known enrollment (No. 178) was issued at the Port of Chicago on April 13, 1870; owner J. Maypole, master H. Faith; date of surrender unknown (Hirthe, personal communication 1988).

However, the Milwaukee Wisconsin of August 1871, bore news of a somewhat more serious occurrence involving the SCOTT:

"The propeller G.J. Truesdell last night brought to this port the crew of the schooner Winfield Scott, which has met with a serious disaster near Death's Door. Captain Henry Faith, commander and part owner of the vessel, reports that he left Menominee with a cargo of lumber for Chicago, on Thursday. He passed through Death's Door in the evening, encountering a heavy sea from the southeast. He kept on, however, until outside of

Spider Island, when the vessel began to labor so heavily that it became necessary to call up the watch from below to take in the head canvass. The flying jib, jib staysail, and foresail were secured, and the watch proceeded to the forecastle, but immediately returned with the intelligence that the vessel had sprung a leak and was filling with water. The mainsail was then ordered double-reefed. This order had scarcely been fulfilled when the Scott gave a lurch and careened upon her beam ends. The crew clung to the wreck from eleven o'clock Thursday night until noon the following day, when the schooner Ethan Allen, bound into the bay, light, bore down for and rescued the chilled and half-drowned mariners, carrying them to Menominee . . . " (Door County Advocate 08/31/1871 p.3,c.1.).

Capt. Faith and his crew took passage on the propeller G.J. TRUESDELL to Milwaukee after telegraphing news of the disaster to Chicago. The Faith kept a sharp lookout on the return passage through Death's Door and past Spider Island, but failed to spot his capsized craft, concluding that it had been driven upon the rocks between Spider Island and Death's Door and had been destroyed (Door County Advocate 8/31/1871 p.3,c.1.).

He was only half correct. The schooner had indeed drifted ashore following the capsize (on August 18, or soon after), but had in fact headed north past the Door, to come ashore in the shallows around Hog Island, east of Washington Island. A wrecking expedition was dispatched from Port Huron to rescue the stranded schooner, but found that they could not save her, salvaging only a portion of the wreck (Milwaukee Sentinel 8/31/1871 p.4,c.6). The WINFIELD SCOTT's cargo of lumber was "liberated" by local fisherman, and the hull was left to the wind and waves (Milwaukee Sentinel 9/16/1871 p.1,c.5).

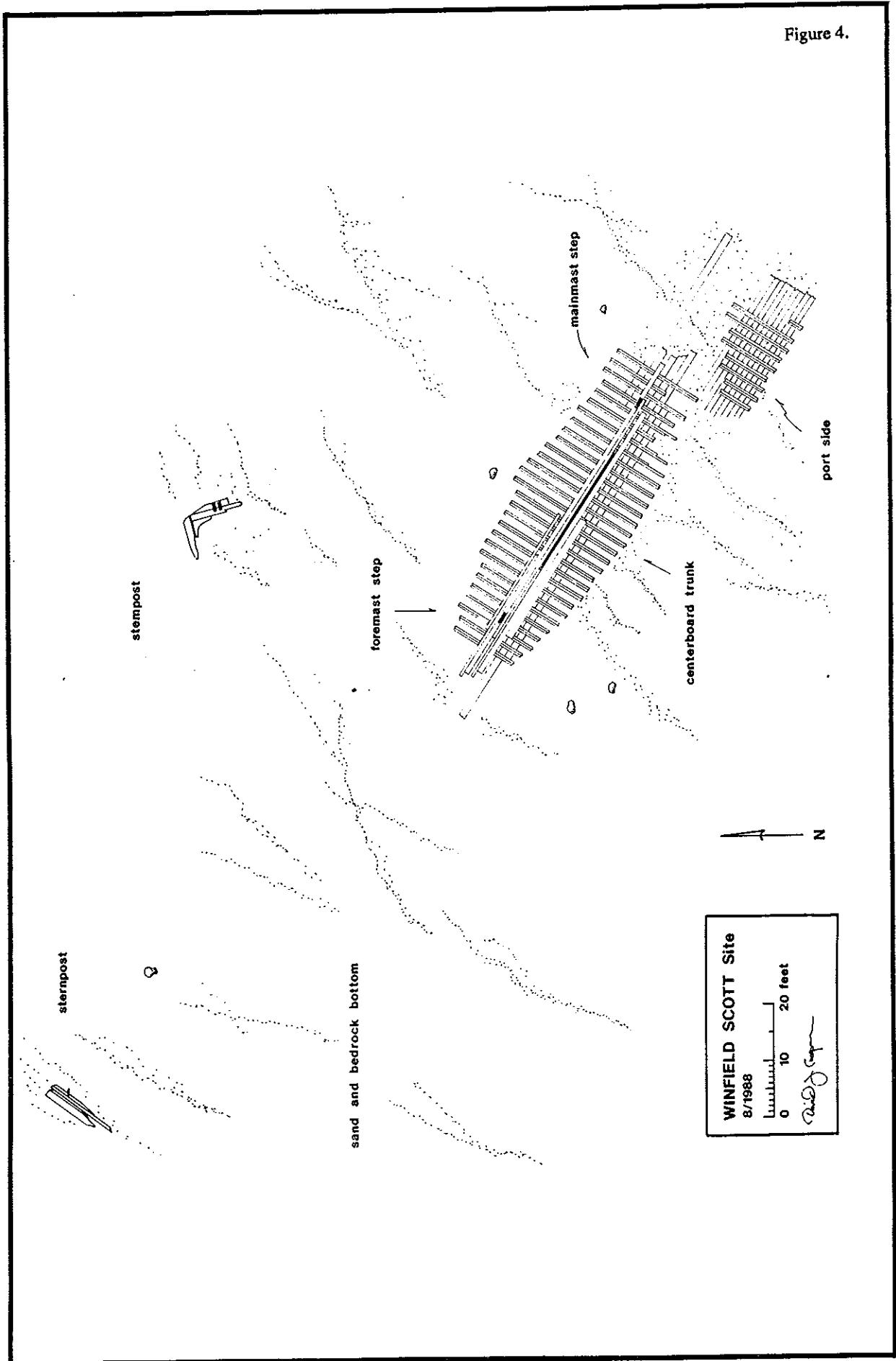
At the time of her loss, the SCOTT was insurance rated B1 and was valued at \$10,000 (Door County Advocate 8/31/1871 p.3,c.1). The loss to the vessel was listed at \$13,000 and loss to the cargo was listed as \$5,000. The vessel was insured for \$8,000 and the cargo for \$3,500. The WINFIELD SCOTT was a total loss to her owners, N.C. Winslow and Capt. Henry Faith (Ibid.; Marine Casualties 8/1871).

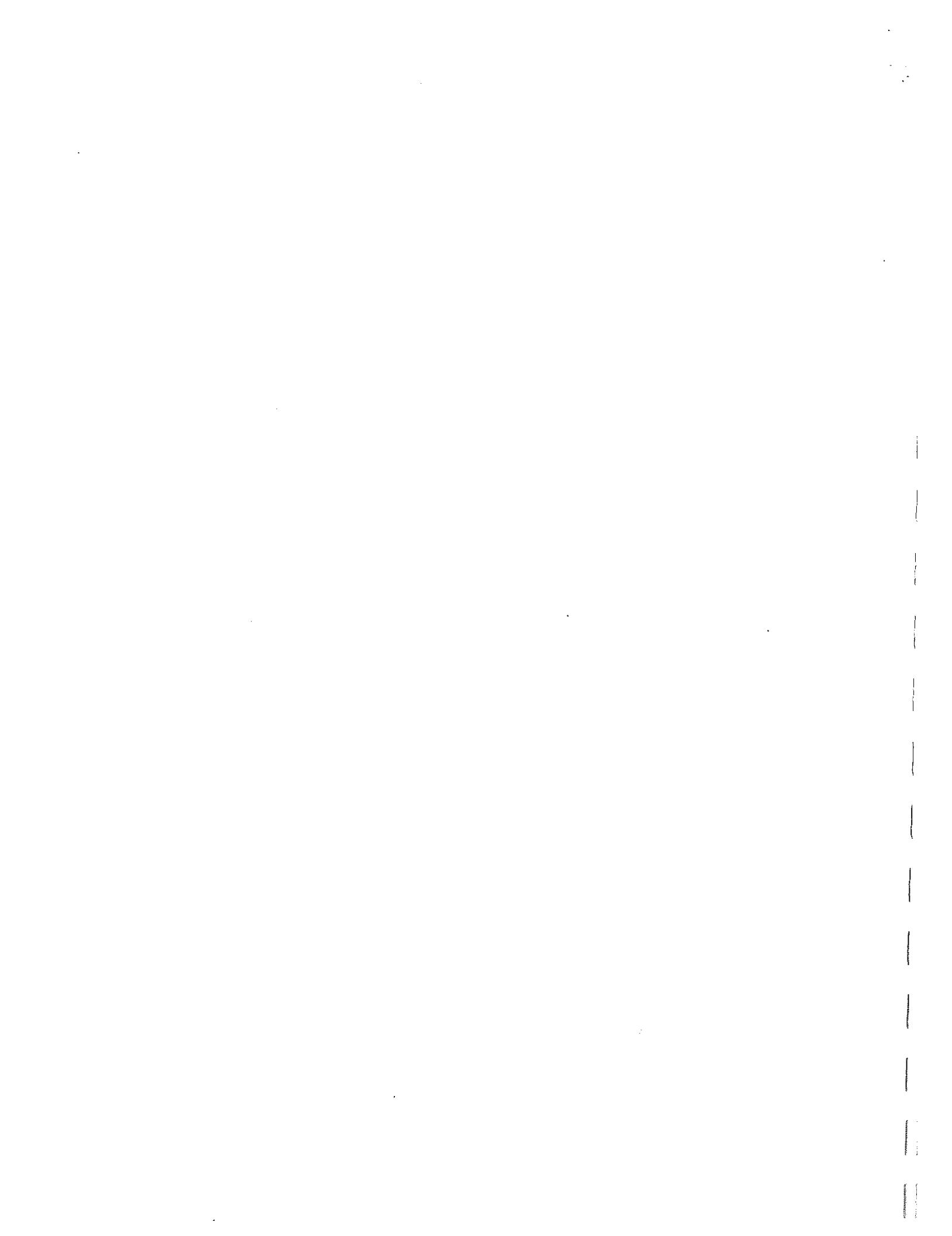
#### Site Description

What is believed to be the wreck of the WINFIELD SCOTT lies in the shallows between Hog Island and Washington Island, directly off East Side park, and is shown on National Ocean Service chart 14909 as a wreck obstruction. The site was relocated in August 1988 using LORAN-C coordinates taken from chart 14909 and visual survey by divers. The main section of the wreck lies in seven feet of water (1988 lake level), on a bottom of sand and bedrock. What is believed to be the bow (based on the location of the two mast steps) is facing inshore (northwest). The disarticulated stempost and bow deadwood is located due north of the main wreck, and the sternpost is located to the northwest. A section of the port side and stern quarter was found just off the site to the south. An additional piece of wreckage was located approximately 100 yards west (inshore) of the wreck (Figure 4).

The site was mapped using a shore-based theodolite and electronic distance meter (EDM) placed in nearby East Side park. A reflector mirror was placed at different points around the site at the water's surface, and distances and azimuths were recorded for each survey point. These points were trigonometrically converted into X-Y coordinates, which formed the basis for the underwater site plan. Each section of wreckage was documented with

Figure 4.





measured sketches and with 8mm video equipment, from which the resultant site plan and schematic drawings were generated.

The main wreck consists of the bilges, keelsons, and centerboard trunk assembly for a wooded-hulled, two-masted schooner. The construction and size of this wreck is consistent with what is known about the WINFIELD SCOTT, and no other wrecked vessel of this type can be reliably placed at this location. The vessel is double-framed, with floors and frames of 4" to 4 1/2" sided dimensions and 9" molded dimension at the floor. Frame sets are arranged with 9 1/2" room and 14" space between sets, fastened with 3/4" wrought-iron drift pins with peened heads.

The vessel is constructed with seven major longitudinal members (Figure 5); a central keelson of 10" x 12" dimensions (sided by molded), a 6" x 14" starboard sister keelson, two port sister keelsons (6" x 11" and 14" x 6"), a starboard pocket piece 5 1/2" x 20", a port pocket piece 11" x 20", and a keel of unknown dimensions (this member was buried under the hull, requiring excavation equipment for access). The keelsons were fastened with 1" wrought-iron peened drift pins, and the pocket pieces were fastened with 3/4" wrought-iron peened drift pins.

The hull was originally ceiled (as evidenced by 3/4" square-shank wrought-iron rosette-head spikes in the floors); very little of this ceiling has survived. Existing ceiling measures 7" to 11" in width, and 1" to 1 1/2" in thickness. Surviving external planking varies from 10" to 18" in width, with a 1" thickness, and was fastened with 3/4" square-shank wrought-iron rosette-head spikes.

The two mast steps on the wreck consist of rectangular mortises into the central keelson. The foremast (east end) step measures 2'2" in length, 7" in width, and 3 1/2" in depth, and is centered approximately 13' ahead of the centerboard trunk. The main (west) step measures 2' in length, and is centered approximately 8' aft of the centerboard trunk.

The trunk itself is of the offset-type, and is situated through the inboard port sister keelson, on the port side of the vessel. The floors at this point become "half-floors", that is, the trunk does not allow the floor from carrying through under the keelsons; thus a half-floor which butts into a mortise in the pocket piece is employed in the vicinity of the trunk. The longitudinal members are notched over the floors where required for a smooth fit (Figure 5).

This port-offset centerboard construction is similar to that employed in the 1846 construction of the schooner ALVIN CLARK, built by Joseph M. Keating in Truago, Michigan, and lost on Green Bay in June, 1864 (McCutcheon 1983:58). In other aspects of her size, framing, rig, fastening, and construction, the WINFIELD SCOTT appears to have been very similar to the ALVIN CLARK. It is possible that the offset centerboard was typical in the pre-Civil War period of lake vessel construction as builders were developing centerboard designs for the Great Lakes, while centerline centerboards were typical of the post-Civil War period, as evidenced by such designs as the 1869 bark A.P. NICHOLS and the 1867 schooner FLEETWING (Cooper 1988:117, 120-121).

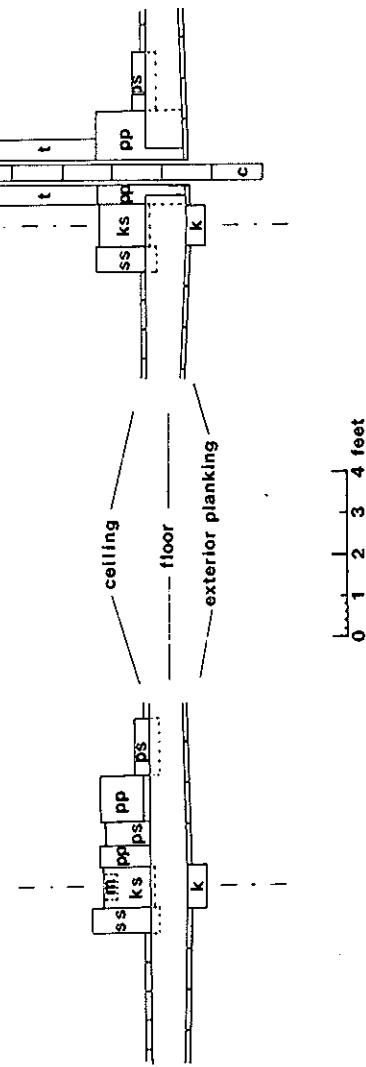
This earlier preference for offset designs may reflect a hesitancy on the part of traditional shipbuilders to interrupt major longitudinal members such as keels and centerline keelsons with a centerboard trunk. Experience and

Figure 5.

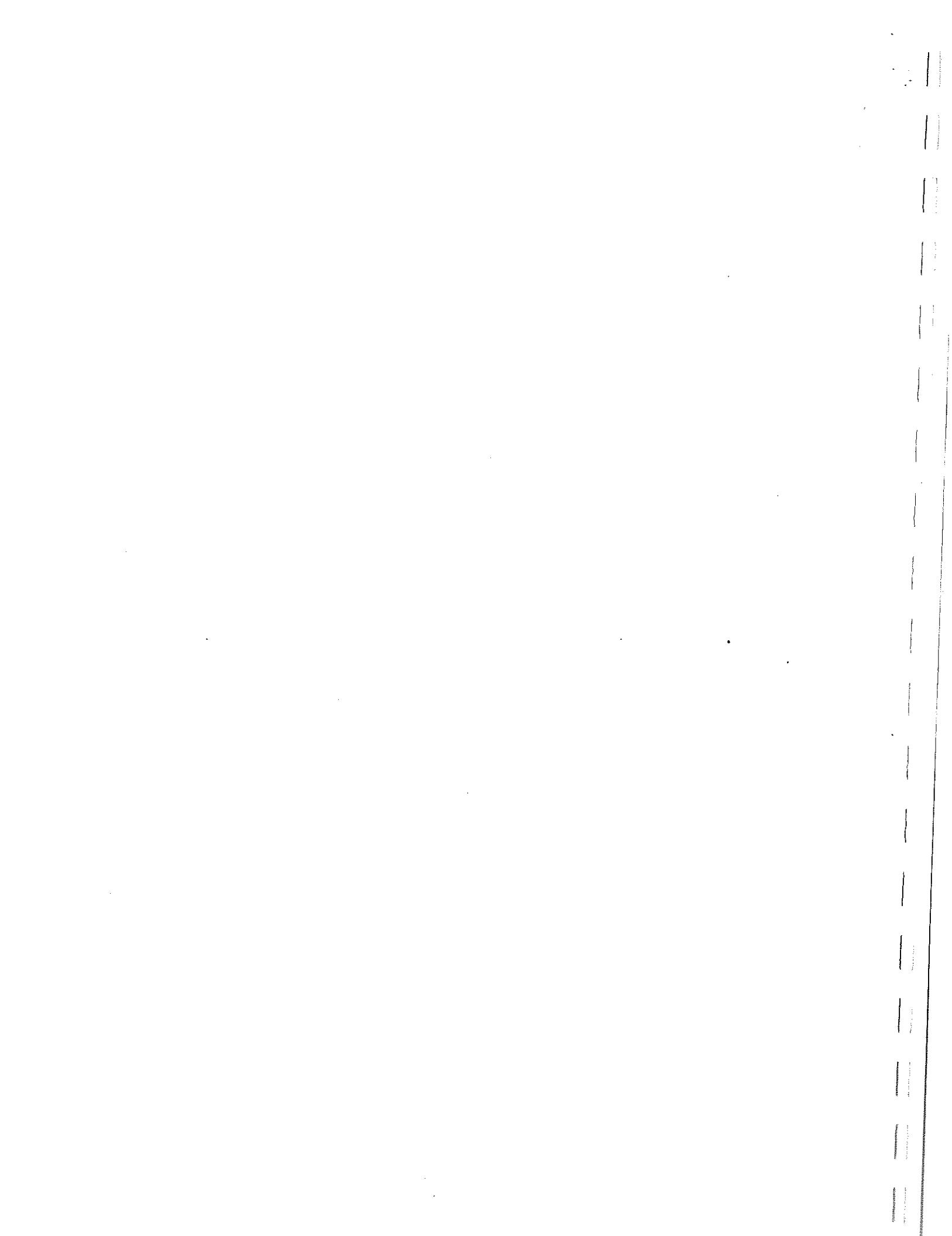
Sch. WINFIELD SCOTT Cross-Sectional Views

centerboard trunk (reconstructed)

at forecast



Key:	
m - mast step	ss - stbd. sister keelson
k - keel	ps - port "
ks - keelson	c - centerboard
pp - pocket piece	t - "
pp - mortise or notch in longitudinal	vessel centerline



experimentation with through-the-keel designs may have convinced builders that, with proper reinforcement and use of sister keelsons, the centerboard trunk need not be a weak point in vessel construction (quite the reverse, judging from the survival of these structural elements in the archeological record). However, only more comparative data from other pre- and post-Civil War vessel types will allow us to fully understand the apparent transition from offset to through-the-keel centerboard design.

Scattered structural elements were found near the main wreck, and additional elements may be found through sub-surface probing or additional survey. Due north of the main wreck lies the stempost and part of the bow deadwood, including mortises for the bow cant frames. This section measures 9'5" in length (along the keel), and 7'11" in height (vertically up the stempost). A second timber believed to be the sternpost lies to the northwest of the site, and is 13'6" in overall length. The remains of what appears to be an iron reinforcing or rudder gudgeon strap were found on this piece, located 3'5" from its northernmost end.

Two additional structural elements were found on site; a 22'11" long by 12'8" wide piece of port side and stern quarter lies just south of the main wreck, where it broke off from the bilge section at the turn of the bilge frames, common to Great Lakes shallow-water breakup of wooden vessels (Cooper 1988:109,128; Lenihan 1987:15; Murphy et. al. 1987:233-236). An additional piece of wreckage located approximately 100 yards west of the wreck is most likely a fragment of the centerboard. It consists of four 4"-thick planks edge-joined in a rectangular shape 22'5" in length and 3'11" in width (the main wreck trunk measures 23' in length). One end of the fragment is cut in a gradual curve, much like the leading edge of a centerboard. Opposite this

curve is a worn area which may have been the former pivot hole for the pin holding the board in the trunk.

Aside from a few loose drift pins, no artifacts were found on site. As the site is shallow, and known to sport divers, much of this material was probably carried ashore and/or buried following the original wreck, and the remainder may have been collected as souvenirs by visitors. As the ship was known to have been salvaged at the time of the loss (Milwaukee Sentinel 8/31/1871 p.4,c.6), it is likely that the anchors, steering apparatus, windlass, rigging, and other parts of her outfit were part of the original salvage of the wreck.

#### Recommendations for Further Research

Additional survey in the vicinity of the site may produce additional structural remains, but it is probable that much of this was carried ashore due to the exposed location of the site. As the relatively thin sand overburden over the local bedrock is not likely to hide much in the way of structure or even small artifacts, most of the research potential of this site will lie in a more refined analysis of its construction, including excavations under the keel, analysis of joinery, and offset measurements of external hull curvature and deadrise. Additional historical research could produce a more detailed operational history of the vessel, and possibly a photograph. The remains are of primary importance for easily-obtained architectural data on a pre-Civil War offset-centerboard schooner, but are probably of relatively little other research potential.

#### Management Recommendations

Due to the lack of easily removed artifacts, this site will be largely unimpacted by increased visitation. Its shallow location and proximity to a county park makes it a good candidate for visitation by beginning divers or for casual snorkeling. Marking of the wreck would facilitate its location by visitors and onshore signage would aid in the interpretation of the site, which may seem to be only broken timbers to the uninitiated visitor. However, visitors should be warned of dangers from offshore currents and surges (it is a 2,200' swim to shore, the wreck is exposed to all weather from the northeast, east, and is only marginally protected from a reef and Hog Island to the southeast). The site also receives some usage from panfisherman, evidenced from tangled fishlines and small boat anchors. Conflicts in visitor usage may arise from fishing and diving on a relatively small wreck.

Scow-Bark CHERUBUSCO

Vessel History

The CHERUBUSCO was a wooden-hulled, bark-rigged scow, built in 1848 at Milwaukee by Hubbell. Her dimensions were 114.2 x 27.1 x 9.4, and she measured 203.70 gross/187.25 net tons. Her official number was 4329. Her first known enrollment was issued at Chicago on June 18, 1864; she was re-enrolled six more times at Chicago in the following five years, most likely due to changes in ownership (Hirthe, personal communication 1988). Her final enrollment was issued at Cleveland on September 6, 1871.

The CHERUBUSCO seemed to change hands somewhat frequently, judging from her re-enrolling. The Milwaukee Sentinel carried an earlier notice pertaining to her sale as well;

SALE OF A VESSEL. - The three-masted schr. CHERUBUSCO, about five years old, was sold at auction yesterday by J.H. Crampton, Auctioneer, by direction of her owner, J.T. Perkins, and bought by Anson Eldred for \$4,400, for the lumber trade (Milwaukee Sentinel 10/12/1853 p.2,c.5).

It is not known if the reference to her being a schooner is an error, or if she was indeed schooner-rigged in her early years. According to what is known about contemporary practice, it would actually be more common to have re-rigged from a bark to a schooner, rather than vice versa (Hirthe and Hirthe 1986:x).

Like many of her sisters, the CHERUBUSCO had at least one chance encounter

with shoal water, a not uncommon incident on the Great Lakes;

[November 1869] Scow CHERUBUSCO, lumber laden, ran ashore on Peshtigo Reef, Green Bay. Got off (Milwaukee Sentinel 12/08/1869).

A combination of old age and weather seems to be what brought CHERUBUSCO to North Bay. She was reported "beached in a waterlogged condition in North Bay" by the Milwaukee Sentinel in November of 1872, and the subsequent day brought news that she was breaking up and had been abandoned (Milwaukee Sentinel 11/18/1872 p.1,c.7; 11/19/1872 p.1,c.6). How she even came to arrive at North Bay is somewhat uncertain, as she was reportedly bound from Chicago to Manitowoc, presumably for a load of lumber. Perhaps a November storm drove her north, preventing her entry into Manitowoc, and forcing her beaching in North Bay after the pumps failed to keep ahead of incoming water. This theory is somewhat supported by a subsequent newspaper account, which describe her as having "recently went ashore at North Bay," implying that some type of heavy weather may have been involved in her loss (Door County Advocate 12/05/1872 p.3,c.2).

Whatever the case, she was a total loss, the vessel being valued at \$6,500, and the cargo at \$3,000 (possibly some type of manufactured goods or sundries from Chicago). The crew was taken to Chicago by the tug DRAKE, which may have performed some salvage on the wreck before leaving the scene (Marine Casualties 1872; Milwaukee Sentinel 11/19/1872 p.1,c.6; 11/23/1872 p.1,c.6). The sources are not in agreement as to her final ownership. She is variously listed as belonging to Messrs. Carter and Jones of Chicago (Milwaukee Sentinel 11/19/1872 p.1,c.6), to A. Kirby and Company of Milwaukee (Marine Casualties 1872), or to Leonard Garn of Chicago (Hirthe, personal communication 1988).

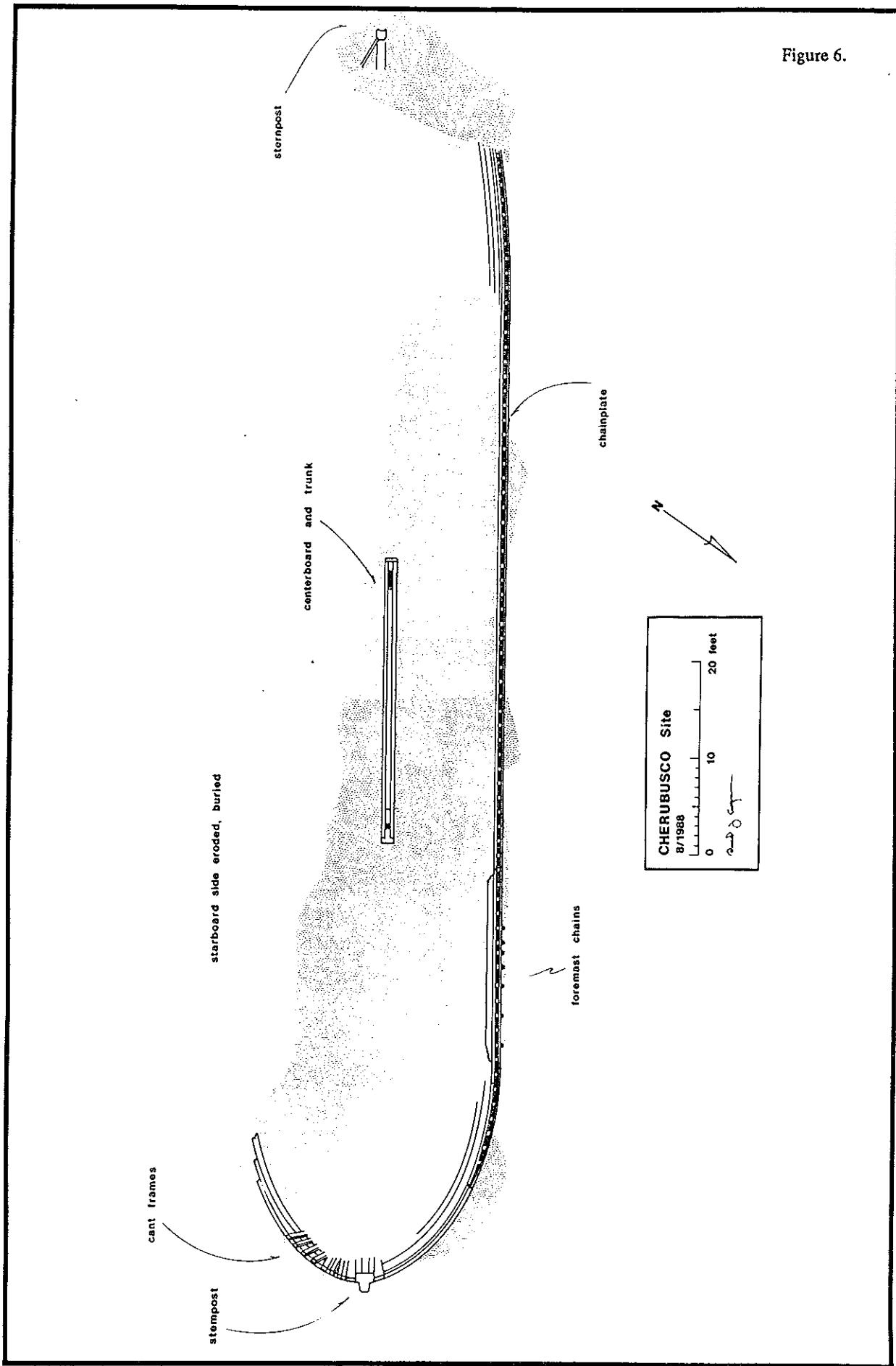
Her last enrollment was rather tardily and sloppily surrendered at Cleveland on March 31, 1878; "Vessel lost in fall 1871. Green Bay - Lake Superior [sic]," with only the phrase "vessel lost in fall" at all approaching the truth regarding the wreck (Hirthe, personal communication 1988).

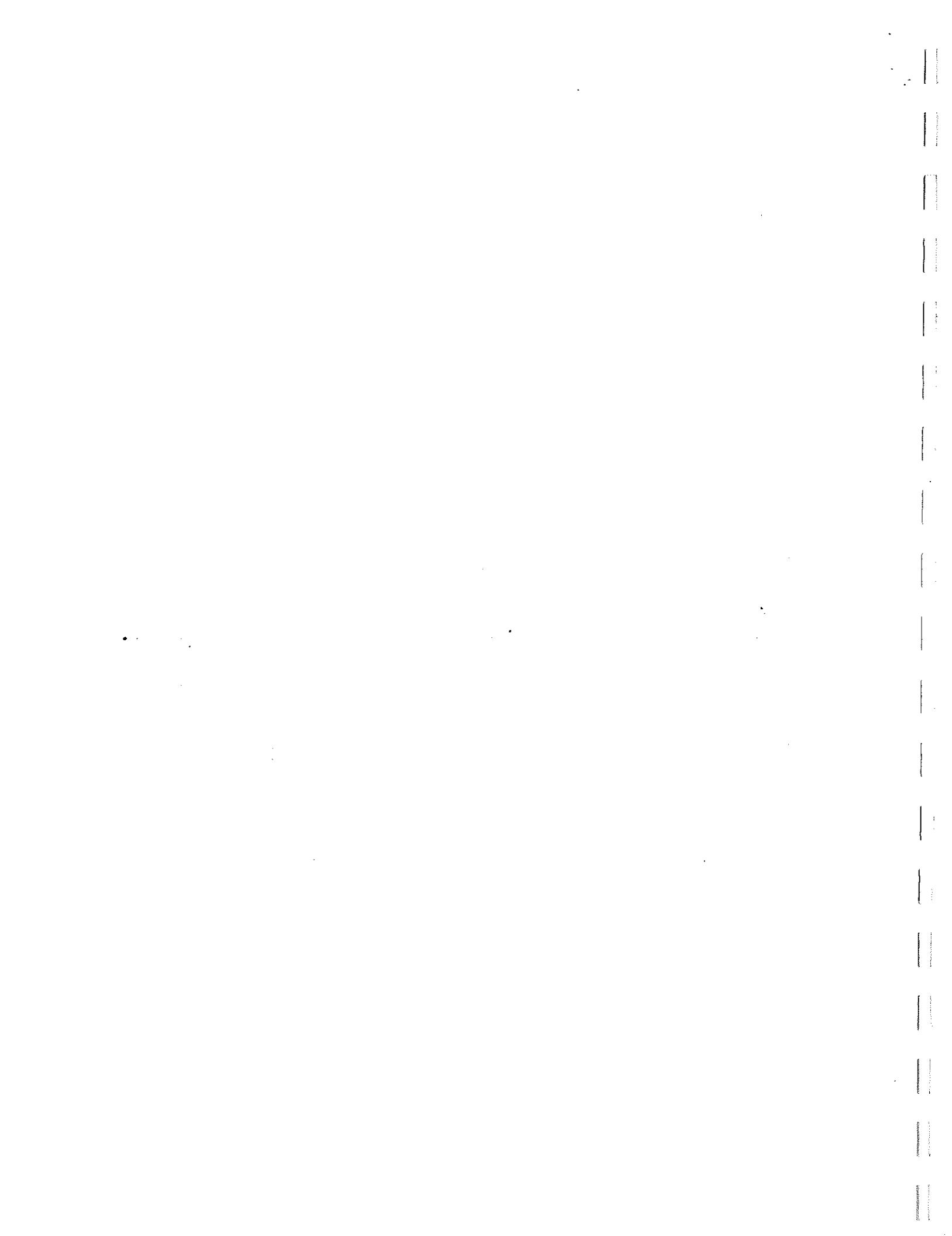
#### Site Description

What is reportedly the wreck of the CHERUBUSCO lies in the middle of North Bay in approximately eight feet of water, and is shown as a wreck obstruction on National Ocean Service chart 14909. The site was relocated using LORAN-C coordinates interpolated from the chart, and by visual survey. It is situated bow to the southeast bearing approximately 145 degrees magnetic. The hull is largely intact, the stempost, bow, centerboard trunk, and sternpost surviving up to their original height (Figure 6). The port side is somewhat intact, particularly in the area of the forechains, where the through-fastenings for the chainplates have reinforced the hull structure, preventing its breaking away. The starboard side has broken away, and most of the starboard side and stern of the vessel is buried under overburden. The overburden on site consists of a light, silty sand which stirs up rather easily. The site is also heavily choked with summer aquatic weeds, which limits visibility, and hinders survey work.

The identification of this site as the CHERUBUSCO is based on reports by local residents, who have known the site by name since its wrecking. Hull measurements from stempost to sternpost produced an overall length of 129'6"; not an especially good match with the CHERUBUSCO's reported enrollment dimension of 114.2'. The difference in length measurement may be accounted for as the difference in overall versus enrollment measurements, the latter

Figure 6.





calculated in the following manner;

Measure the length of the vessel in a straight line along the upper side of the tonnage-deck, from the inside of the inner plank, (average thickness,) at the side of the stem to the inside of the plank on the stern timbers, (average thickness,) deducting from this length what is due to the rake of the bow in the thickness of the deck, and what is due to the rake of the stern-timber in the thickness of the deck, and also what is due to the rake of the stern-timber in one-third of the round of the beam . . . (Butts 1865:16-17).

Field measurements were taken using a simple pull of a measuring tape (which was greatly hindered by weeds), and were augmented by trigonometrically calculated points using a shore-based survey transit and EDM. Despite the distance of 3,590.2 feet, these latter measurements are believed to be quite accurate. There remain the outstanding possibilities that (1) the sternpost is disarticulated or (2) the wreck is not really that of the CHERUBUSCO despite local reports and complete lack of possible alternate identifications. Test excavations could reveal something of a more diagnostic nature, including measurements for beam, depth of hold, a more positive identification of scow-type construction in the hull, or material culture remains which might help date or even identify the vessel. However, pending information to the contrary, the identification as the scow-bark CHERUBUSCO appears correct.

The bow assembly stands 4'1" above the sand overburden, and protrudes to approximately 4' of the water surface (1988 lake levels), making the wreck fairly visible from the surface, as well as a potential navigational hazard.

The bow consists of a T-shaped stempost molded 20" (fore to aft), 9" sided at its leading edge, and 21" sided at its base. Remnants of a 7" molded wooden cutwater are fastened to the leading edge of the stempost. Hawseheads 13" sided by 5" molded and knightheads 8" sided by 4" molded flank the stempost on both sides. Cant frames exposed by the loss of the starboard bow ceiling measure approximately 9" molded by 5" sided. The stempost is backed by three apron pieces measuring (port to starboard) 5" sided by 5" molded, 9" sided by 4" molded, and 4" sided by 6" molded.

Much of the hull aft of the knightheads is broken away, disappearing into the sand on the starboard side. However, the section of hull in the vicinity of the port foremast chains is extant (reinforced by the chainplates themselves). Here the hull is preserved up to the level of the deck shelf, a 17'9" fragment of which is still fastened over the ceiling at this point, measuring 13" in width and 4" in thickness. The side of the vessel stands 2'8" above the bottom (measured from the shelf). The seven chainplates here are spaced in a manner suggesting that the foremast was supported by three shrouds, and four more tightly spaced topmast backstays. A fragment of another port chainplate was found further aft at a badly eroded point in the hull (which at this point only survives to a height of 22" above the sand). The placement of this chainplate suggests that it held a topmast backstay for the mainmast. No evidence for a mizzen mast was found, as the stern is eroded past the level of the chains, and is largely buried after this point.

The sternpost stands rather isolated from the rest of the wreck, and measures 11" molded (fore to aft) and 12" sided. It was identified by its plank rabbet and a portion of outer hull planking. Remnants of an iron gudgeon or reinforcing strap were found fastened aft of the rabbet. The sternpost

protrudes 2'10" from the sand, suggesting that it is either broken off from its original height, that the vessel is more heavily sanded over aft, or the vessel lies slightly down by the stern.

Exterior planking on the vessel measures 5 1/2" in width and from 2" to 2 1/2" in thickness, 3" in thickness at the sheerline, and 3 3/4" thick at the bow. It is fastened with 3/4" square-shank wrought iron spikes. Ceiling is fastened with 3/4" wrought iron drift pins, occasionally using 2" diameter clinch rings. Frames and the shelf are fastened with 7/8" diameter drift pins. A 4" wide by 3" thick wooden wale runs below the chainplates, apparently as a rubbing strake or for reinforcement. The chainplates are 3" wide by 1/2" thick metal straps, fastened through the exterior planking, frames, ceiling, and shelf with large 1 1/4" diameter bolts. Two thick metal washers on these bolts set the top of the plates out from the hull. The through-bolt is capped on the outer end by a metal boss in the form of a truncated cone, 5" in diameter at the base, 1 7/8" in diameter at the top, and 3 7/8" thick. The metal straps running from the chainplates to the lower deadeyes are broken off or missing, as are the deadeyes themselves.

The framing on this vessel is somewhat unusual and fairly crude, consisting of single frames whose molded dimensions are smaller than their sided dimensions (approximately 3" to 5" molded by 5" to 10" sided at the level of the deck shelf). This produces an awkward slab shape to the frames, which are spaced approximately 10". The framing pattern is somewhat irregular, and does not give an impression of particularly well-executed construction. Until excavation can produce a better idea of the vessel's framing and hull shape, this is the best evidence for this in fact being a scow hull (which are generally thought to have been more haphazardly constructed for cheap and

ready service at the expense of sailing quality).

The centerboard trunk is 29'5" in length, and is positioned 46.5' aft of the stempost. Its location as calculated by transit and EDM shows it to be offset 12" to the port of the vessel's centerline, consistent with what is known about other pre-Civil War centerboard schooners such as the ALVIN CLARK and the WINFIELD SCOTT. However, excavation would be required to verify this construction method. The trunk is 15" in external width, and 6" wide across the trunk opening, which itself is 26'6" long. Its side planks are fastened to the headledges with clinch-ringed drift pins, and edge-joined with 1" diameter drifts spaced every 24". The board is still in the trunk, and measures 24'6" in length and 5" in thickness. The board has 1" diameter iron lifting rings on either end, and the trunk is capped with a plank for much of its length. The trunk at its after end stands 4'5" above the sand bottom.

#### Recommendations for Further Research

As relatively little of this site is exposed, excavation will be required to determine the lower hull construction, as well as the vessel's overall dimensions. Exposing more of the framing could provide a better understanding of the unusual framing employed in her hull. Additionally, it can be assumed that the hull was silted in before much visitation took place on the site, therefore excavation would probably produce a good deal of artifactual material and information on the vessel's date, usage, and associated human activity. A brief and largely unsuccessful visual survey was conducted inshore of the hull for disarticulated hull structure or rigging. More extensive survey in the vicinity the site or subsurface probing may locate additional structural components, rigging, equipment, and associated cultural

remains.

#### Management Recommendations

Due to its shallow depth and the relatively high degree of structural integrity, the CHERUBUSCO would be suitable site for visitation by beginning or intermediate divers. The site is well protected in North Bay, and can be located visually from the surface, or could be equipped with a seasonal boat mooring. As bottom visibility is somewhat hampered by weeds and easily disturbed light sands and sediments, a site plan would assist visitors in orienting themselves and in identifying points of interest about the hull. However, visitors should be specifically warned against excavating into the hull, and the site should be periodically monitored for unlawful salvage attempts on the hull contents. It is reported that the standing rigging deadeyes and anchors were already removed from the site by looters, as has been the case with virtually all known sites in the area. While the hull contents do not appear to have been disturbed, the potential of looting as a result of increased visitation and diver interest should be considered and monitored.

Schooner BOAZ

Vessel History

The BOAZ was a three-masted schooner of 127 gross/120 net tons, official number 2791. She was built in 1869 at Sheboygan, Wisconsin by Amos C. Stokes, and measured 114.0 feet length by 22.3 foot beam by 7.1 foot depth of hold (Hirthe, personal communication 1988; Bureau of Navigation 1900:24). She was apparently uninsured for much of her career, as she does not appear in either the 1874 or 1895 Board of Lake Underwriters/Inland Lloyds vessel registries. She was issued with enrollment 119 at Milwaukee on June 16, 1871, was re-enrolled at Milwaukee (number 16) on August 15, 1872, was re-enrolled at Milwaukee May 6, 1874 (number 157), and was issued her final enrollment at Milwaukee May 8, 1895. According to her final enrollment, she was owned out of Milwaukee, and captained by Nils Larson, who owned 1/12 interest in the schooner. Her other owners included Charles T. Burnham of Milwaukee (5/12), John Q. Burnham (5/12), and Phobe A. Hamilton (1/12) (Hirthe, personal communication 1988).

The BOAZ was caught in autumn gale on November 9, 1900 bound from Pierpont, Michigan to Racine, Wisconsin with a cargo of elm lumber. The old vessel was so severely strained by the storm that she began to leak heavily, and sought shelter in nearby North Bay, a common refuge for vessels in distress along the northern Door County coastline of Lake Michigan (Hirthe and Hirthe 1986:4-5). The waterlogged and unmanageable BOAZ struck the harbor point while attempting to enter, and though she managed to come free, she had missed the harbor entrance and threatened to run upon the beach. Both anchors were let go to prevent her stranding. The crew of four men, fearing the BOAZ would capsize in her waterlogged state, escaped to the yawl which was then secured to the

schooner's stern. Here the crew spent a freezing night of drenching rain in the open yawl boat (Door County Advocate 11/17/1900; 11/24/1900 p.1,c.1-2).

With daylight, the crew spotted the small steambarge TWO MYRTLE's, which had taken refuge in North Bay. They pulled to her for assistance, receiving dry clothes and a warm breakfast. The steamer then went out to the BOAZ, slipping her anchor cables and towing her into the bay, where she was beached (Ibid: 11/24/1900 p.1,c.2). The BOAZ's master, Capt. Nils Larson, departed the scene to secure wrecking tugs from Sheboygan to pull her off the beach. The steamer WELCOME later salvaged the schooner's deckload of elm lumber, and her crew departed for Milwaukee (Milwaukee Sentinel 11/17/1900 p.6,c.5).

Though it was initially speculated that the schooner was in good enough shape to be returned to Milwaukee and repaired, either the tugs failed to release her or the owners were unwilling to pay for the salvage. Whatever the case, the end of November found deputy U.S. Marshal E.H. Glantz in Sturgeon Bay preparing to inspect the BOAZ, as a lien of over \$200 for sailor's pay had been placed against it. Upon finding that the vessel was over thirty years old, and was completely under water, the deputy marshal returned to Milwaukee (Door County Advocate 12/01/1900 p.1,c.3). It is not known if the crew ever received their pay. Her last enrollment was surrendered at Milwaukee on June 25, 1901; "Total loss wrecked at North Bay," (Hirthe, personal communication 1988). Final salvage was conducted by Capt. Isabell of Sturgeon Bay, who removed the schooner's spars in the fall of 1903 (Door County Advocate 9/05/1903 p.1,c.3).

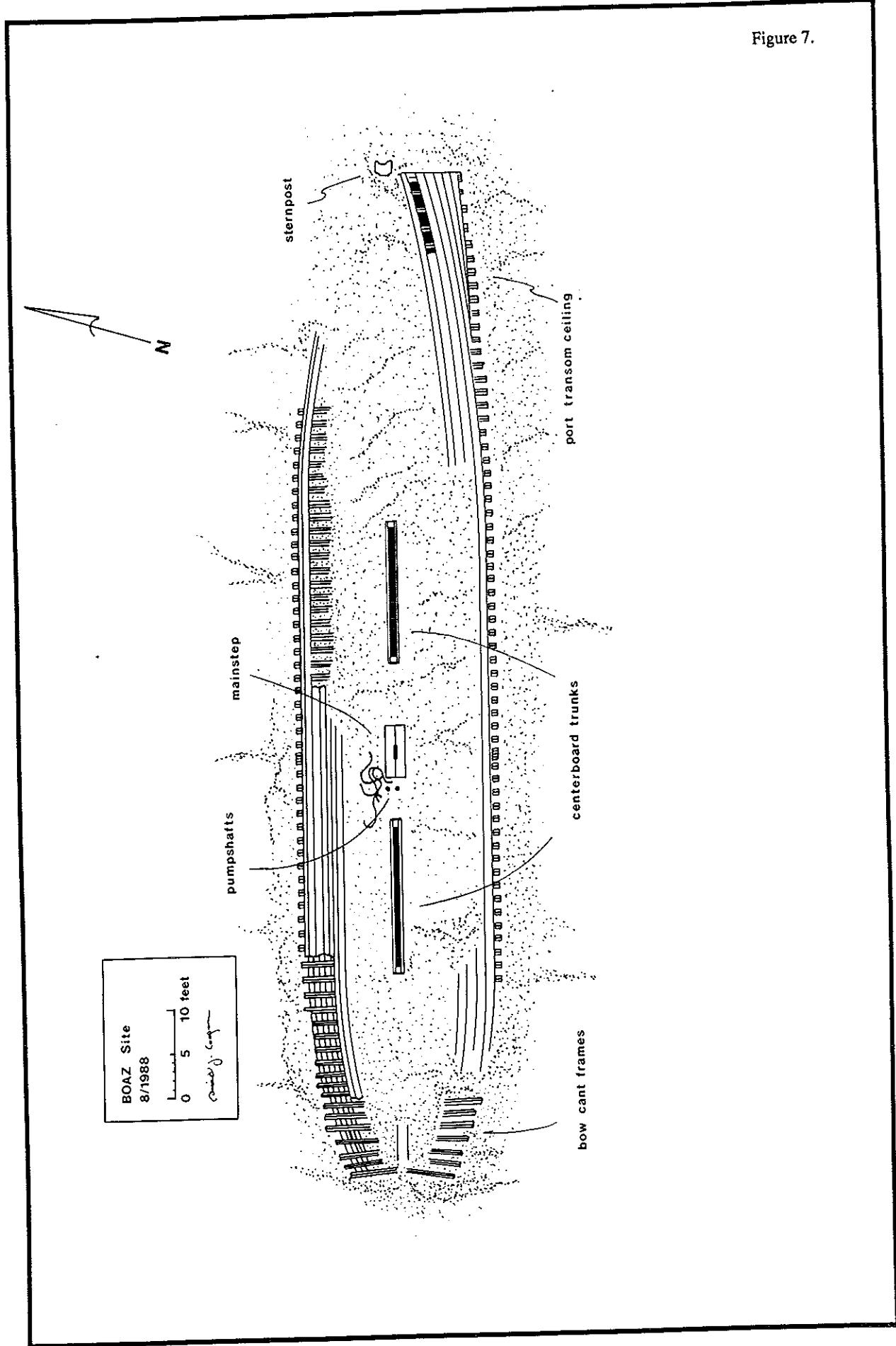
#### Site Description

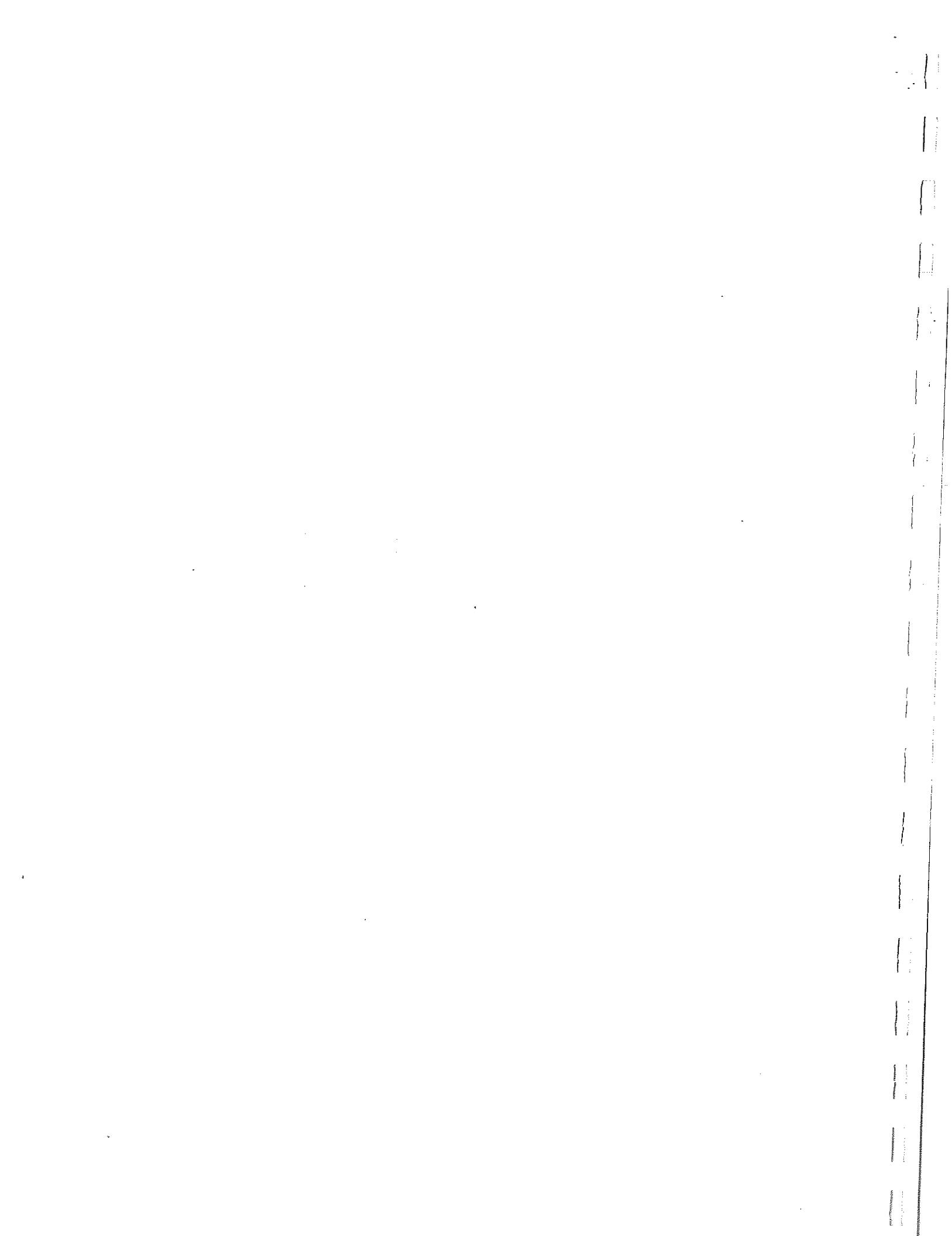
What is reportedly the wreck of the schooner BOAZ was relocated in North Bay in a small lagoon at the southwest end of Marshall's Point. The site is bounded to the east and south by the shore and a privately owned "L" shaped pier. The centerboard trunks are visible from the water's surface. The vessel lies facing bow out (west-southwest) in approximately fifteen feet of water. Like much of the North Bay, the bottom on site is a light, silty sand, and the site is heavily weed-choked for much of the summer. The wreck protrudes from the bottom for approximately 2'5" at either side amidships, and for 5'7" at the westward (inshore) centerboard trunk (Figure 7). An estimated 12" or more sand overburden overlies much of the bilges.

The hull is generally intact to the turn of the bilge, with the centerboard trunks intact to their full height (though missing a few side planks along the top). Sections of bilge ceiling are exposed, as are the frame tops where they protrude above the overburden, especially at the bow and the stern. Five strakes of stern ceiling are exposed in the vicinity of the stern deadrise, and the sternpost still protrudes from the sand.

The vessel has a somewhat unusual tandem arrangement of twin centerboard trunks, placed fore and aft, with a rectangular mainmast step and twin pumpshafts in between. The placement of the trunks in line with the step and pumpshafts implies that this is a through-the-keel centerboard design, but test excavations around the trunks would be needed to confirm this. The placement of the maststep is consistent with this being a three-masted vessel, but (unfortunately) it cannot be found reported that the BOAZ was a tandem-centerboard schooner. The vessel's beam between the trunks is 22', and

Figure 7.





the overall length of the hull debris is approximately 119'. While the trunk height cannot be compared to her original depth of hold without excavating around the trunks, it can be said that the general size, construction, and location of this site is consistent with what is historically known about the schooner BOAZ and its loss.

The vessel is double-framed, each frame having a molded dimension of 5" to 6" at the turn of the bilge and a sided dimension ranging from 3 1/2" to 5". The bow cant frames measure 6 1/2" molded by 3 1/2" sided. Surviving bilge ceiling measures 8" wide amidships and 11" wide in the stern, and is 2" thick. The ceiling is fastened with clinch-ringed wrought-iron drift pins of 3/4" diameter. Exterior planking measures 7" in width and 1 1/2" in thickness.

The two pumpshafts forward of the mainmast step are of an undetermined metal and have interior diameters of 3" and outer diameters 4", standing 16" above the bottom. The maststep consists of two rectangular pieces of wood fastened side by side, forming a step assembly 6' long by 21" wide. The step itself is a rectangular mortise 17" long by 7" wide placed at the middle juncture of the two halves of the step assembly.

The forward centerboard trunk is 17'3" in length and 1'4" in width. The interior slot measures 6 1/2" wide. The side planks measure 6 5/8" to 8" in thickness, and approximately 13" in width. The side planks are edge-joined with 7/8" diameter drift pins, and are fastened horizontally to the trunk headledges (vertical timbers) with 3/4" drifts clinched with 1 1/2" diameter rings. The forward edge of the trunk is sheathed with sheet metal to approximately 3'4" aft of the leading edge, presumably to protect the end from wear and tear caused by bulk cargoes. The centerboard pivot hole is located

4'2" aft of the leading edge, and has a metal bearing or collar 3" in inner diameter and 6" in outer diameter. The board is missing from the trunk (neither board was located on site).

The after trunk is located 27'6 1/2" aft of the forward trunk, and is 16' in overall length and 1'2" in width. The inner slot measures 6 1/2" in width. The side planks measure 3 1/2" to 4" in thickness and 12" to 14" in width. The side planks are edge-joined with drift pins spaced 12" to 16" apart. The pivot hole is located 8' aft of the forward edge, and is located 5'1" from the top of the trunk. The metal pivot bearing or collar has a 3" inner diameter and a 7" outer diameter.

Some miscellaneous planking was located inshore of the site, and no doubt, much of the upper hull could be found buried under the surrounding overburden. Lengths of hawser-laid wire cable of 3/4" and 1" diameter were found in the vicinity of the pumpshafts and maststep, and may be associated with the centerboard winches. This cable may also be associated with an attempted removal of some of the hull structure in the 1960's to improve navigation in the lagoon. Reportedly, cables were stretched across the lagoon to the shore, and an attempt was made to break apart and remove sections of the hull with come-alongs or winches. The effort was unsuccessful. Apparently a good deal of other salvage has gone on here by sport divers including the reported removal of anchors, a wheel, and the rudder, the latter which was lost by the salvors while towing it across North Bay.

#### Recommendations for Further Research

A more detailed study of this site should include test excavations in the

vicinity of the centerboard trunks to ascertain their lower construction and overall height, as well as the keelson arrangement used in the hull. Other test excavations would provide access to other construction details and data on hull shape, as well as material cultural remains associated with the vessel's use, possibly evident of shipboard life and daily work. Such information from the archeological record would go a long way towards filling the large gaps in BOAZ's life history, as well as what is known about the maritime anthropology of the Great Lakes in the nineteenth century. However, the heavily scavenged nature of the site suggests that little of consequence will remain unless it has been deeply buried. Additional historical research may reveal more regarding the BOAZ's ownership and use, and may provide some insights into why her builder chose the rather unique centerboard arrangement, and how this affected her sailing qualities.

#### Management Recommendations

Despite the limited on-site visibility due to heavy summer aquatic weeds, the site is easily located by boat, and would be of interest to the beginning or intermediate sport diver. While there was no evidence of sport fishing (or even fish) on site, the wreck could potentially shelter game species of fish at different times of the year. However, the site is not publicly accessible from shore (the entire Marshall's Point is private property and well-monitored), and anything over moderate visitation would likely produce conflict with boat traffic at the nearby pier, or with the privacy of nearby homeowners. Residents should be warned in advance of excavation plans which would involve operation of pumps or compressor equipment, or excavation should be scheduled off-season.

Pilot Island NW Site

Site History

Pilot Island is one of three islands in the Death's Door (Ports des Morts) Passage (Figure 2). Death's Door Passage is the chief navigational passage between the bay of Green Bay and Lake Michigan. It separates the Wisconsin mainland (Door County) from the chain of islands running up to the Garden Peninsula of Michigan (comprising the islands of Plum, Pilot, Detroit, Washington, Rock, and Fish on the Wisconsin end of the chain). It is bounded by high limestone bluffs and rocky shores, littered with scattered shoals and islands, and possessed of shifting, often contrary, currents and winds. The official 1906 Sailing Directions for Lake Michigan, Green Bay and the Strait of Mackinac describes it:

Porte des Morts (Death's Door) passage.- There is a strong current setting in and out according to the direction of the wind, and many vessels have been lost in consequence. It is frequently so strong that sailing vessels can not make headway against it. The coast is rock bound and certain destruction awaits the craft going ashore. Sometimes the current is against the wind (Eaton 1974:3).

As a result, sailing vessels were exceptionally susceptible to the navigational hazards of the Door (more so than steamers), despite construction of a light on Plum Island in 1848, a lighthouse on Pilot Island in 1850, and a new Plum Island lighthouse in 1896 (Eaton 1974:6-7; U.S. Lighthouse Board 1896:72-73). Current historical research indicates that some 24 vessels were lost in the Death's Door area proper (Plum, Pilot, Detroit Island) from 1837 to 1914 and an additional 40 were lost on adjacent islands, shoals, and bays.

from the 1830's up to the 1940's. All of the known losses in Death's Door proper were sailing vessels (schooners, barks, or brigs). Many hundred other vessels of all types stranded, foundered, or were otherwise wrecked in Death's Door, but were pulled off by nineteenth and twentieth century salvage efforts and refloated. The local maritime mishaps of the twentieth century have been mostly occasional strandings, with a few fires and collisions, most of which took place outside of the Door proper.

Much of the fancy regarding Death's Door has surrounded the origins of the name. The marine mishaps of the nineteenth century in the Door produced little more than some very close escapes from death, thanks mostly to the heroic efforts of locals, passing ships, and the U.S. Light House and Life Saving Services in providing aid to shipwrecked mariners. However, the Door has claimed the lives of unwary or unlucky travelers who ventured across the ice in the winter (Eaton 1974:7,29). As a shipkiller, however, the Door excelled, enough that a canal was cut through at Sturgeon Bay in 1881 to allow vessels to pass through to Green Bay without hazarding the Door. Ironically, many sailing vessels continued to use the Door rather than pay canal tolls and tug fees (Cooper 1988:93-94).

The origins of the Death's Door name, therefore, must be found in an earlier period. The modern legend regarding the destruction of a large Indian warparty in a sudden storm seems to have its roots in late-nineteenth century and twentieth century embellishments of eighteenth and early-nineteenth century French and American travelers' accounts (Eaton 1974:8-18). However, these earliest accounts mention nothing of a warparty or other aspects of the story as it reaches us in its modern form, indicating only that "there were a hundred Indians dashed against these rocks and killed in a single storm" (1835

account) or that a band of Indians, resting on a rock shelf in the Door enroute in canoes to a French trading post, were trapped and drowned by a sudden storm (1831 account); an event reportedly later recorded in pictograph form on nearby bluff faces by Native Americans (Eaton 1974:18-20).

A 1728 French reference to Porte des Morts (Death's Door) calls it "Cap a la Mort", the earliest reference to the Death's Door name now known. Presumably, if there is any base to the legend, it predates 1728. However, it cannot be reliably documented that any of the indigenous peoples of the upper Lake Michigan area have or ever had their own legend surrounding this passage (Eaton 1974:22-27). It is open to question whether the Death's Door story even has its roots in Indian tradition; one author contends that a fanciful legend may even have been concocted by the French as a ruse to discourage English exploration, based on known precedent (Eaton 1974:24).

The most comprehensive study of this legend summarizes:

Our name of Death's Door for the southernmost natural passage from Lake Michigan into Green Bay clearly follows the French Porte des Morts, which was attached to the waterway possibly in the 1600's but more probably around 1700. While "Porte" may perhaps have followed a poetic Indian name, it as possibly was coined by the French on their canoe-borne travels. The legend as we know it today is a mixture of motifs - modern, frontier American, early French, and probably even aboriginal. Beyond question the Death's Door legend refuses to die. Indeed, within recent times it has done better than stay alive; nurtured by modern minstrels who bathe it in vivid color . . . (Eaton 1974:26)

Pilot Island is historically known to have claimed at least ten shipwrecks for which no evidence of later removal could be found between the period 1858 and 1899. One or more of six other vessels reported to have wrecked in the area

of Death's Door between 1841 and 1859 may have also ended up here. The Pilot Island wrecks include:

<u>Vessel Name</u>	<u>Rig</u>	<u>Year Lost</u>	<u>Casualty Type</u>
A.P. Nichols	schooner	1892	stranding
Daniel Slauson	schooner	1863	stranding
E.M. Davidson	schooner	1879	stranding
Forest	scow-schooner	1891	stranding
Henry Norton	schooner	1863	stranding
J.E. Gilmore	schooner	1892	stranding
Lydia Case	schooner	1872	stranding
Mystic	schooner	1895	stranding
O.M. Nelson	schooner	1899	stranding
Shakespeare	brig	1858	stranding

The Death's Door wrecks include:

Columbia	brig	1859	stranding
Dolphin	schooner	1841	stranding
Maria Hilliard	schooner	1856	stranding
Windham	schooner	1855	stranding
Windsor	schooner	1853	stranding
Wisconsin	schooner	1847	stranding

Of these wrecks, the wrecks of the A.P. NICHOLS, J.E. GILMORE, and FOREST have are the most notable for reasons of their freak triple stranding in almost the same location, the subsequent daring nighttime rescue of two crews by lighthouse keeper Martin Knudsen, and for the fact that the physical remains of at least two of these vessels have been identified archeologically.

The story of the strandings begins with the scow-schooner FOREST. This vessel was built in 1857 at Newport, Michigan by and for David Lester. Her dimensions were 87'6" length, 22'3" beam, and 6' depth of hold. Her tonnage was 102 78/95 old measure, she had one deck, two masts, and was issued official number 9740. Her insurance value in 1874 was \$2,500, classified B2 (scow). She was rebuilt and lengthened over the winter of 1879-1880, and her rig changed from two to three masts. Her new dimensions were 115.6 by 23.0 by

6.0 feet, gross tonnage of 113.45, and net tonnage 107.78 (Board of Lake Underwriters 1874:42; Hirthe and Hirthe 1986:33; Bureau of Navigation 1885:138).

Prior to her wrecking on Pilot Island, the FOREST was driven ashore at Newport, Wisconsin, while loaded with lumber at the lumber pier. While anchored offshore awaiting a favorable wind, an east gale drove the FOREST, her companion (the scow-schooner R.H. BECKER) and the lumber pier itself ashore. The FOREST was thought to be a total loss, the BECKER was damaged, and the loss of Hans Johnson's pier was estimated at \$500, as well as the loss of seven barrels of pork and beef, and two or three tons of hay sitting on the pier (Hirthe and Hirthe 1986:33).

The FOREST was put up for sale in February, 1882, the advertisement in the Door County Advocate reading:

#### Vessel for Sale

Scow Forest now lying on the beach at Newport, 6 miles east of Ellison Bay: \$3,500 expended on hull in the last 18 months. Can be got off with little expense. The whole vessel and her outfit, which is all safely stored in Hans Johnson's barn will be sold for \$1,000 cash. For further information inquire of the subscriber, Harrison Fellows, Racine, Wis. The vessel has a carrying capacity for 160,000 feet of lumber.

There were no buyers. The BECKER was purchased by Hans Johnson and released from the beach the following June, and an expedition under Capt. George Decatur Fellows (nephew of the FOREST's owner) removed the FOREST from the beach in August, assisted by the tug JOHN GREGORY of Sturgeon Bay. The FOREST, not damaged as much as had been thought, was refloated in about an hour and was towed by the GREGORY to Manitowoc, where she was repaired and replaced in commission by October (Hirthe and Hirthe 1986:34).

The final wrecking of the FOREST at Pilot Island came on October 28, 1891 enroute from Chicago for Nahma, Michigan, in Garden Bay, Big Bay de Noc from Chicago to take on a cargo of lumber slabs. While running before a high sea and a south-southwest gale at approximately 9:40 p.m., she stranded on the reef extending to the southwest of Pilot Island. The next day the crew of four and Capt. George Petersen landed on the island, and took refuge at the lighthouse manned by keeper Martin Knudsen, where they stayed until November 5th. By this time, the FOREST had broken up and was abandoned as a total loss. The vessel was dismantled on November 2-3 and her outfit was placed into storage on Pilot Island (Hirthe and Hirthe 1986:35). The vessel lay with her stern wedged into the rocks on shore, and the hatches and cabin were washed away. Keeper Knudsen's enterprising children used the cabin, beached by winter ice, as a playhouse (Knudsen 1948:49). The scow was uninsured (Racine Daily Journal 10/31/1891 p.4,c.3). The FOREST's last enrollment was surrendered at Chicago on November 16, 1891; cause of surrender, "vessel lost" (Hirthe, personal communication 1988).

The FOREST lay alone amongst the rocks of Pilot Island until the following autumn, when both the schooner J.E. GILMORE and the schooner A.P. NICHOLS were driven ashore at the same point. The GILMORE was a canaller (a schooner built with dimensions to trade through the Welland Canal) and was characterized by a plumb bow and highly-canted jibboom (Figure 8). She measured 137.7 feet in length, 25.4 feet in beam, and 11.0 feet in depth of hold, with a gross tonnage of 290.89, net tonnage of 276.35, and official number 13307. The GILMORE had a wood hull, two masts, single deck, and was built at Three Mile Bay, New York by Asa Wilcox in 1867. She was built for Thomas S. Mott, Asa Wilcox, and James E. Gilmore (Hirthe and Hirthe 1986:35; Bureau of Navigation 1885:138). In 1874 she was bought by John Gerlach of Cleveland, which

thereafter became her new home port. At that time she was valued at \$14,000 and insurance rated A2- (Board of Lake Underwriters 1874:46). In July 1875, she sank in Cleveland Harbor, but was salvaged and refitted (Hirthe and Hirthe 1986:36).

The A.P. NICHOLS was built at Madison Dock, Ohio in 1861 by the Bailey Brothers (A. and D.E. Bailey) for James Butler of Buffalo, N.Y. Her original measurements were 146.75 by 30.03 by 11.7 feet, 476 9/95 tons (old measure), with three masts (bark-rigged), official number 566 (Hirthe and Hirthe 1986:36).

The NICHOLS had a rather eventful, seemingly accident-prone, career. On September 24, 1865 she collided with and sank the schooner WILLIAM O. BROWN at Bar Point, Lake Erie, sinking the latter vessel in twenty-four feet of water (she was later raised) (Hirthe and Hirthe 1986:36,122). The NICHOLS was at the Ellsworth and Davidson shipyard in Milwaukee repairing leaks in the fall of 1867 (Milwaukee Sentinel 09/17/1867 p.4,c.6). In June of 1869 she was damaged by collision while at anchor off Buffalo, and in November of the same year she struck a sand bar while entering Racine Harbor heavily laden with grain and "suffered considerable damage (Milwaukee Sentinel 12/08/1869)."

She was sold to A.P. Dutton of Racine in 1871, received repairs in 1873, and in the summer of 1877 she was rerigged at Manitowoc to a three-masted schooner (called a "three-and-after") (Board of Lake Underwriters 1874:83; Hirthe and Hirthe 1986:36; Runge). She was sold to Capt. David Clow and Son of Crystal Lake, Illinois in 1883, with a home port of Chicago, and was again repairing in 1884 (Runge). This latter may have been the result of an incident on August 22, 1883 where the NICHOLS dragged her anchors off Mackinac during a

heavy southwest gale, and went ashore on Mission Point. She lost her small anchor, chain, broke her steering gear, and began to leak badly. She was pulled off the Point and towed to Cheboygan, Michigan by the propeller MESSENGER, and temporary repairs were effected by a diver sufficient to get her back to Chicago. Her repairs at Chicago included part of a new keel, a new rudder post, and recaulking (Hirthe and Hirthe 1986:38).

The NICHOLS was involved in a collision with the schooner SAVELAND off Milwaukee in June of 1885, striking the latter vessel on the quarter and damaging her rail and stanchions (Milwaukee Sentinel 06/15/1885 p.4,c.7). She had her pump well rebuilt in 1886 and her bottom recaulked, and she had a steam pump well fitted and a recaulking in 1890 (Runge). Her final measurements were 145.0 by 13.0 by 11.0 feet, 299.67 gross tons, and 284.69 net tons (Bureau of Navigation 1885:62).

A particularly bad string of autumn gales in the fall of 1892 conspired to unite the NICHOLS and the GILMORE with the FOREST at Pilot Island. October 17 found the GILMORE running through Death's Door before a heavy gale, carrying only her staysail, foresail, and jib enroute from Chicago to Elk Rapids, Michigan, light, under command of Capt. D.B. Smith. Abreast of Pilot Island the wind shifted to the southwest, and the under-canvassed light vessel was driven upon the southwest reef into three feet of water at approximately 11:00 p.m. (Hirthe and Hirthe 1986:38-39). Keeper Knudsen managed to make contact with the crew, and as the vessel cabins were intact and provisioned for several weeks, they decided to remain there until the seas calmed. As a precaution, a breeches buoy was rigged from the schooner to the island (Knudsen 1948:57). Although initial reports appeared confident of releasing the schooner, she was found to be solidly placed on the rocks, and work

commenced on stripping and abandoning her (Door County Advocate 10/29/1892 p.5,c.3; Milwaukee Sentinel 10/20/1892 p.6,c.4).

The crew of the GILMORE had apparently escaped to the lighthouse when the next gale struck on October 28. The barometer and mercury were steadily falling, and wind was building from the west shifting to the northwest, driving sleet and snow before it. A group of schooners had taken refuge in the lee of Plum Island, but found their anchors dragging. Two, the GEORGE L. WREN and the HARRISON cut their cables and ran for open water. The other two, WALHALLA and DEMOCRAT finally came to anchor precariously close to Pilot Island. Around 2:00 p.m., Martin's keepers spotted a three-masted schooner under reefed sails approaching the Door from the southeast. With a spyglass, it was ascertained that she was the A.P. NICHOLS. The NICHOLS was enroute from Chicago to Escanaba, light, with a crew of six under Capt. David Clow, Jr. She missed stays while abreast of Plum Island, and dropped her largest anchor to prevent her going ashore on Plum Island's south side. The wind was nearing hurricane proportions, breaking the NICHOLS' foreboom, main gaff, and carrying away the mizzen topsail and raffee. The NICHOLS struggled under damaged rigging into the lee of Plum, dropping her 1,400 lb. anchor and 600 feet of chain cable, but began dragging towards Pilot Island throughout the afternoon (Hirthe and Hirthe 1986:39-40; Knudsen 1948:57-58; Milwaukee Sentinel 11/08/1892 p.6,c.1).

At approximately 8:00 p.m., a loud crash announced the arrival of the NICHOLS to the lighthouse crew, who emerged from the light in oilskins, dropping their hard-earned cups of hot coffee enroute. In the flash from the light and through the blowing snow and sleet, they could see the NICHOLS driven upon the southwest reef near the GILMORE, and almost touching the bow of the FOREST. The proximity of the two wrecks gave Martin the inspiration for a daring

nighttime rescue of the NICHOLS crew, for which he was later to receive medals from the Life Saving Benevolent Association of New York as well as from the U.S. Congress. With the aid of an assistant keeper, Martin encouraged the crew to jump, one by one, from the rolling NICHOLS to the icy deck of the wrecked FOREST. The lighthousemen assisted the crew (including a woman cook and the 320 lb. David Clow, Sr.) off the wreck and across the reef to shore (Knudsen 1948:58,62).

The addition of the crew of the NICHOLS with the lighthouse crew and that of the GILMORE created a cramped situation at the light, with a total of sixteen people to be housed and fed. Fortunately, provisions, bedding, and clothing were salvaged the following day, at which point the NICHOLS' sails were in rags, her jibboom broken, her spars splintered, and her cabin roof hanging by one corner out over the water (Figure 8) (Knudsen 1948:61; Milwaukee Sentinel 11/08/1892 p.6,c.1).

The next day Knudsen took Capt. Clow out to the steamer OUTHWAITE in the lighthouse sailboat to telegraph from Escanaba to the Chicago underwriters regarding the loss of the NICHOLS. The rest of the vessel crews found their way to the mainland in boats, the NICHOLS' crew not reaching Chicago until November 9 (Milwaukee Sentinel 10/31/1892 p.2,c.3; 11/08/1892 p.6,c.1). The lighthouse crew monitored the subsequent deterioration of the schooners, allowing modern archeologists insights into the site formational processes and rate of attrition the schooners experienced. The NICHOLS was reported as a total wreck on December 3 following heavy gales, after which she was purchased from the underwriters by F.H. Van Cleve of the Escanaba Wrecking Company (Door County Advocate 12/03/1892 p.5,c.4; 12/31/1892 p.5,c.3). A March gale in 1893 carried away the NICHOLS' topmast and strained her hull, and by February, 1894

the wreck had completely disappeared, having been broken up by the sea and ice and some portions having been pushed up on the beach (Door County Advocate 3/11/1893 p.5,c.3; 2/10/1894 p.5,c.3; 2/17/1894 p.5,c.3).

The GILMORE appears to have been somewhat more resilient, either due to her position or construction. By February, 1894 the GILMORE lay in about the same condition as when she wrecked (Door County Advocate 2/10/1894 p.6,c.4), and a photograph of Pilot Island at this time reputes to show the dismasted hulls of the A.P. NICHOLS and the J.E. GILMORE ashore on Pilot Island (Runge; Hirthe and Hirthe 1986:42). Unfortunately, the photograph is neither dated, nor are the hulls identified (though the GILMORE's plumb canaller bow is rather evident in the picture). Hirthe and Hirthe (1986:42) suggest that F.H. Van Cleve may in fact have been successful in removing the hulls, whose salvage may never have appeared in the Door County, Escanaba, or Milwaukee papers. Only archeological survey can answer the question of the schooners' final disposition. The last enrollment of the NICHOLS was surrendered at Chicago on November 17, 1892, and the last enrollment of the GILMORE was surrendered on April 25, 1893; both vessels total losses (Hirthe and Hirthe 1986:42).

#### Site Description

The Pilot Island NW Site lies off the northwestern end of Pilot Island, near the present day cement dock. The site consists of a field of debris beginning at approximately the twenty-foot depth contour leading down into fifty or more feet of water. The bottom consists of coarse sand and gravel at the shallower end, turning into finer sand mixed with some silt and organic material at the deeper depths. Though the island to the southeast does offer some protection, the site is rather exposed to wind and waves, and a moderate current will

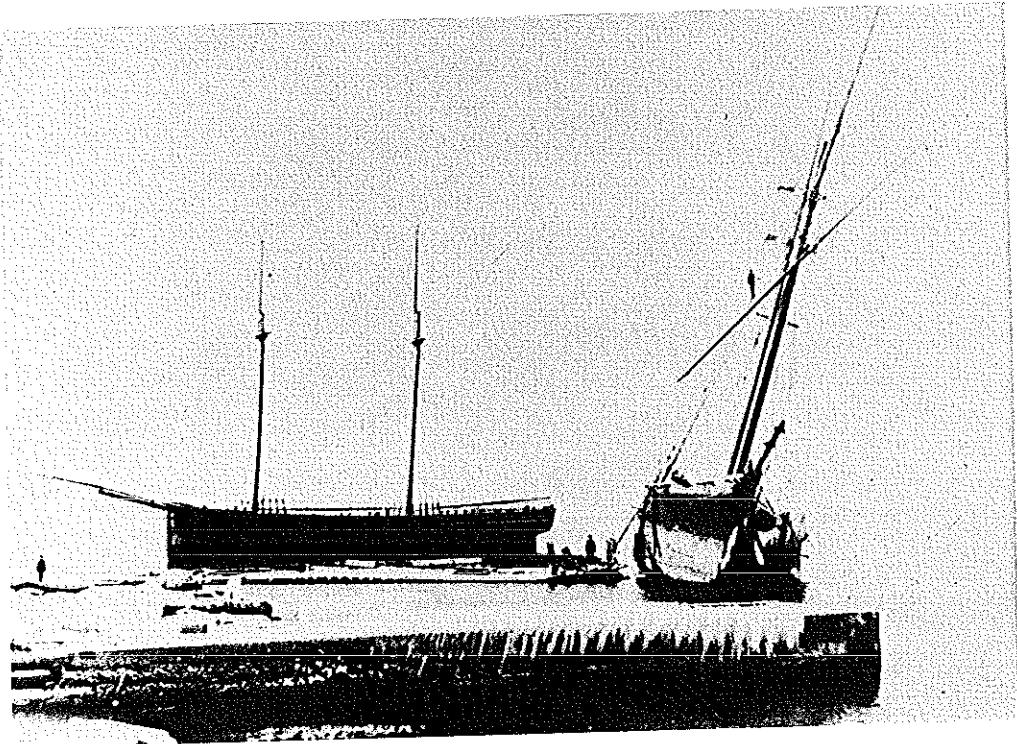


Figure 8. *A.P. NICHOLS* (right), *J.E. Gilmore* (left), and remains of scow-schooner *FOREST* (between dock in foreground and *GILMORE*) ashore on Pilot Island, October 1892.



Figure 9. *Inverted bottom of A.P. NICHOLS; note centerboard trunk and flush keel.*



usually sweep the site in all but the most calm weather. The focal point of the site is the jumbled, intertwined wreckage of two wooden sailing vessels, surrounded by remains of possibly one or more other vessels.

The site was located with the assistance of the charter boat NEPTUNE II, placing the survey team on the main concentration of features. The team concentrated on documenting this focus of the site, and did conduct some visual reconnaissance to the south, west, and north. Major structural elements of wreckage were tagged with coded letters and surveyor's flagging, facilitating identification, documentation, and mapping of the site's many discontiguous elements.

Central to the site were sections C, H, and G. These three large structural pieces were identified as the inverted bilge of a centerboard vessel, the port side, rail, and stern deadwood of a wooden sailing vessel, and the upper side, port rail, and bow of a wooden scow hull, respectively. H and G lay side by side oriented northwest-southeast, and C lies atop H and G, oriented east to west (Figures 9, 10, and 11).

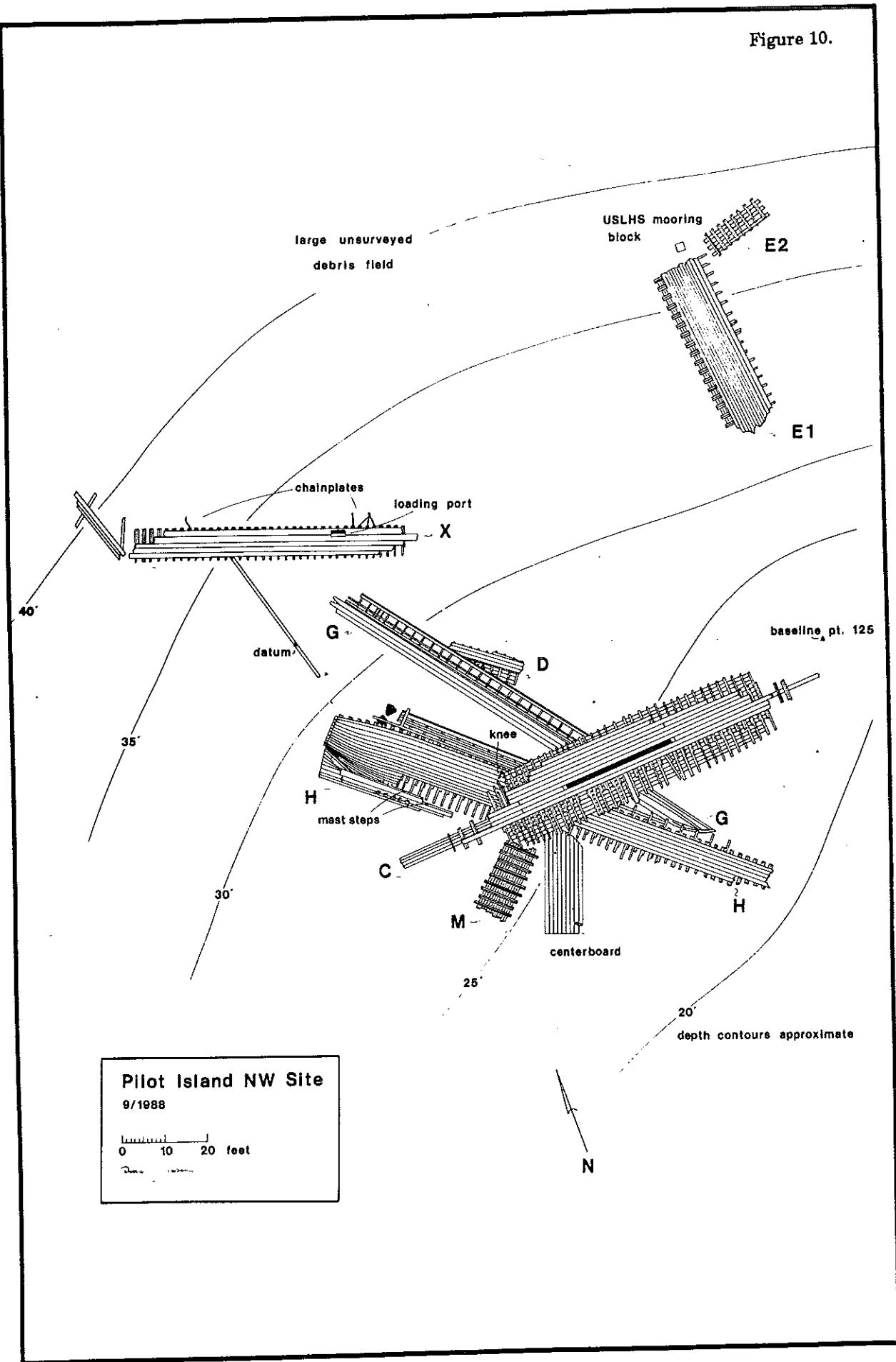
Section H is approximately 110' in overall length, with 33' of surviving deadwood, keel, and keelson in the stern. The section is heeled over to the port side, with the hollow of the stern forming what divers have called an "A-frame" on the site (the space under the transom and the stern deadwood). Section H exhibits double-framing with a frame room of 12 1/2", space of 9" to 9 1/2". The double frames are sided 5" to 6" (aft partner) and 5 1/2" (forward partner) at the floors and are molded 11" at the floors and 6" at the sheerline. The deadwood consists of a tier of four 8" sided timbers fastened atop the keelson and keel with 1" diameter iron drift pins. The keel and

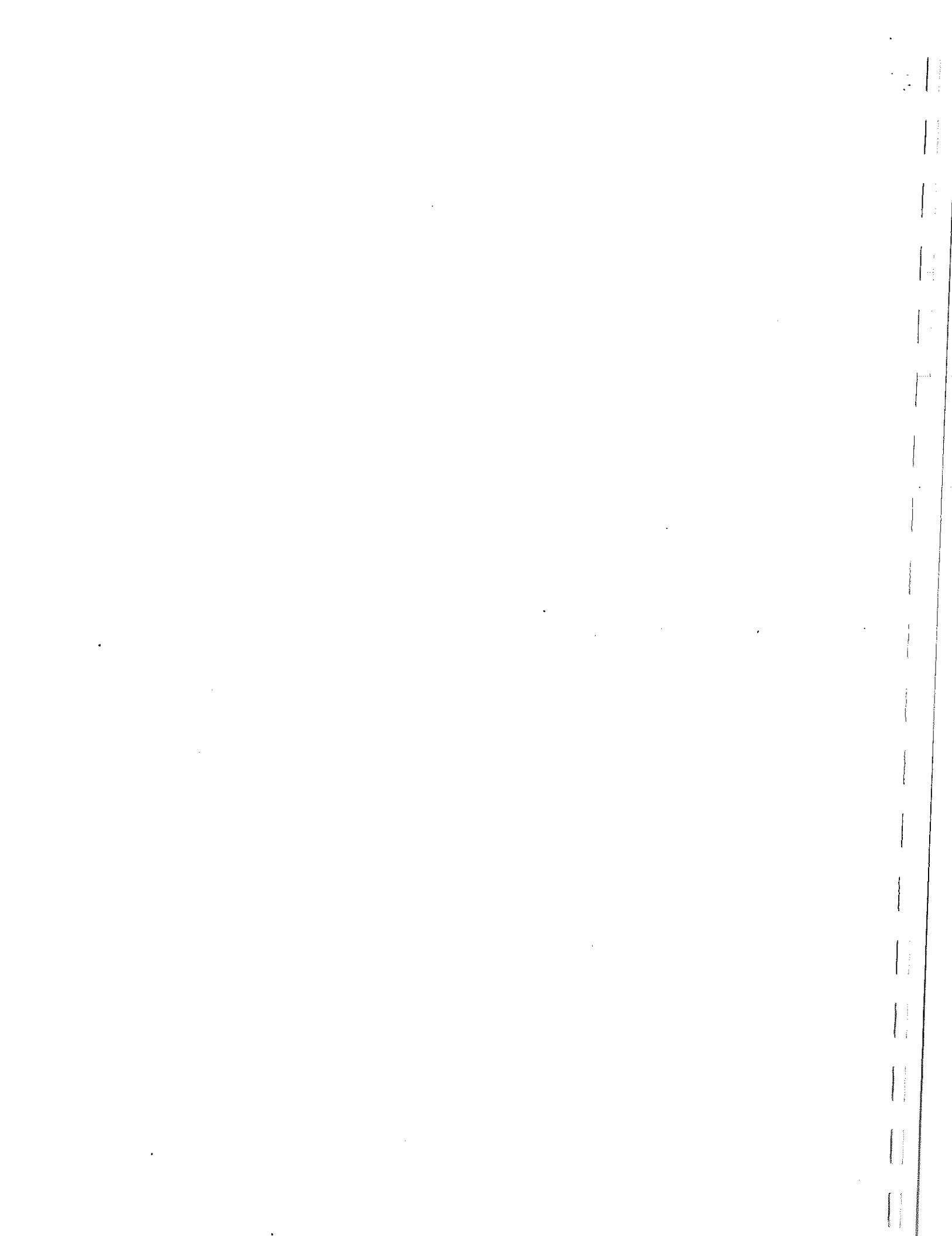
keelson measure 6" molded and 12" sided, and are topped by a rider keelson 12" molded by 12" sided. This first rider is mortised with a maststep measuring 13" in length by 7" sided by 2 1/4" molded. The upper rider is pierced by a vertical round hole approximately 7" in diameter 7" aft of its forward end (possibly a pumpshaft), followed by a maststep approximately 22" in length by 6" sided by 6" molded dimensions, located 6'7" aft of the previous step (Figure 10). This arrangement either represents a mizzenmast with a partnered spencermast, something like a snow rig (a presently unknown mast configuration for the Great Lakes, and one where the 6'7" spacing between masts would be somewhat excessive) or may represent a relocation of maststeps, possibly as a result of a rerigging.

The location of maststeps so far aft on the vessel (approximately 20' and 26' of the forward edge of the sternpost) suggests that she was three-masted. Known examples of mast placement on Great Lakes schooners show a foremast stepped well forward, the mainmast stepped just aft of the centerboard trunk, and the mizzen (if one existed) stepped well aft, often through the aftercabin (Cooper 1988:144). Only a single three-masted vessel is known through the historical inventory to have wrecked at Pilot Island; the schooner A.P. NICHOLS. By coincidence, this vessel was also rerigged, from a bark to a schooner, which may have involved a movement fore or aft of the mizzenmast step.

By immensely fortuitous circumstance, a spar (rigging) plan for the A.P. NICHOLS (one of only a very few of such nineteenth century spar plans known to exist) has survived in the form of a blurred photocopy, the original having disappeared (Labadie, personal communication 1988). The plan shows the NICHOLS in what appears to be a barkentine rig, and probably predates her 1877

Figure 10.





rerigging. The plan shows the distances between masts, as well as the distances from foremast to inside of stem and from the mizzen, "aft" (probably to the inside of the sternpost). This latter measurement is 21' 9". Measurements from the 1988 survey show the distance between the after step and the apex of the deadwood (and presumably the beginning of the sternpost) as 22'. This measurement combined with the identity of this section as that of a three-masted vessel that has been rerigged should be convincing evidence that the identity of section H is in fact the hull of the schooner A.P. NICHOLS, the only three-master known to be wrecked at Pilot Island. It also infers that the aftermost step relates to the NICHOLS use as a bark (from which period the spar plan dates), and the foremost step was for the mizzenmast of her schooner rig. The overall preserved length and width of the hull are within her enrollment dimensions, as is her depth (11') as measured at the exterior of the stern deadwood.

Obvious similarities exist between section H and section C (the inverted bilge of a centerboard vessel). The frame room of 12" and space of 9" is identical, as is a 5 1/2" (forward) and 5" (aft) siding in partner frames, and floor molding of 12" at the keel and 10" at the first strake of exterior planking past the garboard strake. C exhibits exterior bottom planking measuring 10" to 15" in width and 2 1/4" to 2 1/2" in thickness, fastened with 3/8" square shank spikes. Measured exterior planking on section H is 6" to 10" wide by 2" to 2 3/4" thick, with special 20" to 22" by 2" planking over the deadwood, and 8" by 1" planking under the transom. The centerboard trunk dimensions on C are 27'6" in length by 9" in interior width. Notable here is the fact that the keel is flush with the exterior planking (Figure 9) in an obvious effort to reduce the draft of the vessel as much as possible. The overall length of

the section is 106'2".

Interior hull ceiling on H measures 11 1/2" in width and 2 1/2" in thickness, and deck shelves measure 11 1/2" in horizontal span and 3 1/2" in thickness. An iron knee survives on section H near the juncture with section C (Figures 11 and 12). The knee is fastened with 1" diameter iron drift pins, and is rare evidence of composite (in this case, iron) materials being used in Great Lakes sailing vessel construction as early as 1869. The knee is fastened over the deck clamps, which measure 7 1/2" to 8" in width, 3 1/2" in thickness, and are joined with square-keyed scarphs (Figure 13), evidence of a somewhat elaborate reinforcement technique said to be 1.25 times the strength of a plain scarph joint (Desmond 1984:41). In light of both the presence of iron knees and keyed scarphs, it can be said that the NICHOLS was a particularly well-built vessel, employing at least two refinements in latter nineteenth century vessel reinforcement techniques.

With strong evidence identifying section H as being part of the NICHOLS, and with near identical construction attributes between H and C, it appears that the remains of the NICHOLS were pushed north off Pilot Island's southeast reef in the direction of the lighthouse dock (Figure 8, foreground) at some point prior to February 1894 when the NICHOLS was reported to have disappeared due to wave and ice action (Door County Advocate 2/10/1894 p.5,c.3). Evidently, the port side and stern were twisted off from the bottom at the turn of the bilge and at a point in the keel thirty-three feet forward of the sternpost. The piece (H) was deposited to the north, followed closely by the bottom (C) which landed atop the side in an inverted position. Adding the 33' of preserved keel and keelson on H with the 106'2" of C indicates that 139'2" of

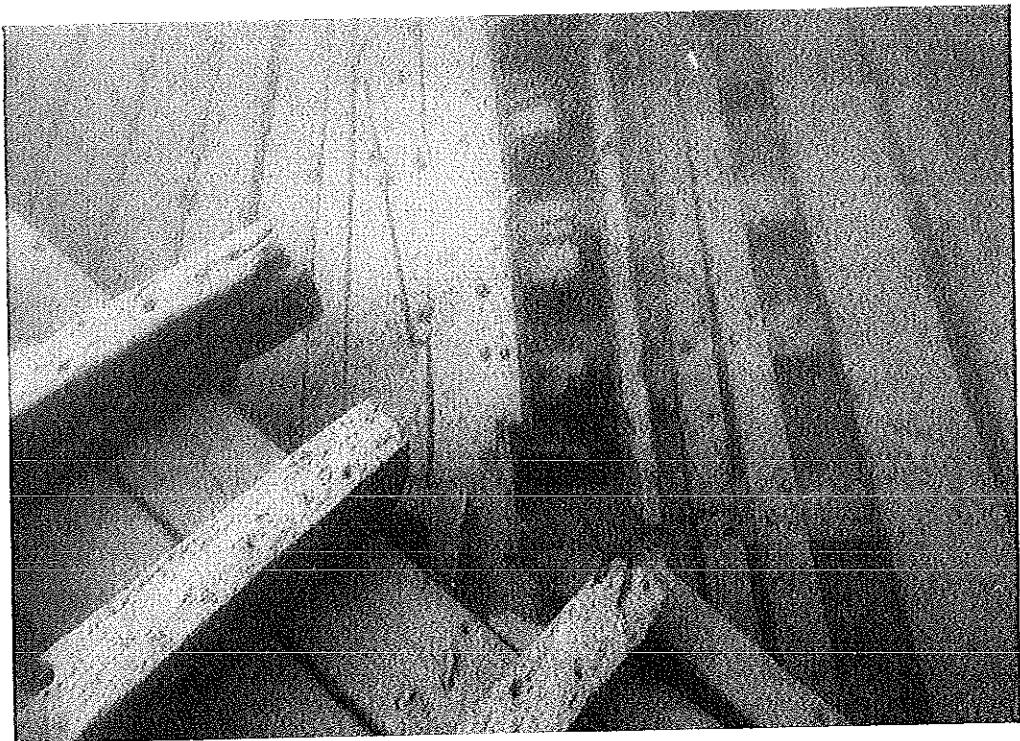


Figure 11. *Port side and rail of NICHOLS, overlain by inverted bottom.*

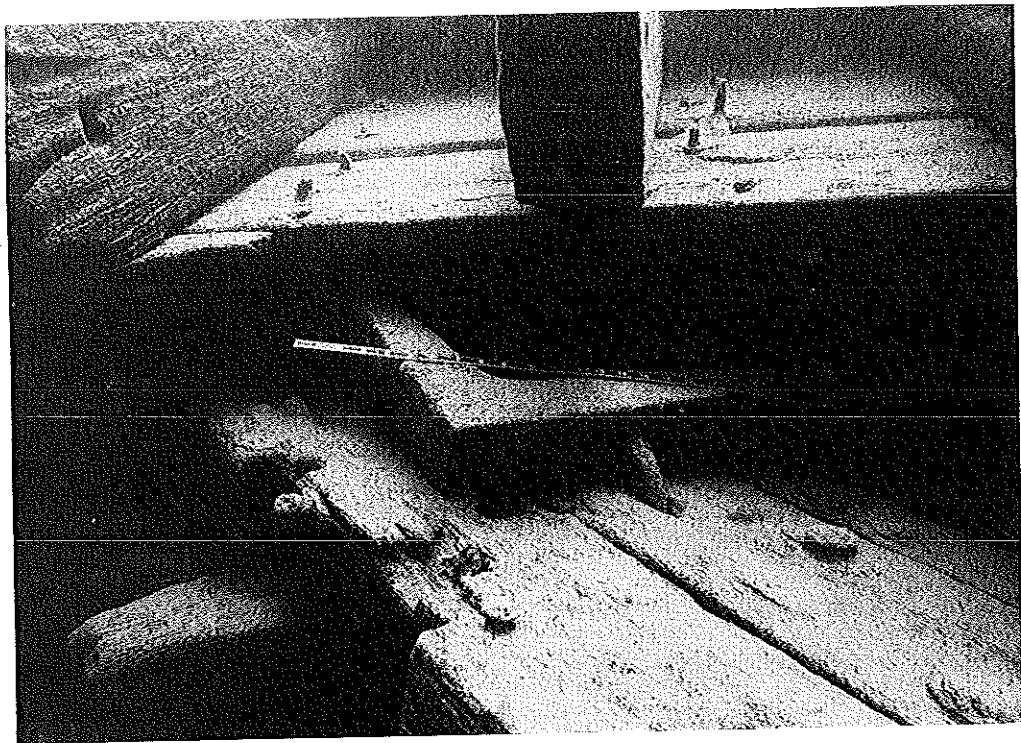
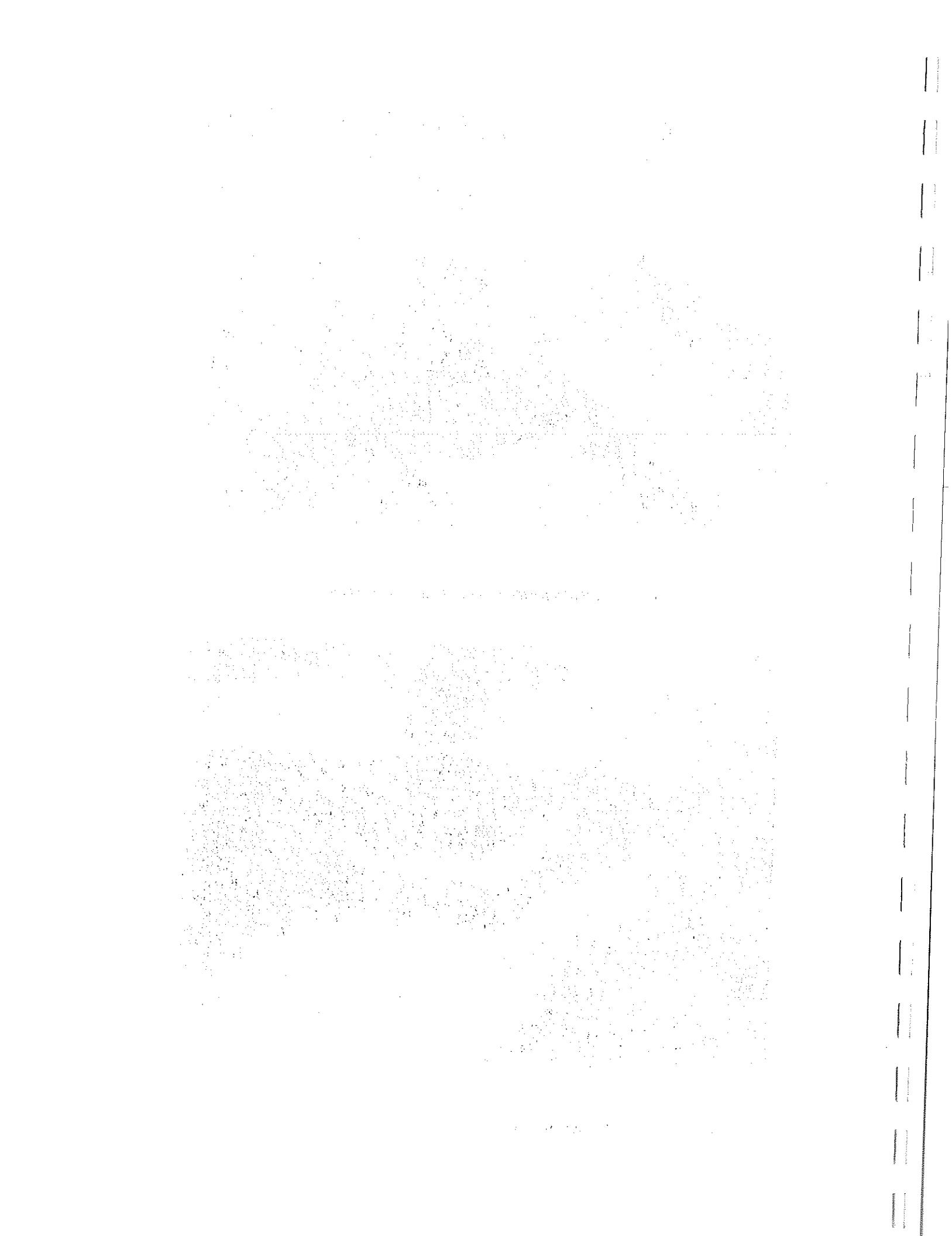


Figure 12. *Iron knee, A.P. NICHOLS.*



the NICHOLS' lower hull and 110' of the upper hull is extant. Additional survey will likely identify a good deal of the remainder of the hull, comparing such diagnostic construction elements as framing patterns and joinery between the numerous structural pieces.

Underlying both C and H is section G, whose deposition obviously predates 1894 (the breakup of the NICHOLS). While this only eliminates the J.E. GILMORE and O.M. NELSON from the list of wreck candidates, diagnostic construction elements again provide evidence for its identity. G is a section of port side, bulwark, and port bow of a scow schooner, the identity of the latter being made from the characteristic scow bow construction exhibited at the southeastern terminus of the feature (Figure 14). Photographic evidence (Hirthe and Hirthe 1986:35) clearly shows the distinctive construction employed in scow bows, versus clipper bows or more conventional types of bow construction. The only known loss of a scow schooner at Pilot Island was a wreck closely associated with the loss of the NICHOLS; the scow schooner FOREST.

Section G is approximately 107'3" in preserved length overall, approximately 8'2" in preserved width overall (railcap to lower ceiling), and approximately 5' from shelf to the lower ceiling. These preserved measurements are comfortably within the FOREST's final registered dimensions of 115.6' length and 6' depth of hold. The G is double framed with a frame room of 9 3/4" and a space varying from 10 1/2" to 16". The frames are sided in pairs, one 3 1/2" to 3 3/4" (forward partner), and one 5" to 6 1/4" (aft). The frames at the sheerline are molded 4". Three single bow frames have been preserved, with dimensions of 7" to 7 1/2" sided, 4" to 4 1/2" molded, and 11" space (Figure 14).

The deck clamp measures 1'9 1/2" in width and 3 1/2" in thickness, with a deck shelf fastened over it of 12" horizontal span and 7" thickness at the bow and 5 1/2" horizontal span and 5" thickness amidships. Below the clamp and shelf lie three strakes of bilge ceiling 11" to 12" in width and 3 1/2" thick amidships. The ceiling, shelf, and clamp are fastened with 5/8" drift pins using 1 3/4" diameter clinch rings. Above the shelf is located a 12 1/2" horizontal waterway, 3 1/2" thick, with notches for the bulwark stanchions. The bulwark stanchions measure 4 1/2" square. A space of approximately 5" exists between the waterway and the shelf for the placement of the butt-ends of the now-missing deck beams, suggesting these beams were approximately 5" square.

Two surviving chainplate stations along the bulwark are consistent with the FOREST's three-masted rig. One station is composed of two iron rod-type chainplates with 3" outer diameter rings set outside the bulwark, and two iron 3" outer diameter ringbolts set into the railcap, centered approximately 69' aft of the bow end in approximately the location of the mainmast. The second (mizzenmast) set consists of two strap-type iron chainplates (the different hardware probably the result of the FOREST's 1879 rerigging) fastened outside the bulwarks and centered approximately 27' aft of the mainmast station. As the plates are on the underside of the bulwark, they are barely visible and are unaccessible for measurement.

A large number of miscellaneous vessel elements surround the main wreckage. Immediately south of section C lies a 25' long by 8'9" wide centerboard which very likely belongs to the NICHOLS (whose trunk length is 27'). The centerboard includes a curved leading edge and an iron-collared pivot hole 4"

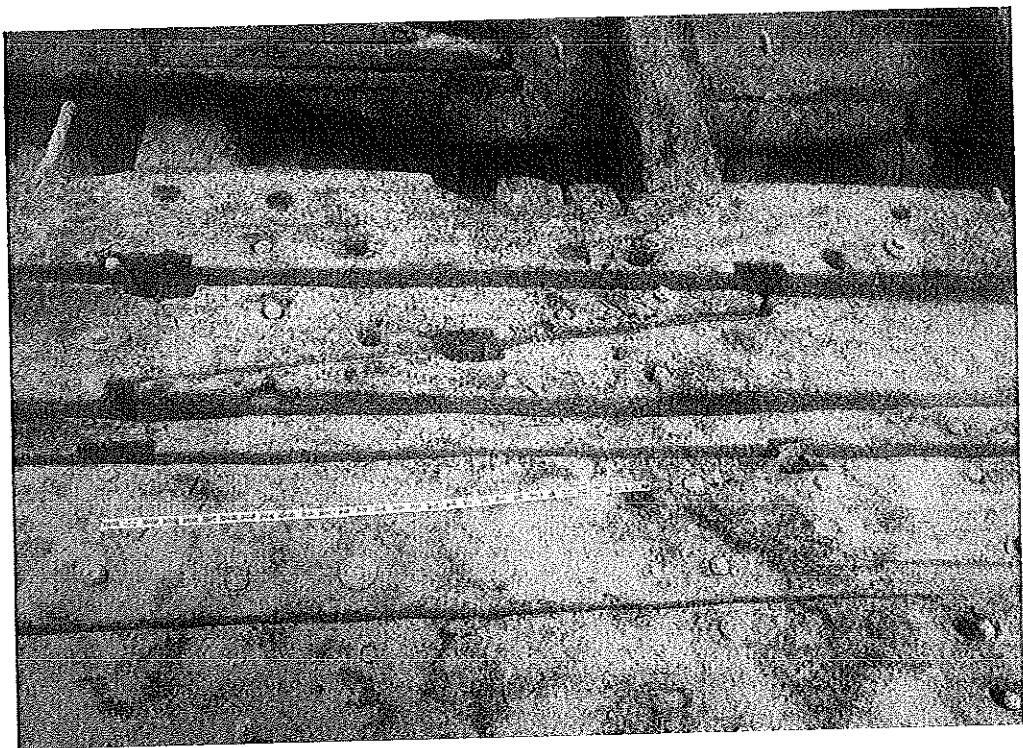


Figure 13. Keyed scarps, A.P. NICHOLS ceiling, section H.

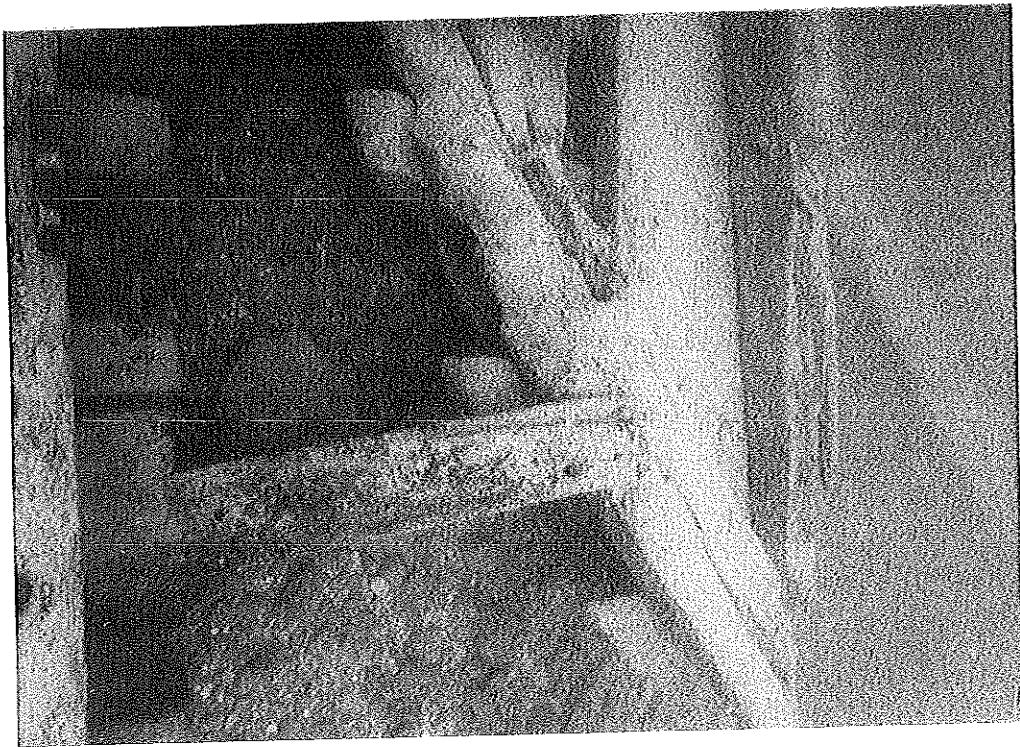
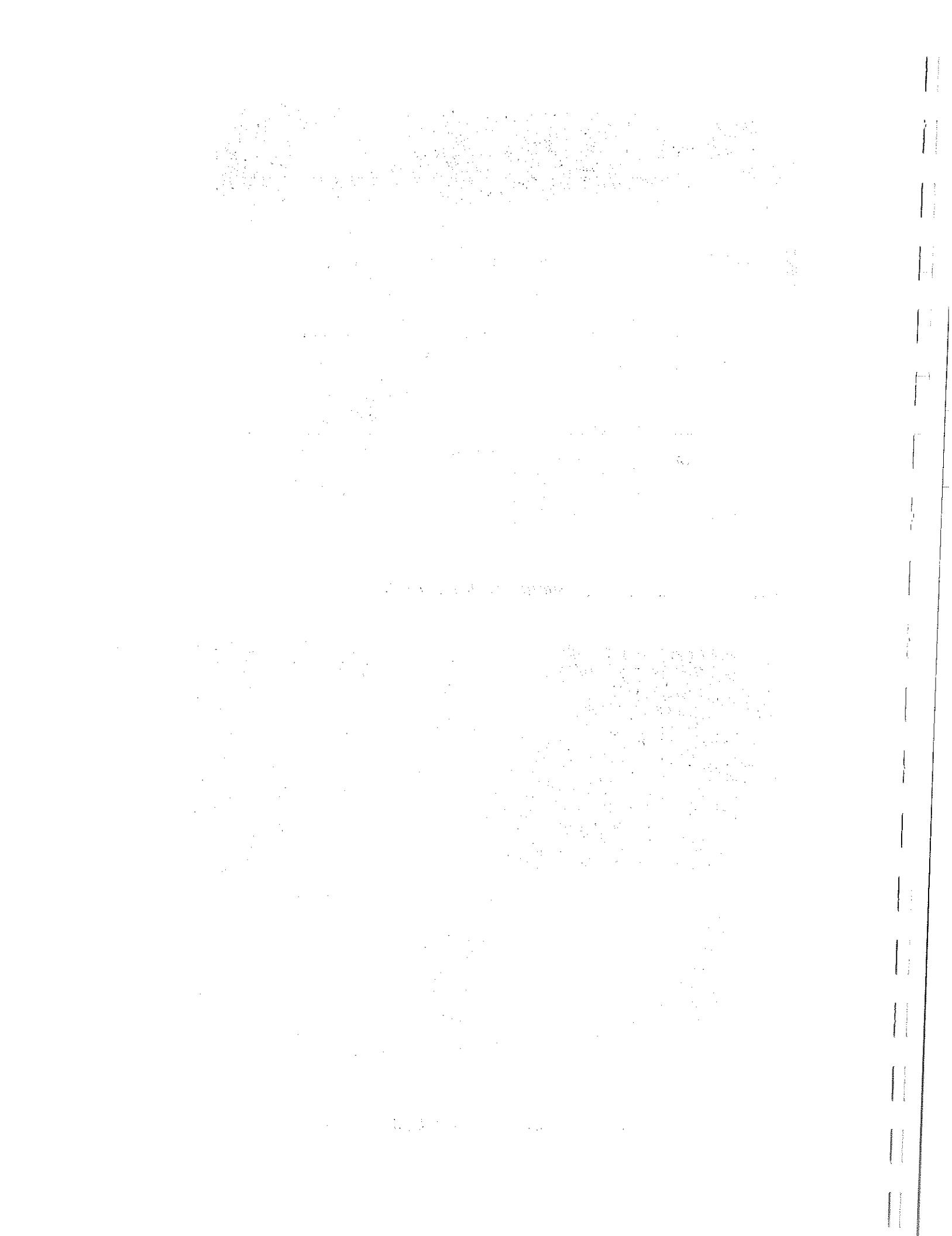


Figure 14. Section G; scow bow construction, probably from FOREST.



inner diameter and 5" outer diameter. The trailing edge includes an indentation from an iron lifting strap 20" long and 7" wide. The board consists of nine 3 1/2" thick planks edge-joined with 3/4" iron drift pins.

West of the centerboard lies a fragment of vessel side, section M. It is double framed, fastened with 3/4" iron drift pins, with nine frame sets extant held together by exterior planking. Frame room of 9", space of 15", molded dimensions at the turn of the bilge of 10" and 4"/4" sided dimensions of double frames relate most closely to the dimensions of the FOREST (G) or may suggest the presence of a third, smaller vessel type on site.

Wedged under section G is a 17'7" by 6' fragment of hull; section D. It is double framed, and consists of three strakes of exterior planking and a small stealer overlying seven frame sets. The exterior planking measures 10" to 11" in width and 1 1/4" in thickness. The stealer is of the same thickness, tapering to a point from 9" width. Underlying ceiling measures 11 1/2" in width and 1 1/2" in thickness. Frame room is 8", space 21", molded at sheer 7 1/2" and double frames sided at sheer 3 1/2"/3 1/2". This section, despite the variation in frame spacing (which could vary throughout the hull) is likely from the same vessel as M. This wreck obviously predates the deposition of the NICHOLS, and may be more remains of the FOREST or the remains of one of the smaller, earlier schooners wrecked here.

North-northeast of the site lie two other vessel fragments; E1 and E2. E1 is reported to be a section of vessel hull lying outboard down, with the futtocks at the curve of the bilge protruding upward. The section is 42' long by 14' wide with three 10" wide by 3" thick ceiling planks and ten 8" wide by 4"

thick strakes of ceiling at the turn of the bilge. Frames are double, with a space of 15", a room of 12", and a molded dimension at the turn of the bilge of 6". Exterior planking of 8" width and 2" thickness is fastened over the outer face of the frames. E2 is 15' in length, and consists of eight frame sets spaced 15", room of 8", and molded 8". Though they could not be positively related to any other site features on the basis of framing dimensions, the room and molded frame dimensions of E1 are most similar to those exhibited by the NICHOLS, and the use of keyed scarphs were reported on this section as well. The room and space dimensions of E2 relate most closely to those of section M and G, and may be additional remains of the FOREST or a vessel of similar framing pattern.

In the vicinity of E1 and E2 lies a large cement mooring sinker marked "USLHS" clearly relating to the island's use by the United States Light House Service prior to its amalgamation into the U.S. Coast Guard under President Roosevelt in 1939 (Evans 1949:218). The block may have anchored a small boat mooring or a buoy. A large scatter of large electrical batteries across the site reportedly relates to the changing and dumping of lighted buoy batteries by U.S. Coast Guard personnel (Shastal, personal communication 1988). These batteries probably post-date 1930, the first introduction of electrical batteries for lighted buoys to replace older, less intense acetylene illumination. Electrical fog signals were also first introduced around this time (Capron 1965:126). It is not known whether these batteries came from the lighthouse itself, area buoys, or a buoy anchored at the USLHS block.

Immediately north of G lies a section of double-framed upper hull 68'8" in length and 7'10" in width; section X. It exhibits a frame spacing of 12" to

13" and room of 9" to 9 1/2". Frame molding at the turn of the bilge is 5", and sided dimensions of each frame in a double set are 4" to 4 1/2". Over the frames are fastened two deck clamps 16 1/2" and 17" in width and 3" in thickness. Adjacent to the deck clamps are three upper strakes of bilge ceiling 13 1/2" in width and 2" in thickness. Exterior planking on X measures 8 1/4" to 8 1/2" in width and 2" in thickness. The stumps of bulwark stanchions 4" by 5 1/2" survive along the sheerline frametops, fastened with 1" diameter iron drift pins with 2 1/2" by 2 1/2" square nuts peened over the ends.

Section X contains a number of iron fittings, including a lumber loading port fastened through the deck clamps. The port is rectangular, 38 1/2" by 14", and with inner dimensions 35 1/2" by 10 1/2". The top inside edge of the port is located 8 1/2" below the frame ends at the sheerline, indicating that this port was originally located quite near to the top of the vessel's hold. The remains of a wooden port cover are still fastened over the interior of the port. Two loading ports of identical outer dimensions employing similar covers have been found on the starboard side of the 1846 schooner ALVIN CLARK (McCutcheon 1982).

Additional fittings include a surviving iron strap-type chainplate fastened to the outer side of the hull and a second chainplate station of five strap-type chainplates. The plates are 3 1/4" in width and 1/2" in thickness. The two stations are separated by 38' 4", implying that they are from a two-masted sailing vessel of roughly 80' overall length or a three-masted sailing vessel of roughly 115' length (comparison of mast spacing on Great Lakes sailing vessels with known dimensions indicates that the distance between fore and main on a two-masted vessel is roughly one-half the vessel's overall length,

and the distance between each mast on a three-master is roughly one-third the vessel's overall length).

While the extrapolated length of 115' and the general room and space measurements of X match quite well with the size of the FOREST and the room and space on section G, the difference in chainplate type and spacing, as well as the difference in fastenings (G exhibits extensive use of clinch-ringing which is not evident on X) suggests that X originates from a vessel similar in size to the FOREST, possibly the same vessel associated with wreckage sections D, E2, and M. Alternatively, all sections G, X, M, D, and E2 may originate from the FOREST, which displays a significant amount of variation in framing dimensions, standing rigging hardware, and fastenings (possibly not an unheard of situation considering the roughly constructed scow-schooners employed on the Great Lakes).

#### Recommendations for Further Research

The wreckage documented at Pilot Island NW is only portion of a large debris field along the northwest side of the island. Diver reconnaissance north and west of the site reported a good deal of additional debris running down into deeper water (approximately sixty feet) including large portions of vessel side, scattered planking, fragments of deadwood, a rudders, anchors, and at least one section of keelson. There are additional reports of wreckage to the south of the main site at approximately the same depth, most likely material from the southwest reef pushed north along the same path as the NICHOLS and FOREST material. There is also an inverted hull to the southeast of the island in approximately sixty feet of water which is a known, frequently visited site.

It is very likely that more material from the NICHOLS (the missing bow and port side) will be encountered nearby, and may be identified by its framing pattern and characteristic keyed scarphing of the deck clamps. The presently undiscovered bottom and starboard side of the FOREST may still be in the vicinity, as well. Diagnostics here would include framing pattern, clinch-ringed fastenings, placement of chainplate stations or mast steps, and the unmistakable boxy construction of a scow-schooner.

It is rather surprising that no remains of the GILMORE have been positively identified on site. The unaccounted-for remains documented thus far at the Pilot Island NW Site (sections M, D, E2, and X) appear to be from a schooner somewhat smaller than the GILMORE, possibly the FOREST or an even smaller vessel. Study of the inverted hull to the southeast of the island (locally and erroneously known as the RIVERSIDE) may reveal this to be the GILMORE. While photographic evidence (Figure 8) shows the GILMORE to have been only a short distance from the NICHOLS and FOREST, its wreckage may not have accompanied these two vessels when they slid off the reef. If the GILMORE struck the reef from the south side it may have slid away into the deeper water to the southeast of the island, not northwest as have portions of the NICHOLS and FOREST. Alternatively, the GILMORE may have been salvaged, as Hirthe and Hirthe suggest (1986:42), though it is clear from the historical accounts and from archeological survey that neither the NICHOLS or the FOREST made it off the reef intact.

Clearly, a good deal of research remains to be conducted at Pilot Island. A thorough remote-sensing survey coupled with diver inspection would very likely locate portions of those other vessels reported lost at this point. Sub-surface probing and testing around Pilot Island may also assist in

locating material cultural remains and buried vessel structure pertaining to the maritime culture and vessel disasters associated with the history of the island and lighthouse.

#### Management Recommendations

Pilot Island lighthouse is currently listed on the National Register of Historic Places, and important consideration should be given to adding the historic vessel remains of the Pilot Island NW Site to this site's boundaries, or nominating the surrounding bottomlands as a historic district (nomination of the entire area as a historic district would require the very thorough and detailed study recommended previously).

The wrecksites of the NICHOLS, FOREST, and GILMORE are important components of the historical events associated with the lighthouse's history as well as the heroic lifesaving efforts performed by men and women of the U.S. Light House Service in the absence of U.S. Life Saving Service stations. The wrecks of Pilot Island should also be recognized as a valuable archeological database pertaining to sixty-five years of Great Lakes vessel construction and use, beginning with the construction of the schooner HENRY NORTON in 1834 (lost at Pilot in 1863) (Board of Lake Underwriters 1860; Green Bay Advocate 10/01/1863 p.3,c.2), and with the loss of the schooner O.M. NELSON at Pilot in 1899 (U.S. Life Saving Service 1899:185).

Pilot Island is also a popular dive destination in northern Door County, and much of what we know of the site is due to diver visitation. Preservation efforts should be cognizant of the important recreational usage of the Pilot Island wrecks, and should be directed at preserving wreck remains and

artifacts, while providing better access and interpretation of the sites to sports divers. The volume of wreckage, clear waters, and sand bottom combine for an extensive recreational diving site of considerable interest. Buoying and boat mooring (as has been proposed for recreational preserve sites) would assist divers in locating wrecksites and orienting themselves, and interpretive brochures, markers, and onshore exhibits regarding Pilot Island and its submerged cultural resources would greatly heighten visitor interest in this treacherous but historic sentinel of the Death's Door Passage.

Steamer R.J. HACKETT

Vessel History

The HACKETT was built by Capt. Elihu M. Peck at Cleveland in 1869 for the ore and grain trade. She was wooden-hulled and single-decked, 208.1 feet in length with a 32.5 foot beam and 12.6' depth of hold, with two masts and a round stern. Her hatches were spaced evenly to match the twenty-four foot spacing of the ore loading chutes at Marquette, Michigan. She was designed to carry 1,200 tons of ore, and to tow one or two barges (called "consorts") of a size equal to herself. Her tonnage was 748.66 gross tons, official number 21934. The barge FOREST CITY was her sister ship, built in 1870 as a consort to the HACKETT, but which had her own machinery installed in 1872 to serve as a full-fledged bulk carrier. Thereafter, the HACKETT consorted with the schooner HARVEY H. BROWN, while the FOREST CITY towed the WILLIAM MCGREGOR (Labadie, personal communication 1989; Labadie and Murphy 1987:57-58; Runge; True 1956:5).

The HACKETT represented an innovation in Great Lakes shipbuilding; the bulk carrier. She was modelled on what was formerly known as a "steambarge", a screw-propelled steamer built with a schooner-type hull. These vessels had open single freight decks (unlike the packet and passenger steamers of the time) with compact aftercabins. Steambarges were designed to not only tow other barges, but to carry bulk cargoes themselves, chiefly lumber. These vessels and their consorts carried occasional cargoes of ore and grain, but were generally too small in capacity below decks (especially important for cargoes requiring protected storage like grain) with inadequate hatch sizes for using bulk unloading equipment (Labadie and Murphy 1987:56-57).

The HACKETT was the first such vessel designed specifically for bulk ore and grain cargo hauling, with appropriate hatches and below-decks capacity. Like the steambarge, she carried her machinery aft, her pilot house forward for improved visibility, and had an uninterrupted cargo hold in between (Figure 15). Her masts carried sails as auxiliary power, and to help steady her while underway. Bulk carriers also incorporated new techniques of internal reinforcement to provide the longitudinal strength required by their great length. Large oak side (or floor) keelsons helped strengthen the bilges, and iron cross-bracing was frequently used to reinforce the hulls (Labadie and Murphy 1987:57-58).

She was initially equipped with a simple high-pressure steam engine from the Cuyahoga Iron Works of Cleveland, with a 28" cylinder and 36" stroke and two firebox boilers of 3/8" iron, 6'9" in diameter and 17' in length each, also manufactured by Cuyahoga. The HACKETT was enrolled at Detroit on March 31, 1870 with Robert J. Hackett, secretary of the North Western Transportation Company as owner and master. Her insurance classification in 1874 values her at \$48,000, A1 rating. In 1877, she was re-enrolled at Detroit as part of a change of officership in the North Western Company; George Hendrie as Detroit secretary and C.C. Allen, master (Board of Lake Underwriters 1874; Labadie, personal communication 1989).

In 1881 she was again re-enrolled at Detroit; change of tonnage to 1,129.22 gross and 921.76 net, dimensions increased to 211.2 feet in length, 32.5 foot beam, and 19.2 foot depth of hold. She also had double-decks and three masts at this time, believed to be her final configuration. Her owner was E.M. Peck, secretary of the North Western Transportation Company, C.C. Allen, master. She was re-enrolled in 1882, Detroit, with E.M. Peck as president of

the company. In 1883, her engine was rebuilt by the Detroit Dry Dock Engine Works, converting it into a steeple engine through replacing the single cylinder with two new ones of 22" and 40" diameter, thereby upping her horsepower to 390 at 85 revolutions. In 1889, she received a new master, D. Givardin, and her boilers were replaced with a single Scotch boiler from the McGregor Boiler Works (Detroit), 9'6" diameter and 14' length. She was sold to the Vulcan Transportation Company of Detroit, James Findlatter, secretary, in 1892, and was later sold to Henry C. McCallum, owner and master, at Detroit in 1905 (Labadie, personal communication 1989; Bureau of Navigation 1904).

The HACKETT was lost on November 12, 1905 bound to Marinette with 1,200 tons of steam coal for the Marinette Fuel and Dock Company. While off Whaleback Shoal in Green Bay about 7:00 or 8:00 AM, a fire started in the crew's quarters. Capt. McCallum was notified and the vessel was run onto the shoal while the crew fought the flames. The crew seemed to have extinguished the fire when shortly thereafter the engineer reported the engine room in flames, the fire evidently having burned through the bulkhead separating the two spaces and igniting oil in the oil rooms. The captain and crew of fifteen men took to the two yawls, abandoning their personal possessions as the steamer quickly became covered in flames (Marinette Eagle 11/14/1905, p.1,c.1).

The Washington Island fishing tug STEWART EDWARDS was just steaming out to lift her nets when she noticed the HACKETT aflame on the shoal. Capt. McCallum reports:

The sea was quite high, but we could see a tug coming to our assistance and knew that we were safe. Just as we left the boat the stack toppled over and struck the whistle rope and the whistle blewed steady until the

craft blew up . . . the coal in the hold of the boat produced so much gas that the whole upper works went up with a report like a gun (Marinette Eagle 11/14/1905, p.1,c.1).

At 8:15 AM, the lookout at Plum Island Life Saving Service Station reported to the keeper heavy clouds of smoke in the direction of Whaleback Shoal. The report was simultaneously confirmed by the lighthouse keeper, reporting a vessel aflame thirteen miles west of the station. Capt. Egle's life-saving crew embarked, and despite a strong headwind and the long distance, managed to reach the site before noon, finding the HACKETT completely afire and abandoned. Egle (apparently of an asbestos-like constitution) managed to board the HACKETT (probably at the bow, the stern by this time having been burned away), saving McCallum's and the first officer's papers, two compasses, and miscellaneous articles valued at about \$120. Egle reported the decks as hot from a fire burning beneath them (evidently in the coal) which eventually went on to burn the rest of the craft to the water's edge (Door County Advocate 11/18/1905 p.1,c.1; Marinette Eagle 11/14/1905, p.1,c.1; U.S. Life Saving Service 1906:104).

The HACKETT was a total loss, valued at about \$20,000 but insured for \$12,000. The cargo was valued at \$4,000 and was fully insured. McCallum and the crew were taken to Marinette by the EDWARDS. Registering at the Stephenson hotel in Menominee, the doubtlessly shaken captain related his story to the press, deplored, "[m]y wife and I purchased the boat last spring in Detroit and practically all that we owned was in her." However, things could have been worse. The HACKETT had been towing a consort barge, the MCGREGOR, but had left it at another port to load lumber, and the Marinette Eagle called it a "miracle" that no one was injured in the fire or subsequent

explosion (Marinette Eagle 11/14/1905, p.1,c.1). The HACKETT's final enrollment was surrendered at Detroit on 11/15/1905; "total loss by fire (Labadie, personal communication 1989)."

#### Site Description

The wreck of the HACKETT lies on Whaleback Shoal, midway between the red lighted nun buoy and the green can buoy, with approximately ten feet of water over the bow and fourteen feet of water over the stern. She lies bow on to the shoal, verifying that she had been run aground in the midst of the fire. The site was relocated with the assistance of the charter dive boat NEPTUNE II.

The wreck lies on a gradual slope of sand and gravel, partially burying the site (Figure 17). An overall 190 foot length of the vessel is extant, running from the propeller forward, with approximately 145 feet of the port bilge exposed. The starboard side of the bilge is buried under approximately 6" to 15" of sand overburden, and is only intermittently exposed in random scour areas. The hull is intact to the turn of the bilges, beyond which it seems to have been destroyed by a combination of the original fire and later storms and ice movement. No evidence for the hull sides, decks, or superstructure was found on site, though there are reports of scattered wreckage over other areas of the shoal (Shastal, personal communication 1988). Visual survey by the 1988 team focused on documenting only the main wreckage area and machinery, leaving a survey of the entire shoal for future investigations.

The surviving hull remains consist of almost solid floor framing overlain with multiple keelsons, evidence of this prototype bulk carrier's extensive longitudinal reinforcement. A single keelson sided 11" at the bow and 14"

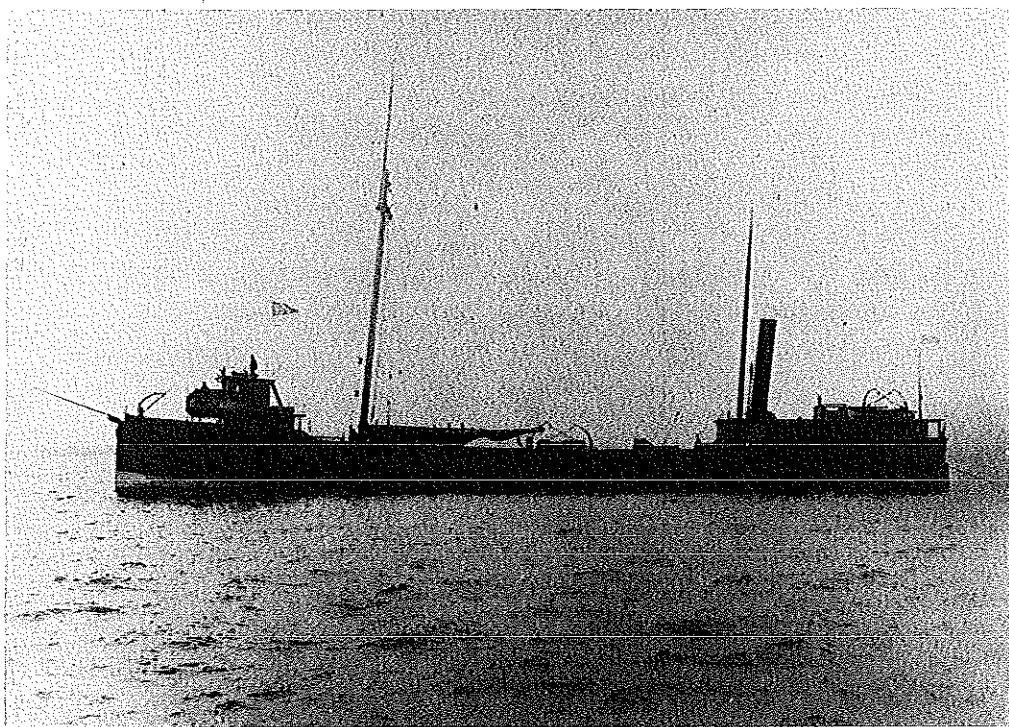


Figure 15. *St.s. R.J. HACKETT*, circa 1892-1905.



Figure 16. *HACKETT* floors and port bilge keelson; note close spacing of floors.

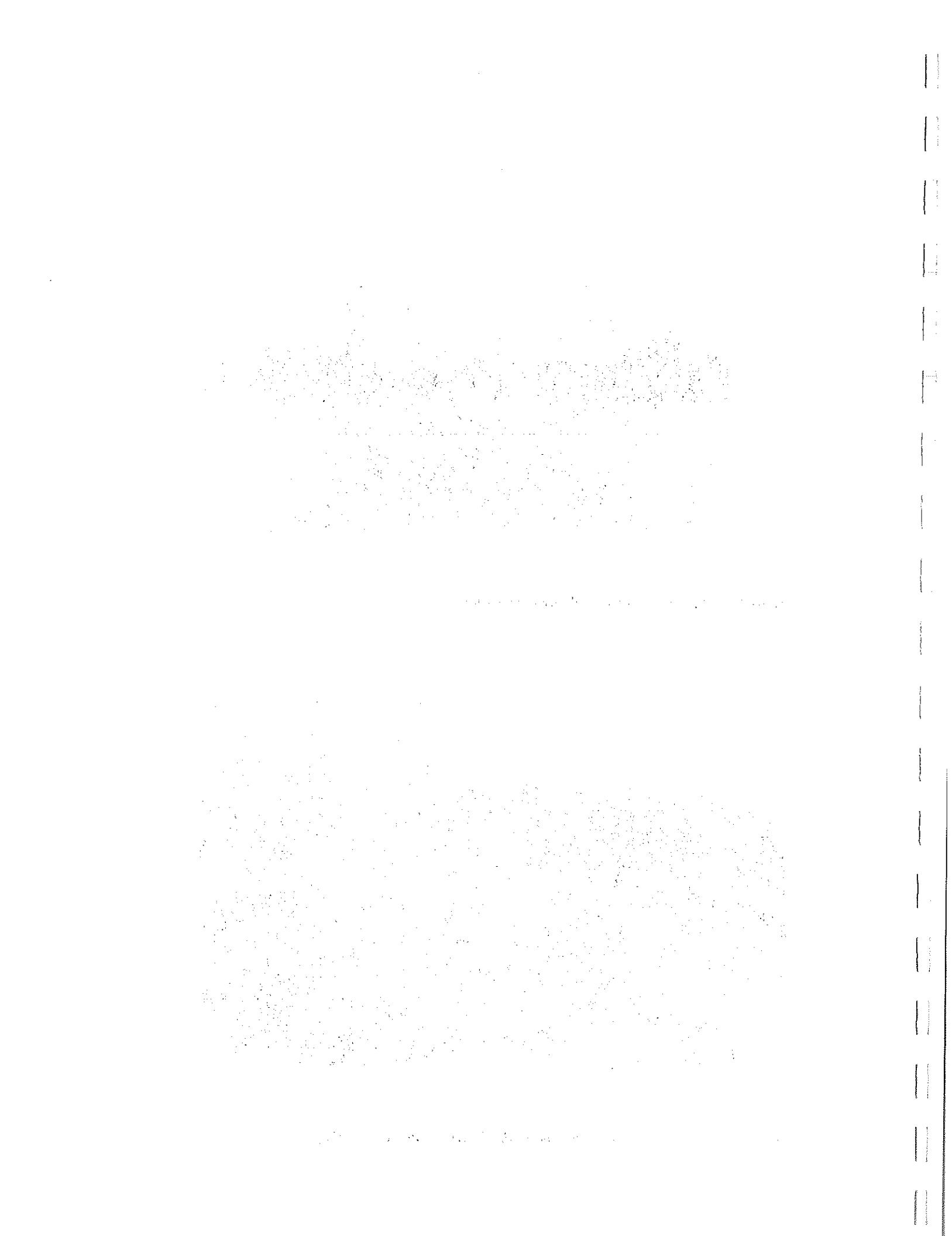
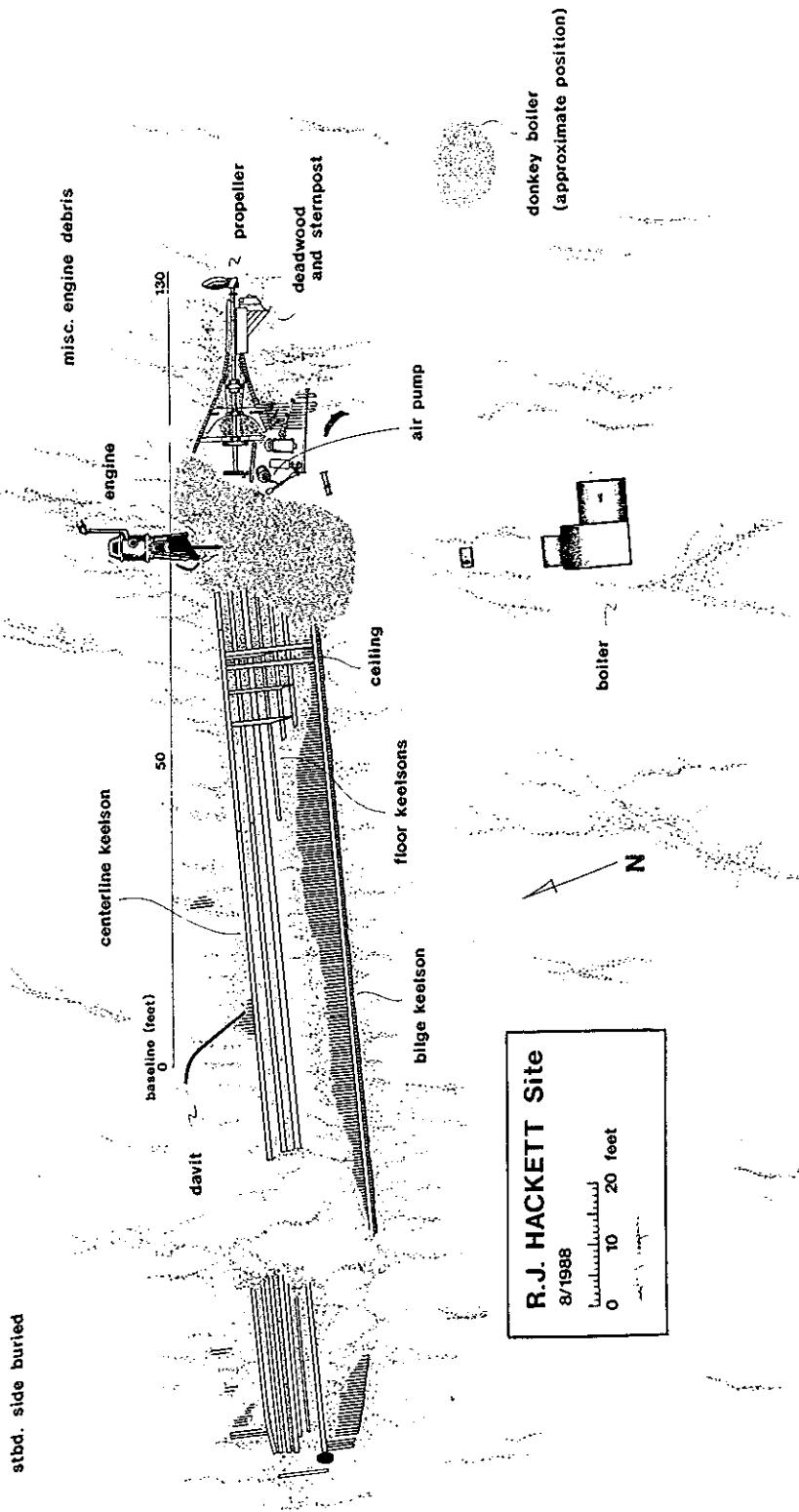
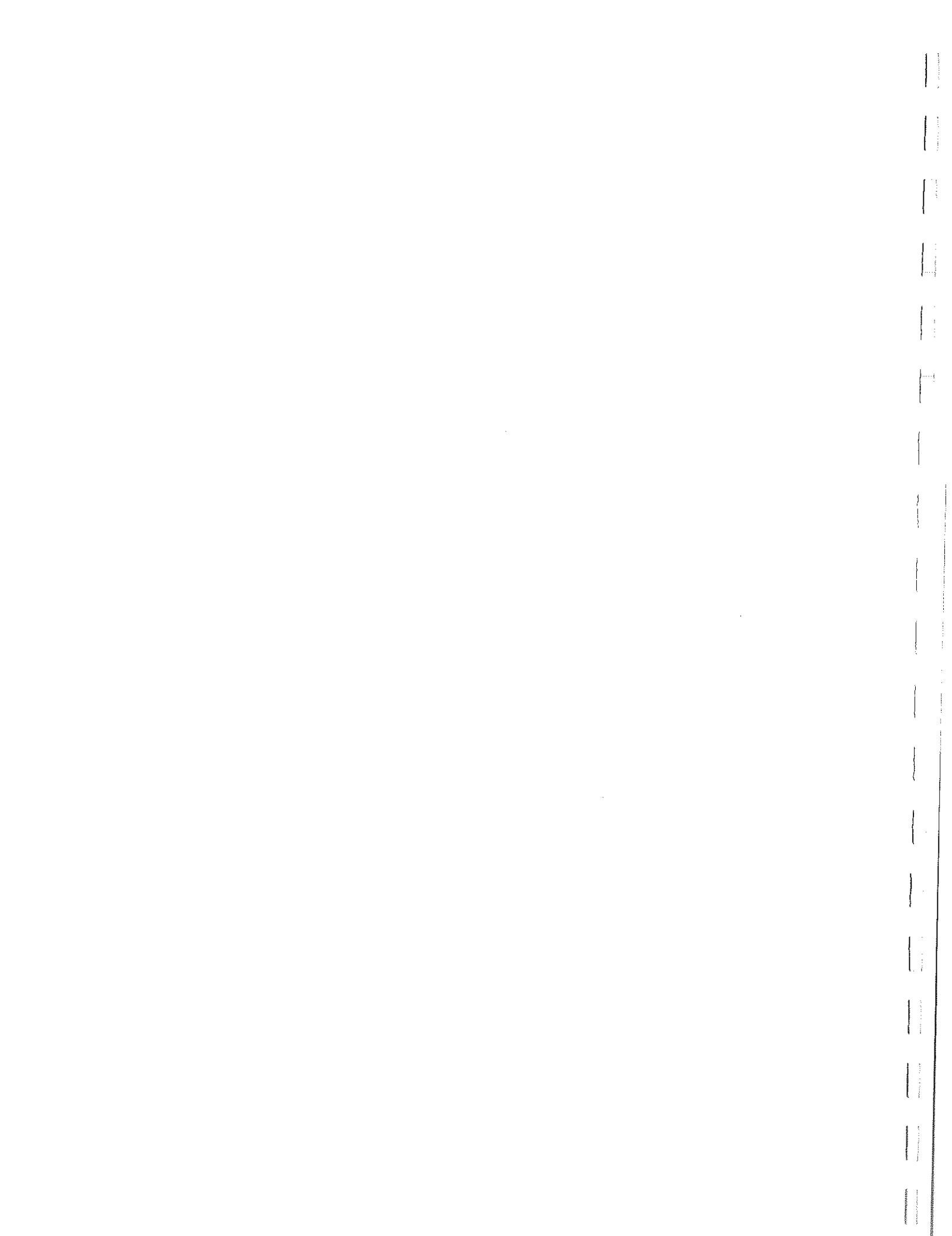


Figure 17.





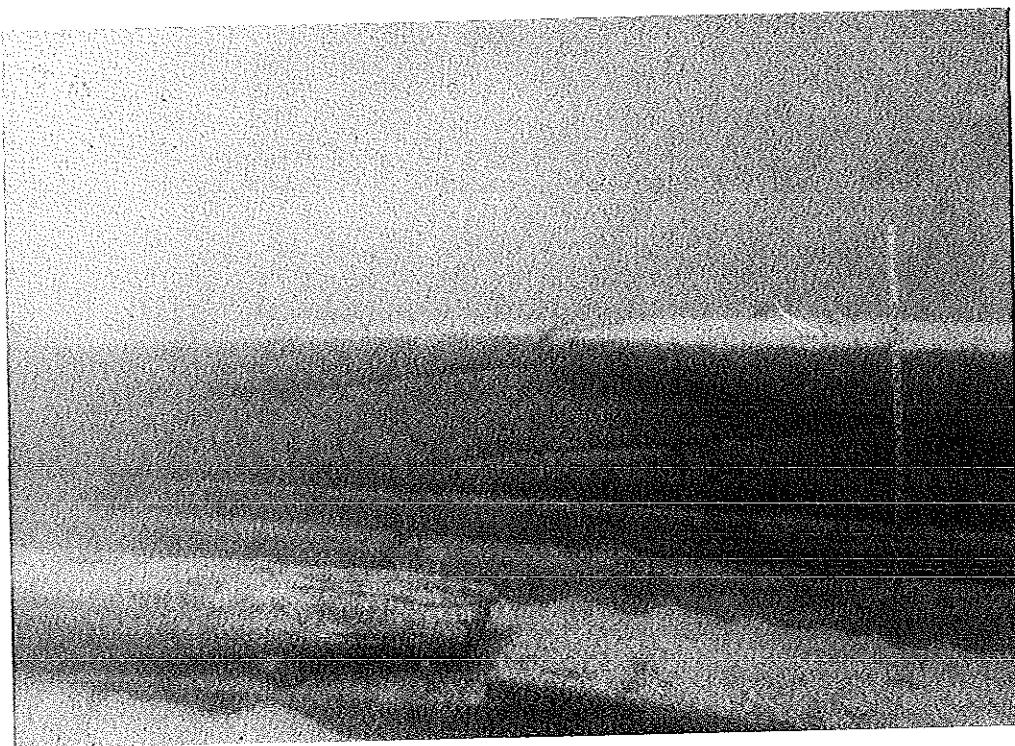


Figure 18. Scarph joints in keelson and rider, amidships viewed from port side.

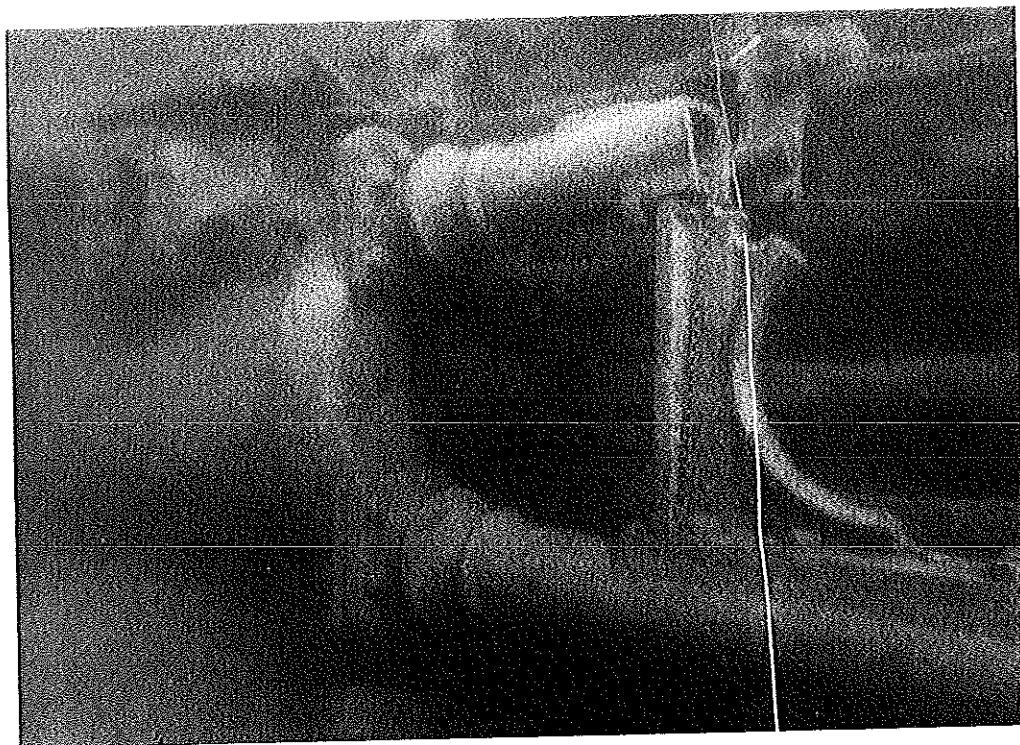
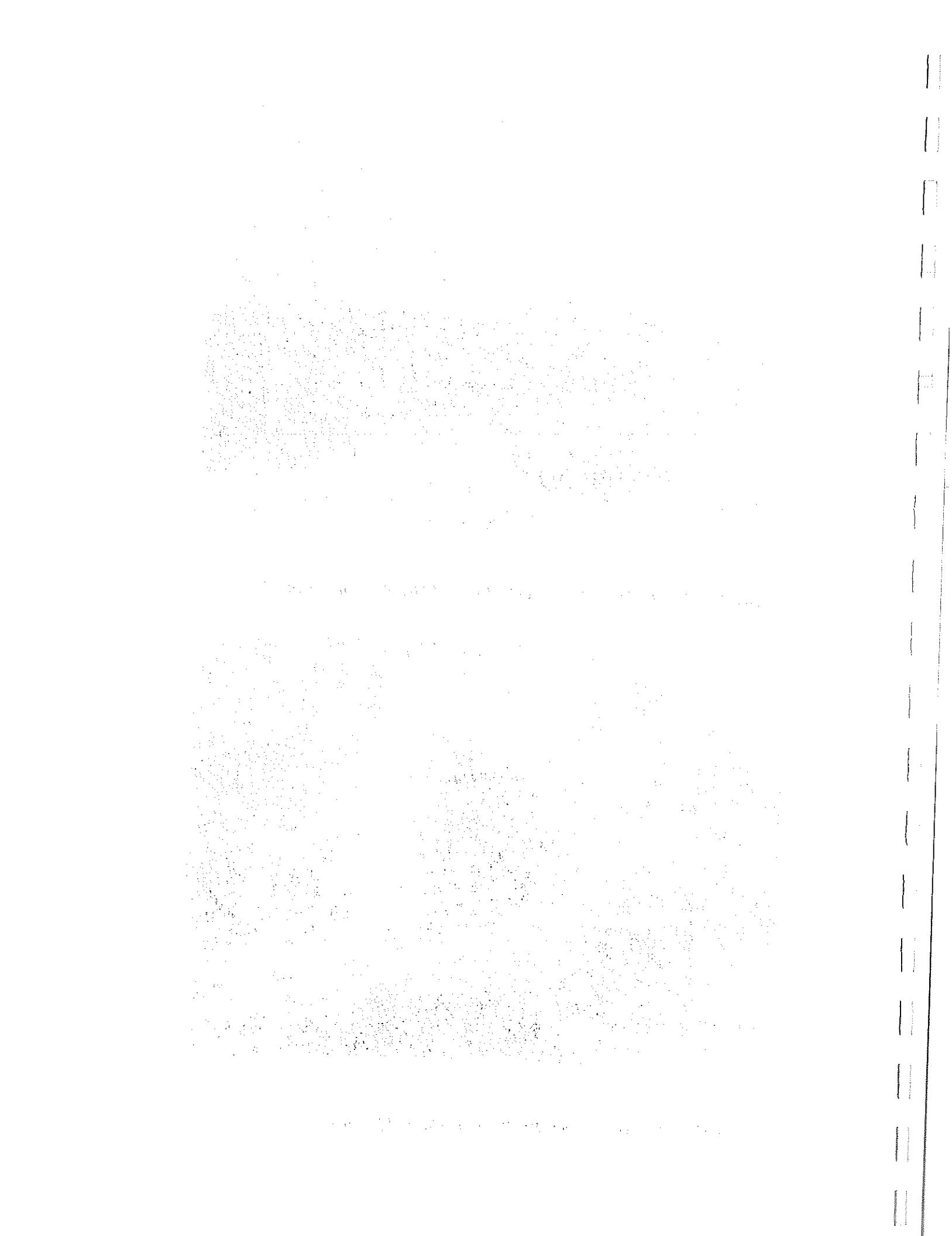


Figure 19. Steeple engine; note Neo-Classical columned framing.



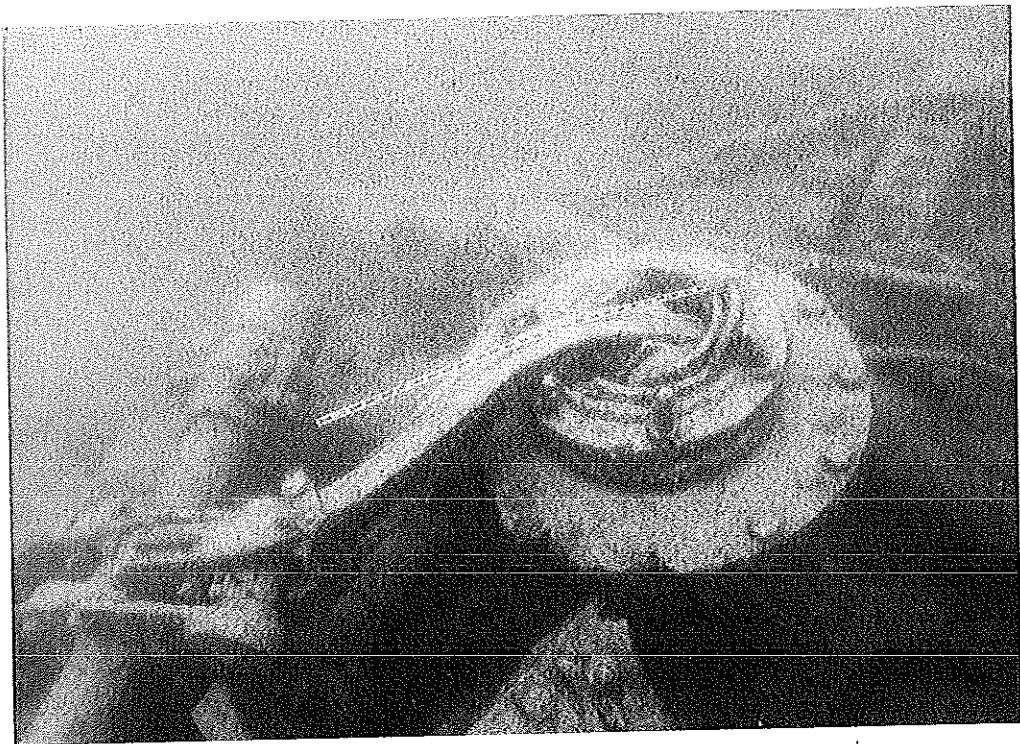
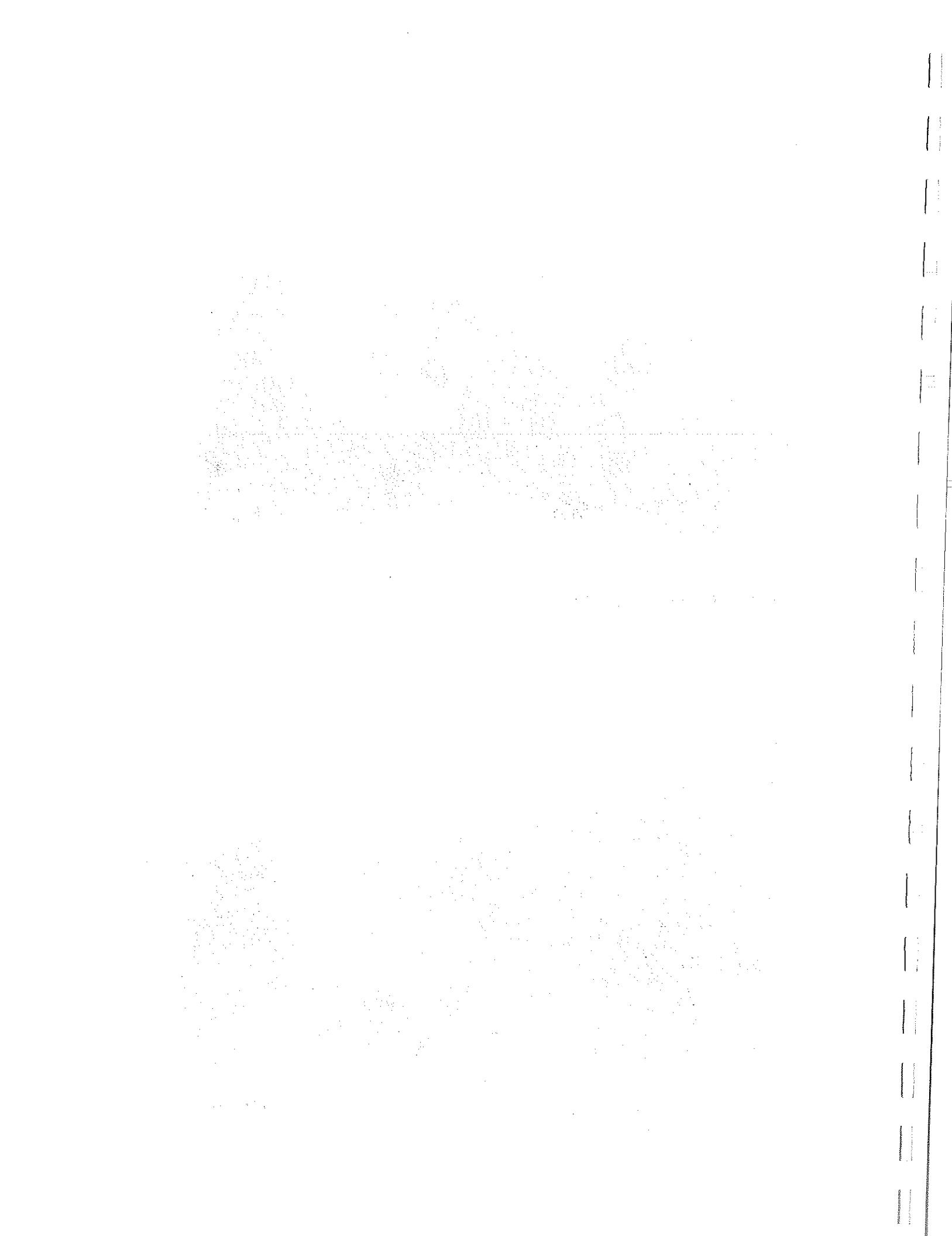


Figure 20. *HACKETT air pump for steeple engine.*



Figure 21. *Diver David Anderson inspects propeller shaft, thrust bearing and braces, and flywheel.*



amidships by 13" molded runs the length of the vessel, topped by a 14" sided by 15" molded rider keelson. The rider is fastened with 7/8" iron drift pins. Five port floor keelsons 9 7/8" sided by 10" molded spaced 16" apart reinforce the bilge amidships, and a 9" sided by 10" molded bilge keelson is placed at the turn of the bilges (Figures 16 and 18). The bilge keelson is fastened with 1" diameter iron drifts, and 2 1/4" diameter clinch rings. The keelsons in the bow are slightly more exposed from the sand overburden. The port floor keelsons here (inboard to outboard) are sided 9 1/2", 7", and 9", and molded 13". Three starboard floor keelsons are also exposed in this area, measuring (inboard to outboard) 7" sided by 9" molded, 8" sided by 9" molded, and 7" sided by 4" molded.

Floor dimensions (where exposed) show a frame room of approximately 11" at the bow. The floors at the turn of the bilges amidships are molded 8-9" and are sided 5 1/4". Floors are single, and the bilge framing is nearly solid, having less than 1" space in between adjoining frames. Though it could not be observed, it is assumed that adjoining frames were through-fastened with drift pins. The bilges are ceiled with athwartship ceiling measuring 9 1/4" in width and 1 1/4" in thickness.

An interesting aspect of the site is the remains of the steeple compound steam engine and associated machinery (Figures 19 and 20). The steeple engine lies heeled over to the starboard side of the wreck, with the engine area occupied by broken remains of iron engine framing, pipes, and other debris. The engine framing is in the form of four Neo-Classical columns supporting the steepled cylinders. Notable in the engine debris is the remains of the air pump, as well as a condenser. Sheet iron which probably lined the boiler area of the engine room can also be found. The floor frames in the engineering spaces are

obscured by the engine debris, as well as fastenings, coal, and debris associated with the fallen stern cabins and deck. Small fragments of ceramics from the crew's galley were observed amongst the debris, larger items probably having already been removed by scavengers. Divers report that a good deal of the brass engine components have already been removed by modern scavengers.

The surviving propeller shaft assembly (Figure 21) includes a cam, flywheel and bearing, thrust bearing, and a shaft coupling. The thrust bearing is mounted on a pillow block reinforced with 1 1/2" diameter iron tie rods fastened to plates bolted to the hull. The propeller shaft is 9" in diameter. The propeller itself, originally four-bladed, has only one blade extant measuring 4'3" in length. The other three blades are broken off close to the hub, possibly by salvage work, or possibly from striking the shoal during the vessel's stranding.

The shaft log and stern deadwood have heeled over to the port side, and the sternpost is broken off to approximately four feet in height. The deadwood timbers, arranged diagonally to the shaft log, are fastened to the latter and to the sternpost with 1" diameter drift pins. The alignment of the stern deadwood and propeller shaft appears to be angled slightly to port of the vessel's centerline, as if the keel has broken at some point beneath the engine, wrenching the stern to port. While triangulation measurements of the midships keelsons and the propeller shaft verified this apparent break, additional triangulation and test excavations in the area of the stern would be needed to ascertain whether or not the stern is still articulated with the bow.

The HACKETT's boiler is a prominent feature on site, and is located

approximately fifty feet to the port of the vessel's centerline, where it has either rolled or been dragged by ice or salvors. The boiler is of the firebox type (contrary to the historical records which indicate that her last boiler was a Scotch boiler). It lies on its starboard side, with its two stokeholes facing forward. The boiler measures 14' feet in overall length, 10'5" in width, and 12'2" in height. Eight rows of 3" diameter firetubes run across the forward (stoking) face of the boiler, with two semi-circular stokeholes underneath 19" in width and 16" in height. The firebox area is open on the bottom, and measures 7'8" in length and 10'5" in width. A cylindrical water reservoir is mounted on the aft end of the firebox, and measures 95" in diameter and approximately 6'4" in length. The boiler is of iron, with riveted construction. Atop the boiler is mounted a riveted iron steam drum partially buried in the sand, approximately 4' in diameter and 6' in length.

A good deal of other miscellaneous debris surrounds the site, and a good deal more is likely to be buried in the sand. An iron plate with the mount for a hinged access door was found to the south of the engine, and divers reported a small donkey boiler approximately fifty feet to the southeast of the site. A boat davit identical to that shown in a 1892-1905 photograph of the HACKETT (Figure 13) was found partially buried in the sand on the starboard side of the keelson, forward of amidships. A presently unidentified hull fitting resembling a hawsehole, 28" in diameter but with an interior opening of only 3" was found at the bow. This fitting appears to have originally have been fastened through the hull or deck, and may have been the pivot base for one of the davits.

### Recommendations for Further Research

The fact that the HACKETT was a historically-known prototype for an important vessel design, the Great Lakes bulk carrier, it is anticipated that the remains of the HACKETT will be the subject of a good deal of future research interest, both by marine historians and nautical archeologists. Further visual survey in the vicinity of the main wreck may bring to light remains of the upper hull, superstructure, and deck, which will be invaluable sources of marine architectural data on this vessel. Remote-sensing and/or controlled probing may also bring to light additional hull elements, machinery, and artifacts in the vicinity of the wreck which are currently buried under the shifting sands and gravels of Whaleback Shoal. Artifactual evidence for shipboard life will add a new element to the primarily architecture-oriented knowledge of this vessel. Additionally, the architectural study of the HACKETT should include complete documentation of the surviving hull, with a detailed study of scantling dimensions, fastening, joinery, hull form, and other elements of her construction and reinforcement. This could be coupled with a search for builder's records pertaining to the HACKETT or to the FOREST CITY, none of which are currently known to exist.

### Management Recommendations

As a vessel of great historical significance, the preservation of the HACKETT is a high priority, and nomination to the National Register of Historic Places should be considered. The site is of great interest historically and archeologically, and is also a favored site for sport diving. The shallow, clear waters of the shoal, large items of machinery such as the engine and boiler, and numerous fish create a dive site of considerable appeal to the

beginning or intermediate sport diver. The HACKETT should be incorporated into a marine preserve system which would help make the site more accessible (through buoying) as well as interpret the remains to the divers, either through waterproofed site plans or through a self-guided underwater trail of the site. Some monitoring of the site will also be necessary as some portable artifacts may still be found; however, heavy scavenging has removed most of the more favored items such as brass valves and gauges. The exposed location of Whaleback Shoal and its distance from the mainland makes diving on the shoal susceptible to any sort of bad weather, and visitors should be warned against embarking for the shoal in building seas or winds. The distance from land does, however, remove many of the user-conflict concerns of the inshore sites.

Steamer LOUISIANA

Vessel History

The LOUISIANA was built in 1887 in Marine City, Michigan at the yard of Morley and Hill (Figure 22). Her enrolled dimensions were 267.0 foot length, 39.6 beam, and 20.0 depth of hold, with a gross tonnage of 1,929 and a net tonnage of 1,383 (Bureau of Navigation 1912:232; Runge). She was screw-propelled, wooden-hulled, and was powered by a fore and aft compound (two cylinder) steam engine with cylinders of 26 and 48-inch diameter and a 40-inch stroke. The engine was built by Dry Dock Engine Works of Detroit in 1887 (Runge), and was rated at 610 indicated horsepower in 1912 (Bureau of Navigation 1912:232). Steam was provided by one firebox-type boiler 10' diameter by 15' 8" length, built at the Dry Dock Engine Works in 1887. Seven hatchways provided access to the hold (Runge).

The LOUISIANA was a refinement of the bulk carrier design first employed in the R.J. HACKETT and the first generation of forty-seven bulk carriers built between 1869 and the Panic of 1873. Bulk carrier construction resumed again in 1880, and LOUISIANA was part of this second generation of some 170 bulk freighters built during the 1880's. Size increased in the years between 1869 and 1902 (when the last wooden bulk freighters were built) from the HACKETT's 210 foot length to later generation vessels of 310 foot length. This was made possible more due to channel improvements to the St. Mary's and Detroit Rivers, as well as the St. Clair Flats, than in improvements in shipbuilding techniques. From this point on, iron and steel became the dominant shipbuilding materials for bulk carriers, permitting greater lengths, superior

longitudinal reinforcement, and lower deadweight in relation to vessel size  
(Labadie and Murphy 1987:58-59).

Following twenty-six years service as a bulk freighter, the LOUISIANA was lost in the large November gale of 1913 on Lake Michigan. At that time she was owned by Frank M. Osborne, home port of Cleveland, and under command of Capt. Fred McDonald. The LOUISIANA departed Lorain, Ohio on November 2 with a load of coal for Milwaukee, which she delivered and departed light for Escanaba, Michigan for a cargo of iron ore. A heavy northwest snowstorm struck the LOUISIANA around midnight of November 8, forcing the steamer to take refuge in Washington Harbor, Washington Island, enroute to Escanaba via Death's Door. The combined heavy winds and seas, reportedly exceeding seventy miles per hour, caused the anchors to drag and pushed the steamer perilously close to shore. By morning, a fire of unknown origin was discovered in the hold, and after a fruitless firefighting effort, the crew of seventeen men abandoned the ship to the fire and the storm. The Plum Island lifesaving crew appeared on the scene after bringing their beach apparatus overland, but nothing further could be done, the steamer crew having already taken to the lifeboats. The LOUISIANA burned where she lay, driven up against the rocky southeast shore of Washington Harbor. The gale which destroyed the LOUISIANA blew unabated until the night of November 11, wrecking a reported twenty Great Lakes vessels, damaging seventy-one other ships, and drowning 248 sailors (Door County Advocate 11/11/1913 p.1,c.2; Frederickson 1961:I:63-64).

#### Site Description

The wreck of the LOUISIANA lies on the southeast side of Washington Harbor, with her stern in eighteen feet of water, and her bow running almost up to the

water's surface. A disarticulated sixteen-foot section of the bow, including cant frames, stempost, bow deadwood, and keelsons, lies exposed on the rocky beach, approximately one-hundred feet to the south of the site (Figures 23, 24). A surviving 239' 6" of the bilge lies on a gradually sloping rocky bottom, flanked by charred and broken pieces of the vessel's sides, machinery, sheet metal, and fastenings. The hull is broken off at the turn of the bilge at the bow (inshore) end, but survives to a height of approximately thirteen feet (keelson to frame tops) at the port and starboard stern quarters. A large debris field of fallen sides and machinery is situated at the starboard quarter, much of this material leading off into deeper water to the northwest. The engine and boiler have been salvaged, but many miscellaneous engineering components such as bearings, pipes, and sheet metal surround the iron engine mount and broken fore and aft cylinders in the stern.

Other salvage to the site can be seen in the port midships area, where a large hole has been blasted through the hull, splintering the keelsons and removing a fifteen foot section of floors, ceiling, and exterior planking. It is not known whether this was the result of contemporary salvage efforts, efforts to remove protruding hull elements that affected navigation, or simply modern vandalism.

#### Vessel Construction

The hull of the LOUISIANA is constructed entirely of wood, with iron cross-bracing in her sides (Figure 25), and fastened with iron. The timbers appear to be of white oak (as was common practice), but wood sampling was not conducted by the researchers to ascertain the actual material used. Multiple keelsons were used for longitudinal strength, and the hold of the vessel was

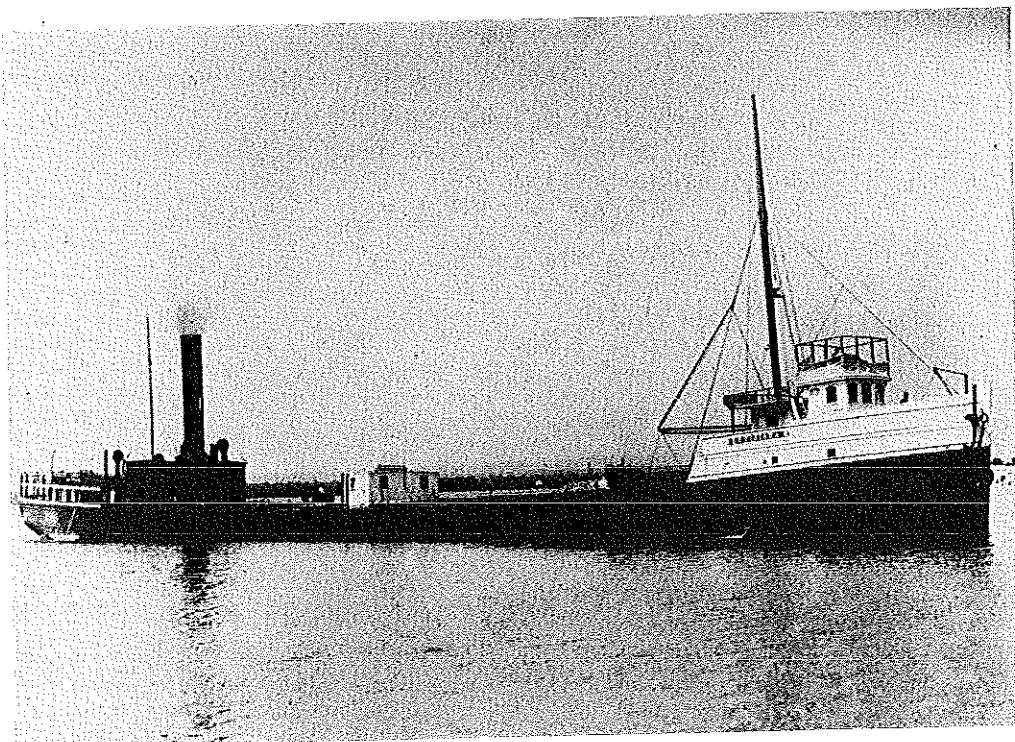


Figure 22. *St. s. LOUISIANA*, circa 1889.

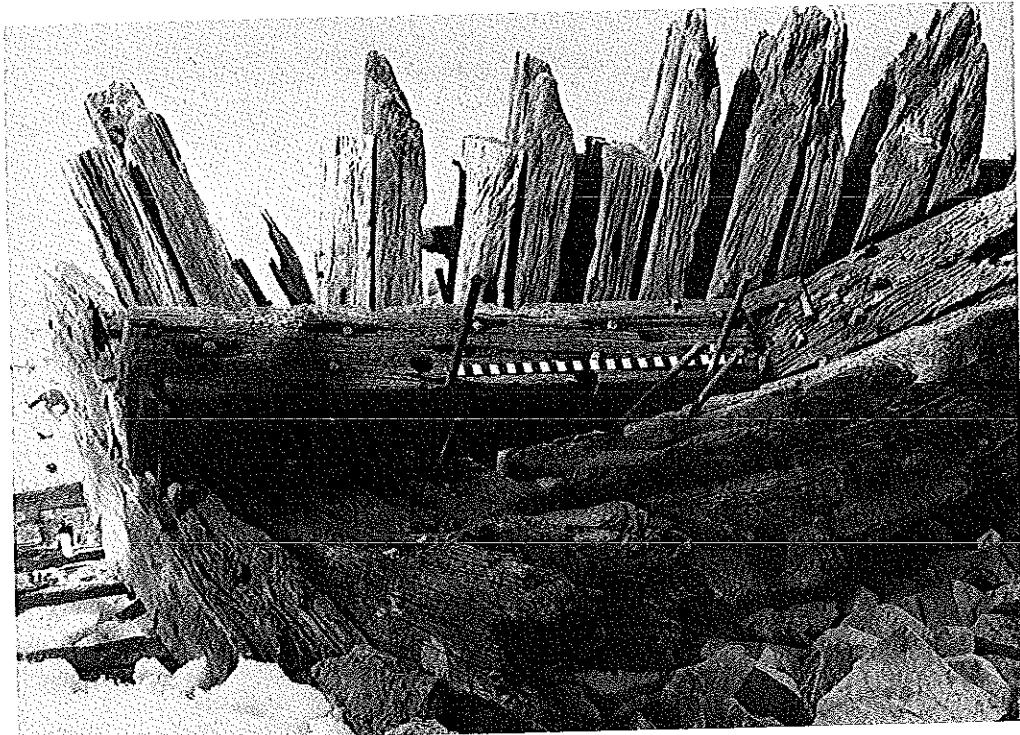


Figure 23. *Disarticulated bow section.*

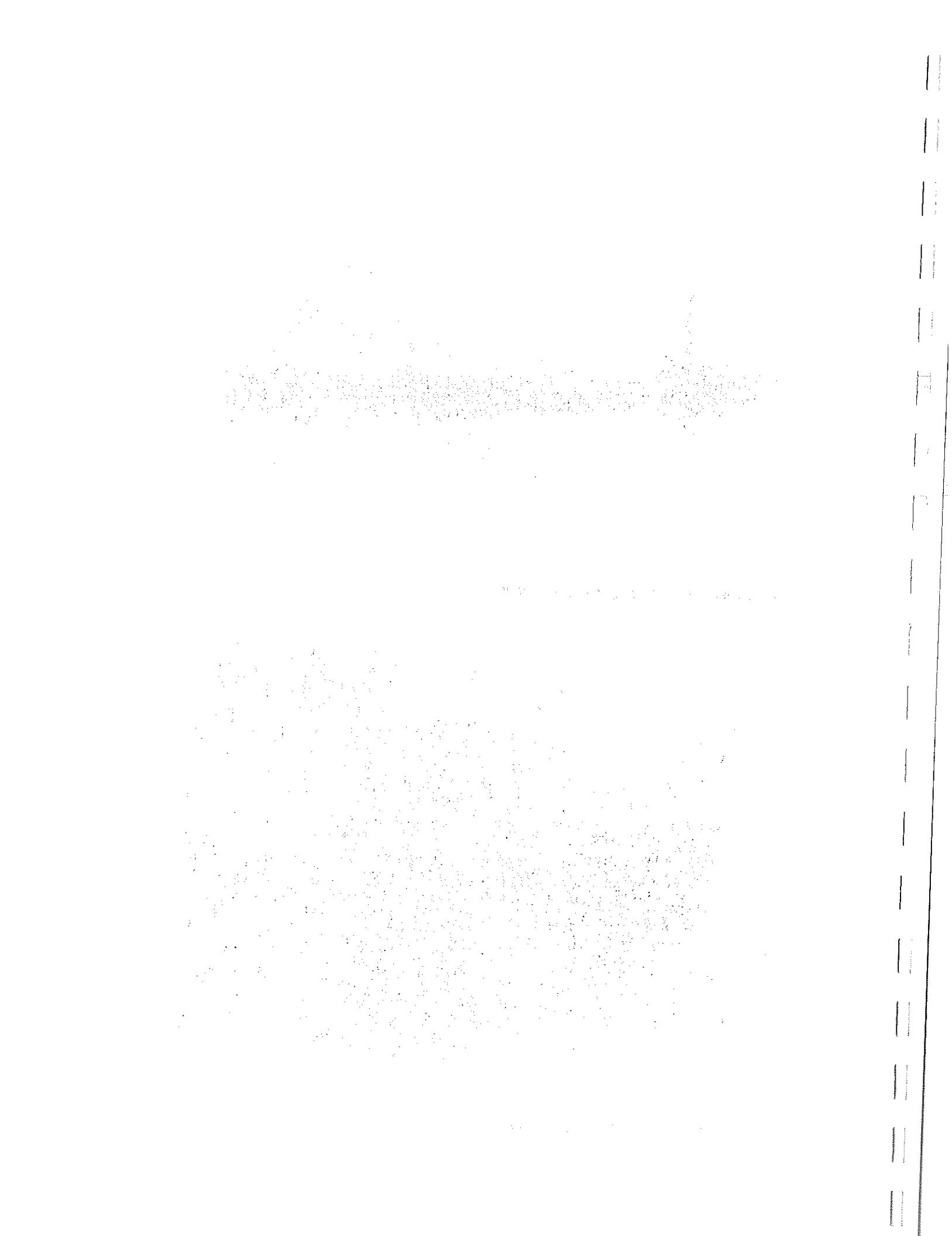
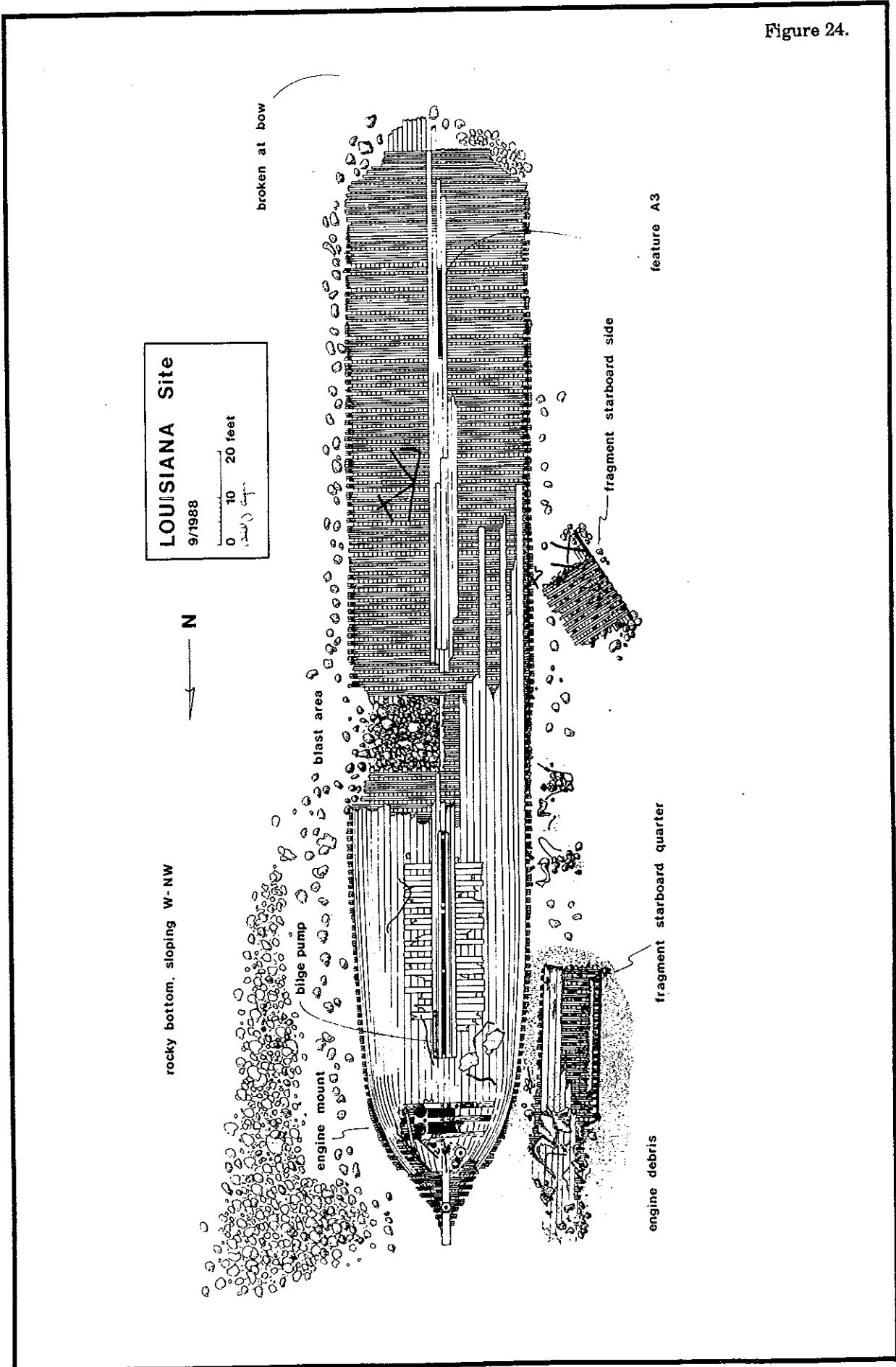
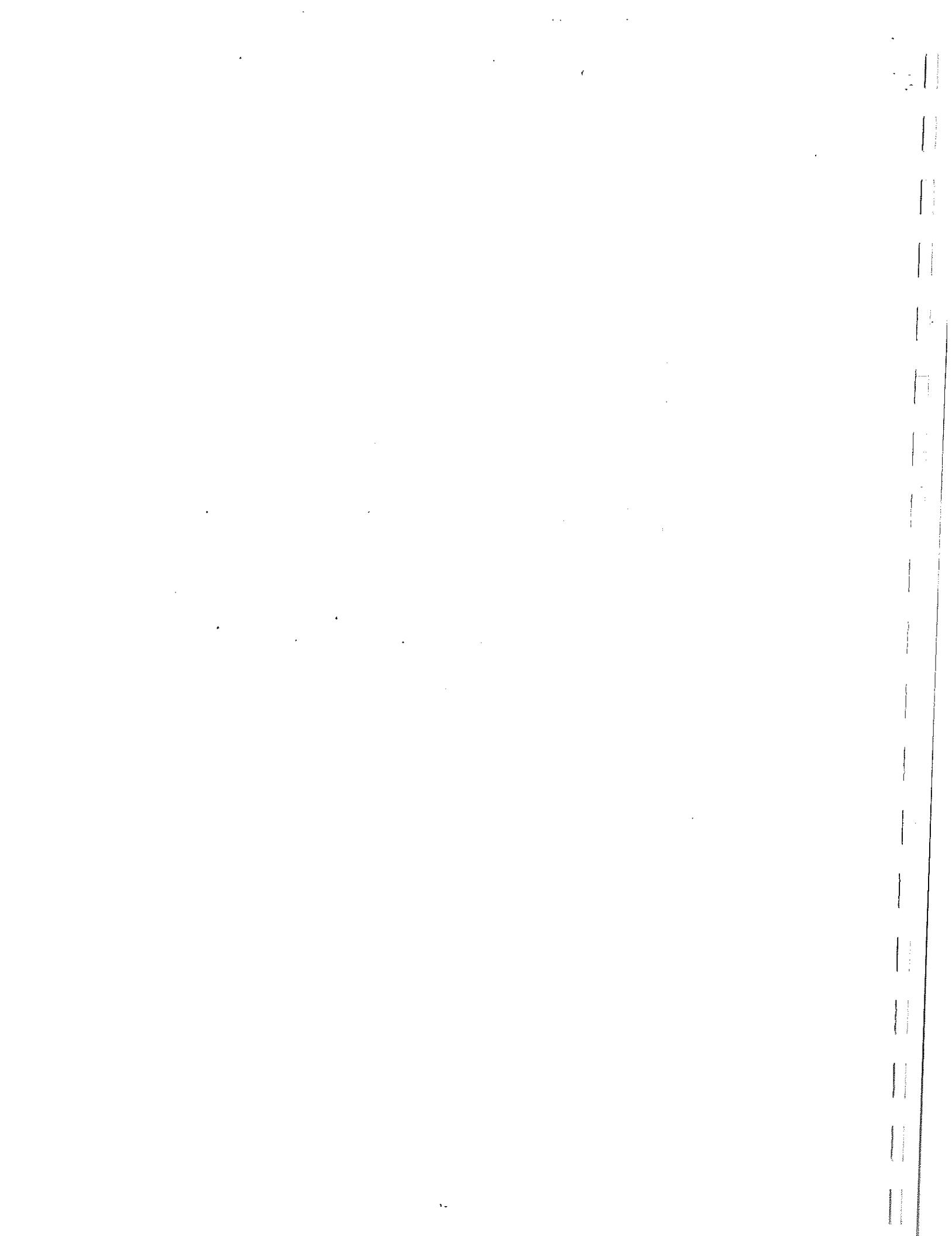


Figure 24.





double-ceiled longitudinally and athwartships. At least three framing patterns were documented in the hull, alternated with solid floor framing at major stress points.

The basic vessel frame used in LOUISIANA is a 5" sided frame, with a molded dimension of 20" at the floor, and 15" at the turn of the bilge. At the forward end of the hull, these frames appear in sets of doubled frames followed by a space of 3" followed by a set of triple frames. Five of these relatively closely-spaced sets are followed by a solid framing of four 5" sided floors, a 9 1/2" sided floor, a 6" sided floor, and a 5" sided floor (this solid framing perhaps coinciding with a hatchway or a bulkhead).

A second framing pattern was employed following the solid flooring, in the vicinity of feature A3 (see below), an anomalous construction possibly associated with a longitudinal bulkhead. Here, three floor sets appear, each consisting of a set of double frames, a 6" space, five frames, and a 9" space. Following feature A3, floor framing assumes a slightly looser spacing pattern, appearing in sets of triple frames, a 3" space, followed by three sets of double frames with 9" spaces. This pattern was documented to proceed through the hull to amidships (the site plan projects this pattern aft of this point). Selected measurements in the stern areas found solid framing for nine feet under the engine mount, with double framing and 10" spaces aft of the engine spaces into the stern deadwood.

The hull is reinforced with five major longitudinals; a 15" sided by 12" molded keelson, flanked by a port sister keelson 8" sided by 11" molded, a starboard sister keelson 10" sided by 11" molded, and assistant port and starboard sister keelsons each 12" by 12". Amidships and aft, the keelsons

are overlain by two rider keelsons, a port rider 12" by 12" and a starboard rider 14" by 13".

The hull is ceiled with longitudinal ceiling varying from 6 1/2" to 14" wide by 5" thick at the bilges and 2 3/4" thick above the turn of the bilge. It is fastened with 7/8" diameter iron drift pins and 2" diameter clinch rings. Portions of surviving athwartships ceiling (Figure 26) were found in the stern measuring 14 1/2" wide by 3/4" thick, running across the flat of the floors from the keelsons to the turn of the bilge. This appeared to be of a softer wood (possibly pine) and was apparently a sacrificial layer of easily-replaced planking over the bilge ceiling as protection against heavy cargoes such as coal and iron ore. Exterior planking varies from 8" to 9" in width, measures 3 1/2" in thickness, and is caulked with oakum, remnants of which may still be found in the planking on the port quarter.

The longitudinal keelsons form two central slots, one located near the bow (feature A3), and another towards the stern. These slots are very similar to schooner centerboard trunks in construction, save for their being covered at the bottom by the vessel's keel. Longitudinal pocket pieces and half floors were observed at feature A3, and are believed to have been used at the stern "trunk", though the presence of bilge ceiling prevents observation of this construction method. Stumps of vertical timbers and fastening holes in these trunks suggest they held vertical stanchions which supported either the decks or some type of longitudinal bulkhead. While the former is known to have been a common means of supporting decks of wooden ships, hold stanchions are normally stepped onto the centerline keelsons (Desmond 1984:61), not footed firmly down through the height of the keelson assembly. Such an arrangement suggests that the stanchions were constructed to resist lateral (transverse)

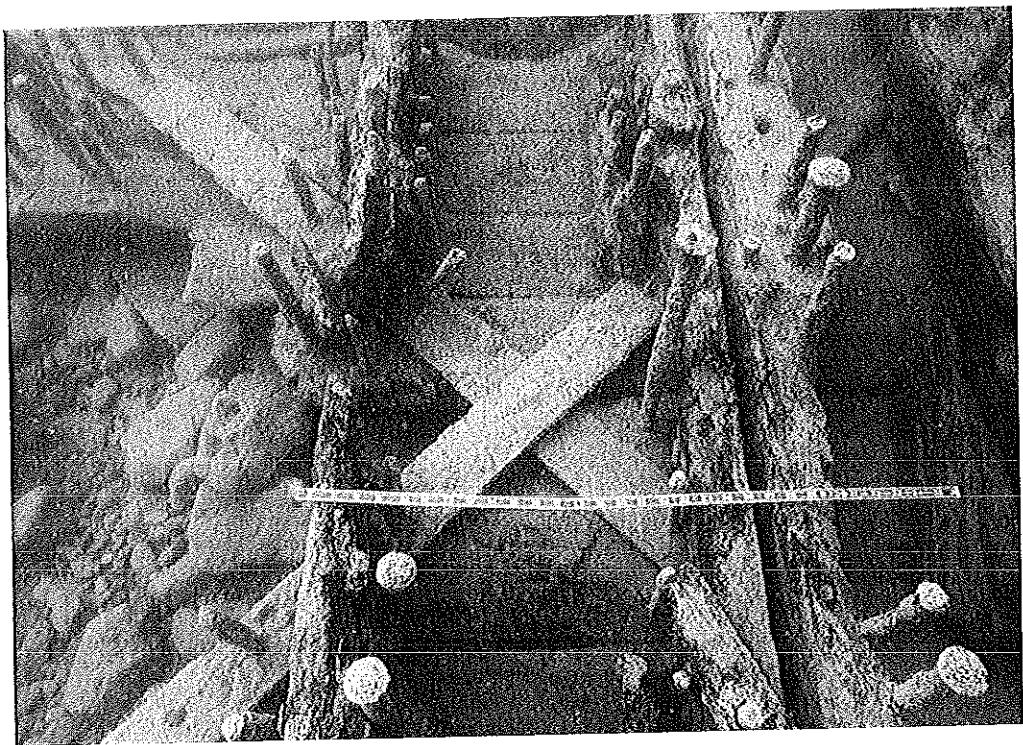


Figure 25. *Iron cross-bracing.*

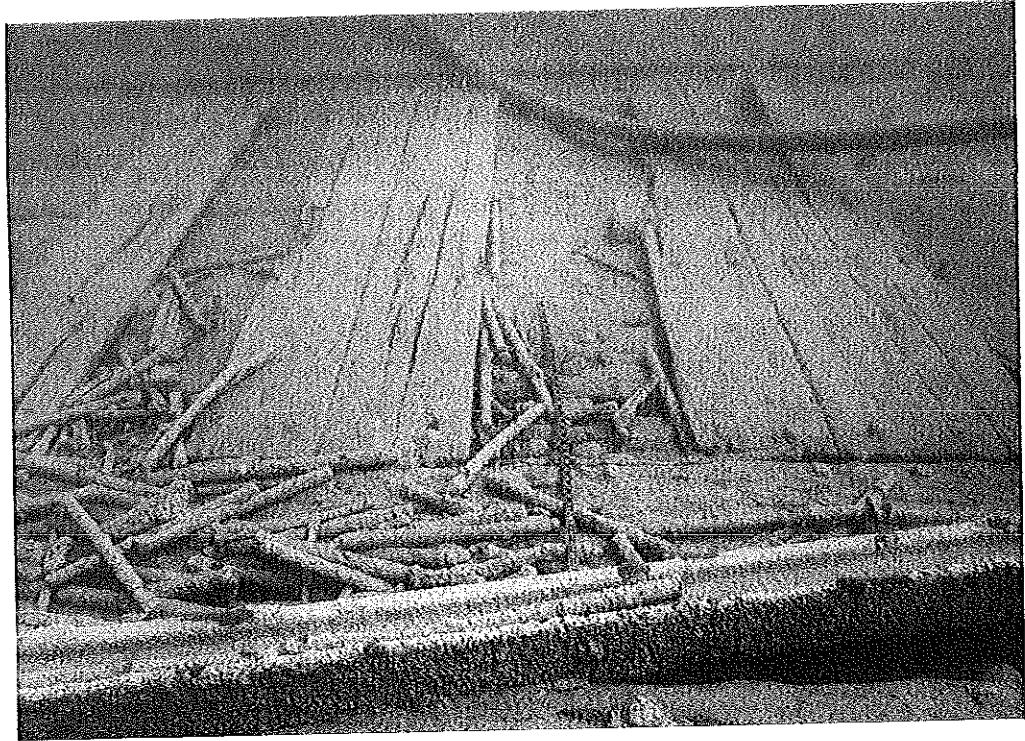
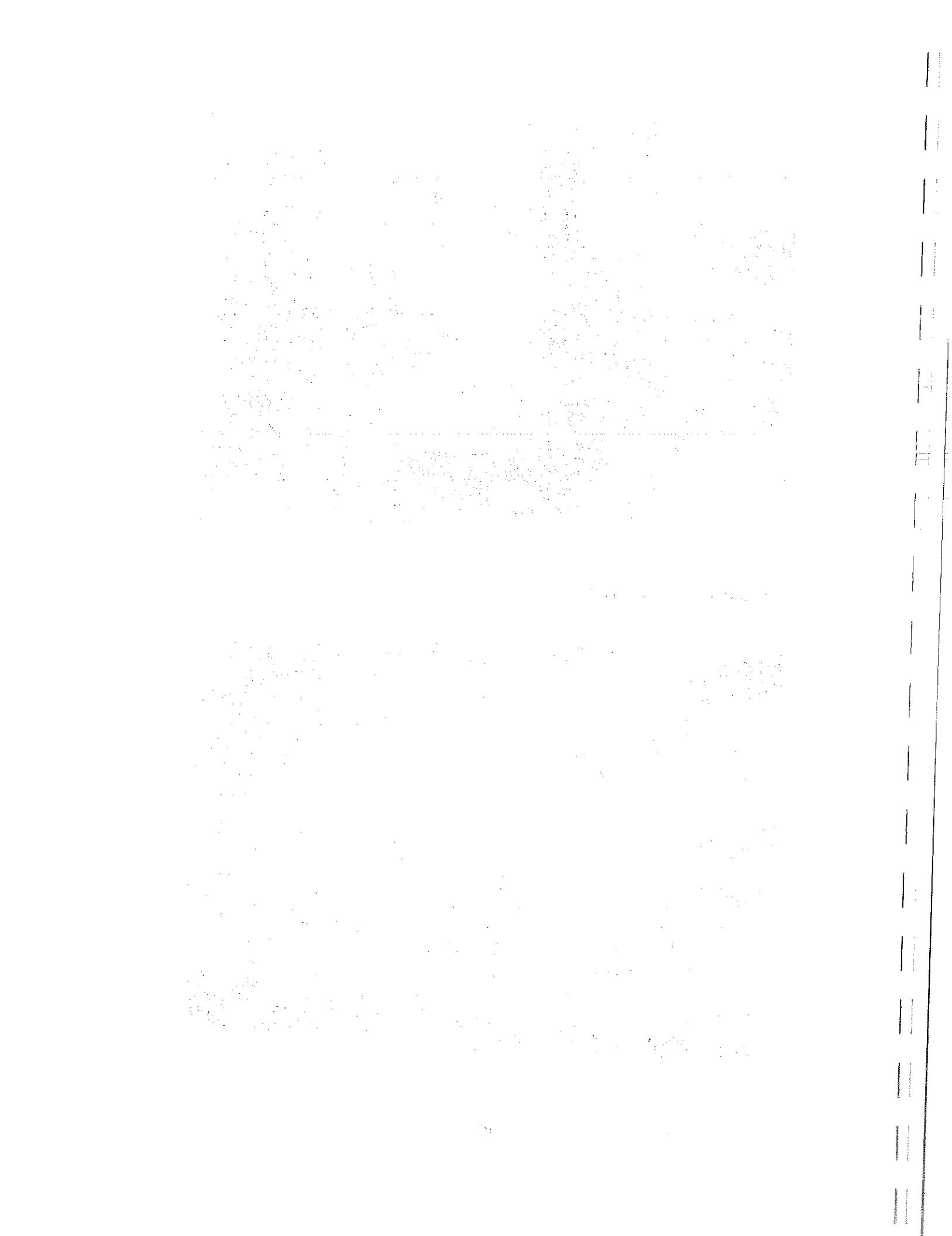


Figure 26. *Athwartships bilge ceiling, port side.*



stress rather than vertical stress (downwards from the decks). One possible suggestion was forwarded by Patrick Labadie (personal communication 1989), who noted that a number of vessel disasters in the 1880's at approximately the time of the LOUISIANA's construction were attributed to the shifting of bulk cargo in the hold while under sail, causing the vessel to capsize. Labadie has suggested that longitudinal bulkheads may have been a response by shipbuilders to this concern of bulk cargo shifting, and an ad hoc design using centerboard trunk construction techniques was the most expedient means of building a bulkhead resistant to athwartships movement of heavy cargo such as iron ore. It is not known if other examples of this type of bulkhead construction exist for wooden vessels.

The LOUISIANA exhibits another unusual construction feature, the use of iron cross-bracing in the upper hull. In 1917, Desmond describes this method of hull reinforcement:

Steel straps are fastened diagonally across outside the frame of a vessel for the purpose of strengthening vessel against strains that tend to change its shape longitudinally. (Hogging or sagging strains.) These are let into frames flush, cross frames at about 45 degrees inclination, and are fastened with at least one bolt through each strap into each frame, and to each other with rivets wherever two straps cross (Desmond 1984:56).

While it is not known at what point this construction came into general usage for the Great Lakes, evidently the method described by Desmond in 1917 was in use as early as the LOUISIANA's construction in 1887, though using iron instead of steel. E.P. Dorr's construction rules of 1876 discuss diagonal iron strapping, making its required use and spacing a function of vessel size and type of construction, requiring that straps measure 4" in width by 1/2" in thickness, and that they be fastened to a band of iron at the frametops measuring 4 1/2" by 5/8". LOUISIANA's straps measure 4 1/4" by 1/4", and the

frametop band measures 8" by 3/4". By 1895, roughly one-third to one-half of the Great Lakes propellers employed this iron strapping, and it could also be found in a few of the newer schooners (Inland Lloyds 1895). No examples of its use prior to 1879 could be found in Inland Lloyds (1895), with most of its apparent usage beginning in the early 1880's.

The vicinity of the engine mount is literally choked with engine debris, including sheet metal, fragments of the engine, piping, fasteners, and iron cross-bracing. The mount consists of an iron base fastened to wooden supports running athwartships (Figure 27). The broken bases of the fore and aft cylinders may be seen to the port of the engine mount (Figure 28). A ten foot long section of bilge pump pipe and strainer for a steam-powered pump is located to the port side of the stern keelsons, running down into the bilge through the ceiling. The pipe measures 8" in outer diameter.

The boiler of the LOUISIANA was reportedly salvaged in May of 1920 by the tug SMITH for the Leathem Smith Company of Sturgeon Bay (Door County Advocate 5/7/1920 p.6,c.7; Ibid: 5/14/1920 p.7,c.2). The SMITH returned around August to remove the engine itself (Ibid: 8/6/1920 p.8,c.1). Much of the engine debris in the LOUISIANA probably relates to this salvage work. It is not known if the propeller, propeller shaft, and rudder were removed at this time or later.

#### Recommendations for Further Research

Additional research on this vessel should be directed at a more thorough study of her marine architecture, including the unusual pattern of floor framing, a study of the iron cross-bracing, and additional documentation and historical

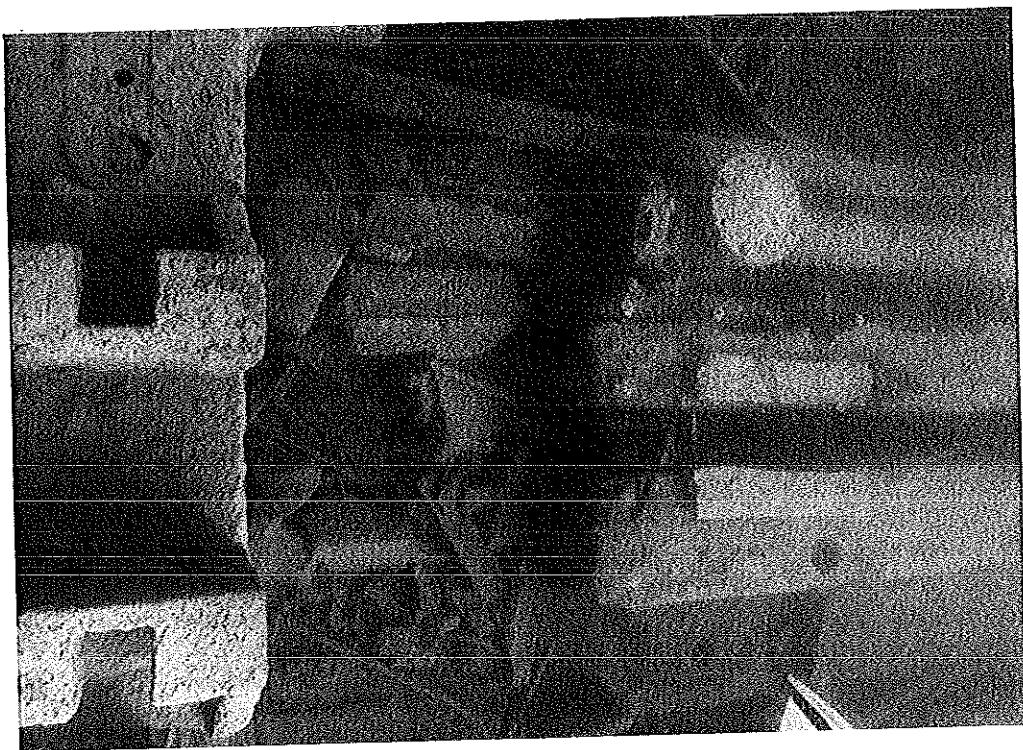


Figure 27. Forward engine mount (foreground), bilge pump pipe at left, keelsons and "trunk" for stanchions visible rear center.

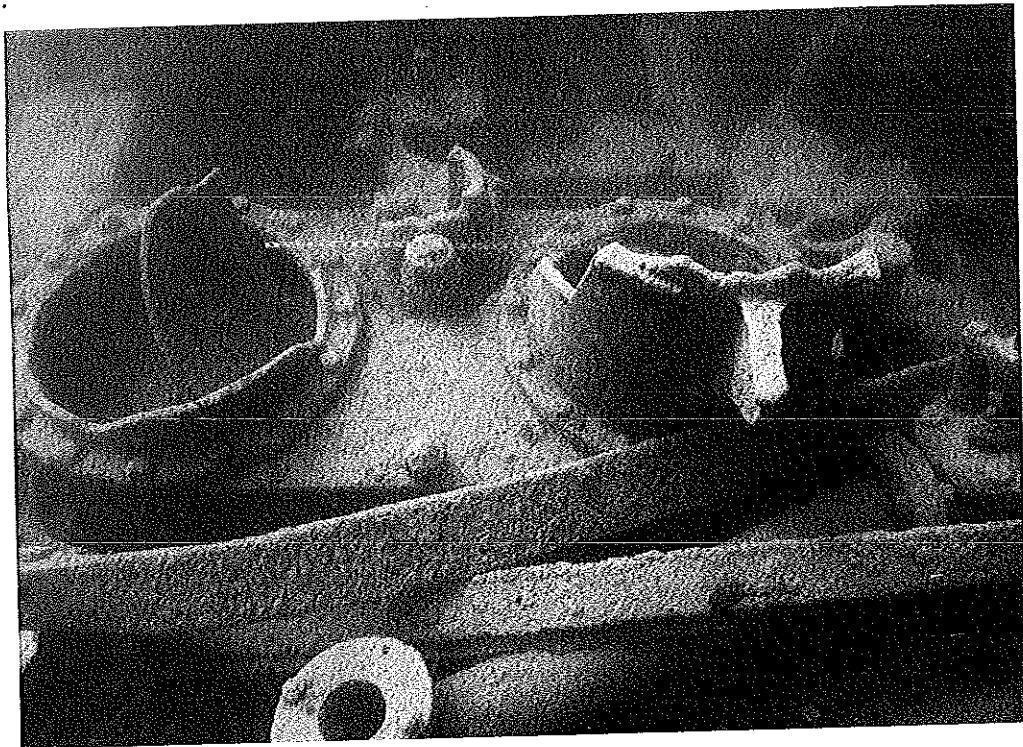


Figure 28. Fore and aft cylinders, viewed from port side.

the first time in the history of the world, the  
whole of the human race has been gathered  
together in one place, and that is the  
present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.  
The whole of the human race has been  
gathered together in one place, and that is  
the present meeting of the World's Fair.

research regarding the trunk-like construction employed in her keelsons. It is believed that additional hull remains can be found in deeper water to the west and northwest of the site, including portions of her upper sides, deck, and superstructure. Photographic documentation of the wreck (Frederickson 1961:I:64) shows that much of the upper hull survived the fire, and has probably been brought down to its present level by ice or by modern salvage as evidenced by the use of explosives on the LOUISIANA's midsection.

#### Management Recommendations

The LOUISIANA's historical significance lies both in her being an example of second-generation wooden bulk carrier design and construction, as well as her association with the events of the great 1913 gale and local history surrounding that storm. Though post-depositional impacts have greatly affected the vessel's integrity, sufficient structure remains for archeological study as well as recreational diving. At present, the site is a favorite dive for beginning and intermediate divers, attractive for its shallow depth, water clarity, large amount of structure, extensive fish population (primarily smallmouth bass), and protected location in Washington Harbor.

Additional recreational diving will have little impact on the archeological integrity of the site, much of the portable material already having been removed by collectors, precluding any research on the site beyond vessel architecture. As with the previous sites, recreational development should include small boat moorings to improve access and prevent anchor damage, site interpretive materials to orient and inform visitors on site history and features of interest, and periodic monitoring of moorings and general site

condition. Visitors should be discouraged from removing any additional archeological material such as fastenings, as this will further reduce the integrity of the site.

The site does not present any hazards beyond those normally attendant to swimming in the vicinity of broken metal and wooden structure (torn wetsuits, snagged equipment, etc.) However, heavy weather from the north could trap unwary visitors in a harbor that has no refuge for small boats. Other caveats include the occasional use of the site by sport fishermen, which may create some onsite user-conflicts. Additionally, the proximity of private residences to the site may create some conflicts unless visitors are instructed to respect the privacy of residents and to avoid trespassing to gain shore access to the site.

#### GENERAL MANAGEMENT RECOMMENDATIONS

Plainly, northern Door County is an area of rich maritime heritage and abundant submerged cultural resources. The six sites surveyed in 1988 are only part of a wide range of resources which are expected to encompass prehistoric Native American materials, fur trade materials, the full scope of nineteenth and twentieth century sail and steam navigation, as well as historical material associated with onshore activities such as lumbering, fishing, shipbuilding, and passenger traffic centered around piers and early communities.

The preservation of this aspect of Door County's heritage will require continued historical research and field survey to identify and evaluate submerged cultural resources in need of protection, an effort which should be conducted statewide. The preservation and wise management of these resources is very much in the interests of both Door County as well as the state in general. Many of these sites are the only surviving evidence (physical or documentary) of the exploration, settlement, social and economic development of Door County, or have the potential to provide new and interesting perspectives on what is known about Door County as it relates to other local, regional, and national history.

Maritime resources and submerged cultural resources are particularly important in understanding the cultural context of coastal areas. The study of Door County's submerged cultural resources, due to its early exploration, settlement, proximity to navigational routes, and predominance in shipbuilding provides unique opportunities to understand the full gamut of Great Lakes maritime history as it has been experienced on a local level, from prehistoric

occupation and use of the lakes to Euro-American exploration, fur trading, fishing, and settlement, through to Industrial Revolution lumbering, shipbuilding, sail and steam navigation, and the development of a very unique Great Lakes maritime culture, with its own vocabulary, ethnicity, artifact and vessel typology, and traditions.

It is largely the amalgamation of Door County's water-related natural resources and its maritime-related cultural resources which has given the area much of its economic livelihood and its tourism appeal. Promoting a greater public appreciation, awareness, and concern for submerged cultural resources will serve the various functions of improving the usage of these resources, the public's appreciation of the area, and the management and preservation of the resources themselves.

Currently, Door County's submerged cultural resources are either underused or have been abused. All sectors of the public, from those who visit shipwreck (and other) sites (and are able to impact them most directly), to those who create a willing market for nautical artifacts (and thereby hasten the destruction of the resource) must be informed and educated in a preservation ethic if the resources are to be available for future study and enjoyment.

Experience of other submerged cultural resource managers, most notably the states of Michigan, Vermont, and the National Park Service indicate that integrating local communities and user-groups into management is important, including ad hoc site monitoring, providing interpretation and improved access to sites, encouraging diver reports of sites, providing volunteer assistance for survey work, and undertaking serious amateur efforts to survey and preserve submerged cultural resources. Michigan has gone a step further,

using local groups to aid in stewarding, monitoring, and developing concentrations of submerged cultural resources which have been designated by the state as bottomland preserves.

The concept of submerged cultural resource preserves is to designate significant resources meriting special protection and management (much like a land-based preserve or sanctuary) but without the facilities development and staffing of a full-fledged park. Most bottomland preserve development is restricted to interpretive materials (guides and exhibits) and access-oriented aids such as boat moorings, which also prevent anchor damage and provide a measure of safety for divers trying to descend to or ascend from the site.

Michigan preserve "hardware" has been the result of local initiative, as has been much of the actual state preserve designation and promotion. It is recommended that Wisconsin obtain the statutory authority to designate preserve areas, assign responsibility to administer these areas to a state agency, and develop the means to survey, designate, develop, and preserve these areas, in conjunction with local initiatives, much like Michigan's use of local preserve committees.

Currently, Wisconsin has some limited means to survey state bottomlands (under the present state underwater archeology program), and holds statutory authority to protect archeological and historical sites on state lands and bottomlands and to prevent their destruction. However, a well-conceived system of state bottomland preserves will serve the needed function of ongoing efforts to survey for sites, designate important areas, and involve local groups in preservation and development. While the Michigan experience clearly shows the necessity of local commitment to submerged cultural resource

preserves (if for nothing else, simply for economic reasons such as diver tourism), the National Park Service has rightly pointed out that government management beyond simple designation is crucial if preserves are to actually preserve anything:

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 . . . an agency recognizes shipwrecks as historic entities and treats them as they would any comparable historic site on dry 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 . . . [It must be made] . . . 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 diver's children to dive on; those that have been destroyed by commercial salvage or slow attrition by weekend vandals will not (Lenihan 1987:527).

Wisconsin's involvement in a system of marine preserves will require just such a level of commitment, both from the state and the public. Initial preserve areas, such as the proposal for Door County, should focus on improving visitor usage and access to currently known sites where monitoring and daily management are less urgent problems, the site having already been significantly impacted. Newly discovered sites should be carefully and professionally evaluated using criteria for placement on the State or National Register of Historic Places. Such sites may be thereafter designated individually or in groups (via historic districts) as preserves, and adequate provision be made for diver visitation, including evaluation for and possibly mitigation of, visitor impact and illegal salvage. Public involvement (such as is provided by Michigan's local preserve committees) should include responsibilities for monitoring, visitor safety, and installation and maintenance of boat moorings (possibly by local charter operators) and should

involve formal memorandum agreements on preserve stewardship with local political subdivisions. Joint efforts at survey, development, and interpretation may also be undertaken, within the resources of the respective state agencies, local political subdivisions, and public groups.

The six Door County sites surveyed by the State Historical Society of Wisconsin could form the nucleus for a small, trial preserve. Additional sites in the area should be added as they are surveyed and evaluated, provided that increased visitation would not compromise the integrity of significant and sensitive sites. Good interpretive materials would inform the public beforehand and while on-site what to expect and what is expected of them, enhancing the visitor's experience and minimizing impact to the site. Visitor's should also be notified in advance of recommended skill levels associated with sites, safety problems, and local emergency facilities. The six sites surveyed thus far are not difficult for diving, nor do they present significant safety problems for visitors. On the same token, advanced divers wishing for more challenging dive conditions should be informed of the beginner to intermediate-level nature of the sites presently under consideration.

At the very least, a trial Door County bottomlands preserve would improve the existing sites' access and interpretation by the public, and would very likely rejuvenate a good deal of interest in the area's submerged cultural resources, leading to increased visitation, additional survey, and opening of new sites. Just as important, the preserve would highlight the public and the state's concern for preserving and managing these resources, promoting a conservation ethic, demonstrating public commitment, and calling attention to the area's unique and important submerged cultural resources.

## BIBLIOGRAPHY

- Andrews, Frank.  
1910 Grain Movement in the Great Lakes Region. United States Department of Agriculture Bureau of Statistics, Bulletin 81. Washington, D.C.
- Board of Lake Underwriters  
1860 Lake Vessel Register. Buffalo, New York.
- Bureau of Navigation  
1868-1900 List of Merchant Vessels of the United States. U.S. Treasury Department, Bureau of Navigation. Government Printing Office, Washington, D.C.
- Butts, I.R.  
1865 Manual of Admeasurement: United States Tonnage Law of 1864. I.R. Butts and Co., Boston.
- Capron, Walter C.  
1965 The U.S. Coast Guard. Franklin Watts, Inc., New York.
- Chapelle, Howard I.  
1982 History of American Sailing Ships. Reprinted. Bonanza Books, New York. Originally published 1935, Norton, New York.
- Cooper, David J.  
1988 1986-1987 Archaeological Survey of the Schooner FLEETWING Site, 47-DR-168, Garrett Bay, Wisconsin. East Carolina University Research Report No. 6, Program in Maritime History and Underwater Research, Greenville, N.C.
- Curtis, John T.  
1959 The Vegetation of Wisconsin: An Ordination of Plant Communities. The University of Wisconsin Press, Madison.
- Cuthbertson, George.  
1931 Freshwater; A History and Narrative of the Great Lakes. Macmillan Co., New York.
- Desmond, Charles  
1984 Wooden Ship-building. Reprinted. Vestal Press, New York. Originally published 1919, Rudder Publishing Company, New York.
- Dirst, Victoria.  
1987 Archaeological Research at Whitefish Dunes State Park, Door County, Wisconsin. State of Wisconsin Department of Natural Resources, Bureau of Parks and Recreation, Publication No. PR155(87), Madison.
- Dorr, Ebenezer P.  
1876 Rules for the Construction and Characterization of Sail and Steam Vessels. C.J. Burroughs & Co., Chicago.

- Eaton, Conan Bryant  
1974 Death's Door; the Pursuit of a Legend. Bayprint, Inc., Sturgeon Bay.
- Evans, Stephen  
1949 The United States Coast Guard: 1790-1915. U.S. Naval Institute,  
Annapolis, Maryland.
- Frederickson, Arthur C. and Lucy F. Frederickson  
1961-1963 Ships and Shipwrecks in Door County, Wisconsin. 2 vols.  
Door County Publishing Co., Sturgeon Bay, Wisc.
- Gara, Larry.  
1962 A Short History of Wisconsin. State Historical Society of  
Wisconsin, Madison.
- Greenhill, Basil  
1980 Schooners. Naval Institute Press, Annapolis.
- Hirthe, Walter M.  
1988 Personal communication.
- Hirthe, Walter M., and Mary K. Hirthe  
1986 Schooner Days in Door County. Voyageur Press, Minneapolis.
- Holand, Hjalmar R.  
1917 History of Door County. S.J. Clarke Publishing Co., Chicago.
- Hough, Jack L.  
1958 Geology of the Great Lakes. University of Illinois Press, Urbana.
- Inland Lloyds  
1895 The Inland Lloyds Vessel Register. W.R. Smellie, Cleveland.
- Knudsen, Arthur and Evelyn  
1948 A Gleam Across the Wave: The Biography of Martin Nicolai Knudsen,  
Lighthouse Keeper on Lake Michigan. By the authors, Sturgeon Bay,  
Wisconsin.
- Labadie, C. Patrick  
1988 Personal communication.
- Labadie, C. Patrick  
1989 Personal communication.
- Labadie, C. Patrick, and Larry Murphy.  
1987 Major Vessel Types on Lake Superior: Sail to Steam. In  
Submerged Cultural Resources Study: Isle Royale National Park,  
edited by Daniel J. Lenihan, pp.43-61. Southwest Cultural Resources  
Center Professional Papers No. 6, Santa Fe, N.M.
- Larsen, Curtis E.  
1985 Lake Level, Uplift, and Outlet Incision; The Nipissing and  
Algoma Great Lakes. In Quaternary Evolution of the Great Lakes,  
Geological Association of Canada, Special Paper 30, edited  
by P.F. Farrow and P.E. Calkin, pp.63-70.

- Lenihan, Daniel J. (editor)  
1987 Submerged Cultural Resources Study: Isle Royale National Park.  
Southwest Cultural Resources Center Professional Papers No. 6,  
Santa Fe, N.M.
- MacGregor, David R.  
1984 Merchant Sailing Ships 1815-1850. Naval Institute Press, Annapolis.
- Mansfield, J.B.  
1899 History of the Great Lakes. 2 vols. J.H. Beers and Co., Chicago.
- Marine Casualties of the Great Lakes 1863-1873.  
n.d. National Archives Microform Publication No. T729, Washington, D.C.
- Martin, Charles I.  
1881 History of Door County, Wisconsin. Expositor Job Print, Sturgeon Bay, Wisc.
- Martin, Lawrence.  
1932 The Physical Geography of Wisconsin. Wisconsin Geological and Natural History Survey, Bulletin No. 36, Madison, Wisc.
- Mason, Ronald J.  
1966 Two Stratified Sites on the Door Peninsula of Wisconsin.  
Anthropological Papers, Museum of Anthropology, University of Michigan,  
No. 26. University of Michigan Press, Ann Arbor.
- Mason, Ronald J.  
1986 Rock Island: Historical Indian Archaeology in the Northern Lake Michigan Basin. Midcontinental Journal of Archaeology Special Papers No. 6. Kent State University Press, Kent, Ohio.
- McCutcheon, C.T., Jr.  
1982 Sch. ALVIN CLARK Sectional Reconstruction Plan.
- McCutcheon, C.T., Jr.  
1983 ALVIN CLARK: An Unfinished Voyage. Wooden Boat 52 (May/June):55-56.
- Murphy, Larry, Daniel J. Lenihan, and C. Patrick Labadie.  
1987 Shipwrecks of Isle Royale: The Archeological Record. In Submerged Cultural Resources Study: Isle Royale National Park, edited by Daniel J. Lenihan, pp. 215-334. Southwest Cultural Resources Center Professional Papers No. 6, Santa Fe, N.M.
- National Board of Lake Underwriters  
1874 Classification. Printing House of Matthews and Warren, Buffalo.
- Odle, Thomas P.  
1951 The American Grain Trade of the Great Lakes, 1825-1873. Ph.D. dissertation, University of Michigan, Ann Arbor.
- Omwake, H. Geiger.  
1965 Analysis of 19th Century White Kaolin Pipe Fragments from the Mero Site, Door County, Wisconsin. The Wisconsin Archeologist. New Series, 46:125-139.

Peterson, Rex.

1965 Geography of Wisconsin. College Printing and Typing Co., Madison.

Rector, William

1953 Log Transportation in the Lake States Lumber Industry 1840-1918.

Arthur H. Clark Co., Glendale, Calif.

Runge, Herman G.

n.d. Herman G. Runge Collection, Ship Information and Data Record.  
Humanities Collection, Milwaukee Public Library.

Shastal, William

1988 Personal communication.

Singley, Katherine.

1988 The Conservation of Archaeological Artifacts From Freshwater Environments. Lake Michigan Maritime Museum, South Haven, Mich.

True, Dwight

1956 Sixty Years of Shipbuilding. Society of Naval Architects and Marine Engineers, Great Lakes Section, Ann Arbor.

U.S. Life Saving Service

1876-1914 Annual Report of the Operations of the U.S. Life-Saving Service For the Fiscal Year Ending June 30. U.S. Treasury Department, U.S. Life Saving Service. Government Printing Office, Washington, D.C.

U.S. Lighthouse Board

1896 List of Lights and Fog Signals of the United States on the Northern Lakes and Rivers. Government Printing Office, Washington, D.C.

U.S. Treasury Department

1874 General Regulations Under the Customs and Navigation Laws of The United States. Government Printing Office, Washington, D.C.

Newspapers

Door County Advocate

Green Bay Advocate

Marinette Eagle

Milwaukee Sentinel

Racine Daily Journal

