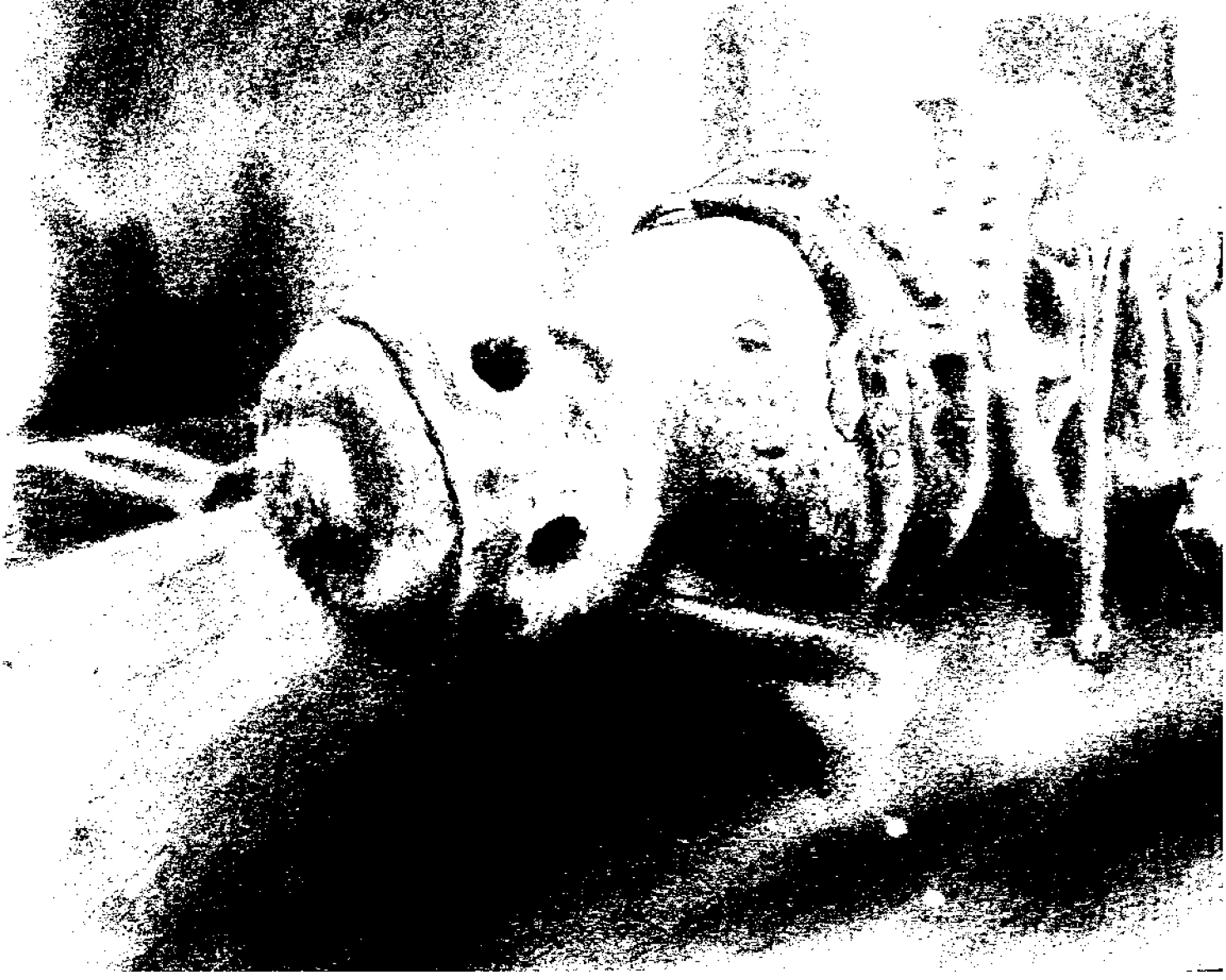
By Fire, Storm, and Ice:

Underwater Archeological Investigations In the Apostle Islands



By Fire, Storm, and Ice: Underwater Archeological Investigations in the Apostle Islands

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This report is dedicated to the memory of Dr. Walter M. Hirthe, marine historian and friend.

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1.0 INTRODUCTION

The 1990 survey of submerged cultural resources in the Apostle Islands was a joint effort between the State Historical Society of Wisconsin, East Carolina University, UW-Sea Grant Institute, UW-Marine Studies Center, and the National Park Service (NPS) Apostle Islands National Lakeshore. The survey was conducted under a grant from UW-Sea Grant Institute, with additional funding, equipment, personnel, and logistical support supplied by the other participating institutions. The project was staffed principally by East Carolina University as part of its summer field school in underwater archeology, and the overall project was directed by the State Historical Society of Wisconsin (SHSW). The survey work was conducted during the period 7/5 through 8/1/1990.

The Apostle Islands area is one of overlapping state and federal jurisdiction, combining State of Wisconsin-owned lakebeds and National Park Service-owned island and lakeshore areas (the park controls the surface waters to a distance of one-quarter mile offshore of National Lakeshore areas). The management of submerged cultural resources in this quarter-mile belt around the National Lakeshore is complicated by the fact that the sites are located on state bottomlands, but they are accessed through park water and are partially under National Park control. Both the National Park Service and the State of Wisconsin require improved management information on these submerged cultural resources to assist in planning for the preservation and recreational use of these sites.

The National Park Service has pioneered the effort to evaluate and manage submerged cultural resources on the Great Lakes, where state programs have traditionally been unfunded or nonexistent (Halsey 1988; 1990:35, 40-41, 49). A major National Park Service study was undertaken at Isle Royale of both historic shipwrecks and historic fishing camp remains, which resulted in the improved management, preservation, and recreational development of the sites (Lenihan 1987). The National Park Service Submerged Cultural Resources Unit (NPS-SCRU) has conducted many other such surveys and evaluations in marine areas under federal jurisdiction (Carrell 1984, 1987; Delgado and Haller 1989; Murphy 1984).

More recently, Wisconsin has undertaken its own efforts to manage state submerged cultural resources through the State Historical Society of Wisconsin. The Division of Historic Preservation operates a state underwater archeology program for identifying, evaluating, and inventorying significant state cultural resources for preservation and management (Cooper 1988a; 1988b; 1989; Cooper and Rodgers 1990). The State Historical Society of Wisconsin is the principal historic preservation agency for the state of Wisconsin, responsible for the research, protection, restoration, and rehabilitation of historic properties (Wis. Stats. 44.02, 44.30-44.31). Historic properties include prehistoric and historic archeological remains (including shipwrecks), both on land and underwater. The SHSW is responsible for identifying, evaluating, mapping, and protecting such historic properties (Wis. Stats. 44.47). Recent federal legislation (Public Law 100-298 Abandoned Shipwreck Act of 1987) and accompanying guidelines specifically charges the states with the management of historic shipwrecks on state bottomlands. This management goes beyond traditional parameters of historic preservation programs, and includes such issues as public recreation and commercial

salvage.

Inventorying of state submerged cultural resources is a vital first step in management, assisting in prioritizing evaluation efforts and preservation planning (Murphy 1988:36-38). A recent Congressional report has highlighted the need for submerged cultural resources inventories, finding:

> The lack of National and State inventories of underwater archeological sites and maritime historical resources has seriously impeded efforts to protect these resources. If the Federal Government and the States wish to protect underwater archeological sites and maritime cultural resources, they should apply greater efforts to making such inventories (U.S. Congress, Office of Technology Assessment 1987:5).

The need for submerged cultural resources management planning in the Apostle Islands resulted in NPS efforts in 1984 to document and evaluate a recently discovered shipwreck site located within the Lakeshore quarter-mile boundary. The site found was the schooner-barge NOQUEBAY, which was subsequently evaluated by archeologists from the NPS-SCRU, assisted by local diver volunteers. Following the Unit's management recommendations (Carrell 1985), the site was later opened to diver visitation, and is currently the Park's most popular dive site, attracting a registered 147 visitors in 1988, or sixty percent of the park's diving activity for the year.

While the NPS-SCRU conducted some further visual inspection of known wrecksites under park waters, no additional site surveys were conducted because the resources were technically located on state bottomlands. However, continuing interest in Apostle Islands diving is creating demands for site management recommendations and a management agreement between the State and the National Park Service. This is especially critical for one wreck site within the park boundaries (the steamer R. G. STEWART) for which the park is not issuing diving permits pending evaluation of the site and the development of a management plan.

Project Objectives

The Apostle Islands survey project had two principal objectives:

(1) to conduct surveys and evaluations of two known shipwreck sites (schooner LUCERNE, Long Island, and steamer R. G. STEWART, Michigan Island) within the boundaries of the Apostle Islands National Lakeshore for the development of a management plan between the SHSW and NPS;

(2) to conduct surveys of known submerged cultural resources outside of the park boundaries, especially those resources which are frequently utilized by sport divers or those sites which appear to be threatened by human activity such as artifact collecting.

The submerged remains of an eighteenth and nineteenth century fur trade settlement at Grant's Point, Madeline Island, were the primary focus for the latter investigations. Secondary objectives that were investigated included wrecksites at Red Cliff Bay, Sand Island, Outer Island, Stockton Island, and Pikes Bay (Figure 1.1).

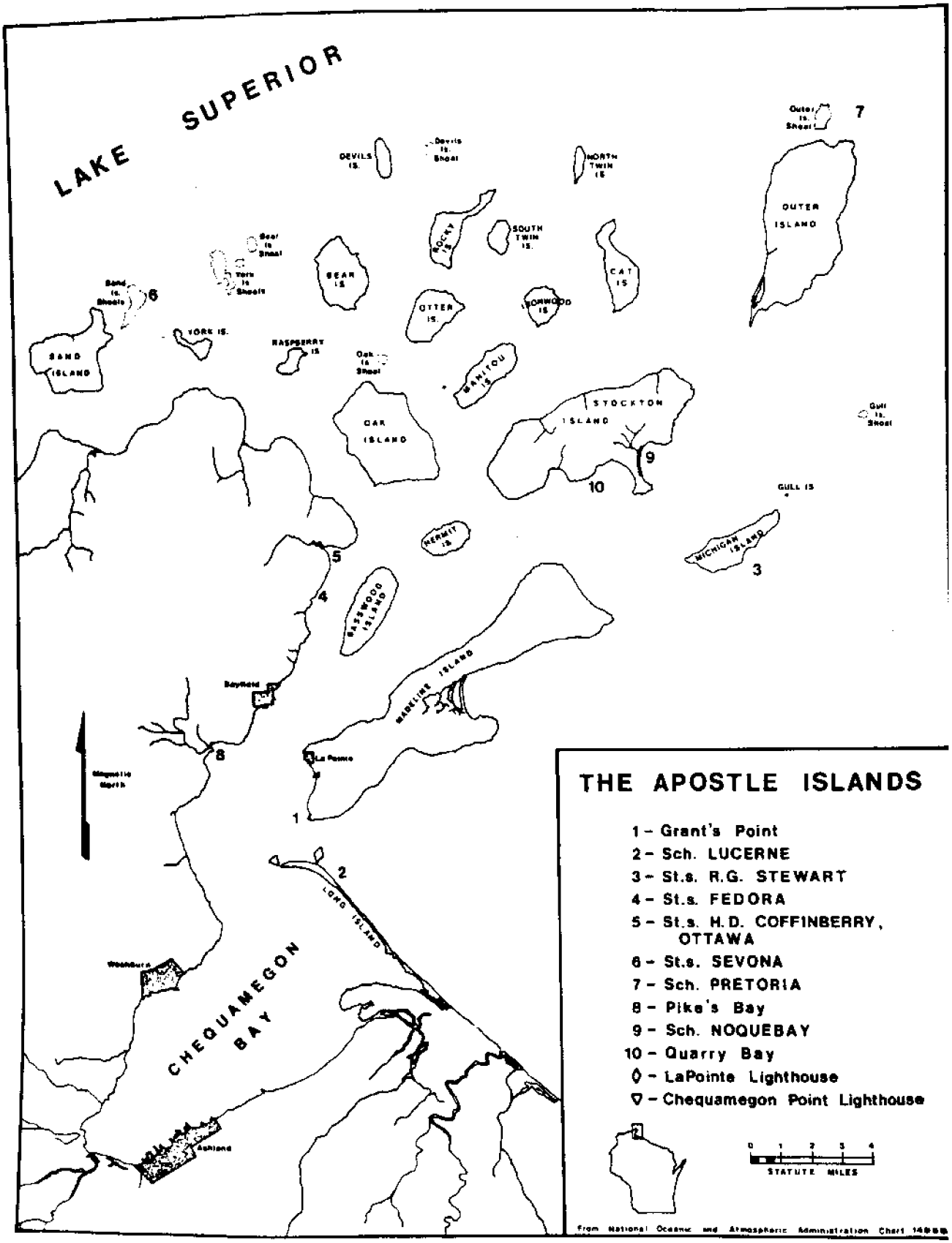
The purpose of the project was to produce reconnaissance-level documentation of sites outside the park boundaries, and evaluations of those sites within the park for listing on the National Register of Historic Places. In both cases, survey data was to be utilized by park and state resource managers to improve their management of the area's submerged cultural resources. Site assessments, including site maps, artifact inventories, site locations and boundaries, archeological analysis, and site histories will have important applications to site management, interpretation, recreational development, and enforcement of laws protecting submerged cultural resources.

Currently, SHSW submerged cultural resource surveys are part of a state legislature-requested pilot study to plan and develop a program of marine preserves. These preserves, modeled after the successful Michigan program (Halsey 1990:33-37), are to protect state underwater archeological and historical resources and to promote diver and non-diver tourism. This is allied with regional and nation-wide efforts to better protect and manage submerged cultural resources, while encouraging public appreciation and responsible usage. States such as Michigan, Vermont, and Florida have already undertaken submerged cultural resource surveys to identify and manage state submerged cultural resources, and have developed marine preserve systems as a means of protecting archeological sites, as well as enhancing their usage through recreation and tourism. These 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. Increasing public and governmental interest in potential Wisconsin marine preserves have created a demand for state submerged cultural resource surveys and marine preserve planning.

Research Design and Methodology

Cultural resource surveys begin with the identification and location of potential sites through survey of documentary sources (historical, modern, photographic, and cartographic), interviews with local persons (divers, fishermen, etc.) familiar with the location and nature of various bottomland resources, and initial archeological field survey using electronic remote-sensing or visual survey. Past and present SHSW efforts in this initial research have produced an inventory of approximately 700 shipwreck sites statewide (largely based on historical sources) with selected areas chosen for more intensive research. A special literature survey of the Apostle Islands was also conducted by the National Park Service (Holden 1985), and has served as the basis for identifying field survey objectives.

Survey priorities for field research were chosen on the basis of estimated potential for significant archeological remains. Field survey consisted of actual physical inspection, evaluation, and interpretation of the archeological site, involving survey and documentation of



THE APOSTLE ISLANDS

From National Oceanic and Atmospheric Administration Chart 14966

Figure 1.1

the remains, and identification of management problems (such as archeological importance and sensitivity, site environment, human and natural threats, visitor access, and safety). Survey work was conducted along those guidelines established by the National Park Service for submerged cultural resource survey and evaluation in determining eligibility of sites for the National Register of Historic Places.

The survey research design was straightforwardly directed towards formulating descriptions and archeological assessments for each site. Sites were 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, and (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 an 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.

Site evaluation and documentation was conducted using SCUBA and simple manual mapping techniques, coupled with still and/or video photography. Documentation included measured sketches, construction schematics, and site plans for National Register-level documentation. Analysis was conducted using comparative archeological evidence obtained from archeological surveys of comparable sites, and was augmented by historical documentation relating to individual site history and general Great Lakes maritime history. Where artifacts were encountered, material culture was interpreted in the context of its relevance to shipboard activities, shipboard hierarchy, shipboard activity/use areas, and other aspects of maritime

anthropology.

The submerged cultural resource survey report is to serve as a source for site description, analysis, interpretation, and management recommendations for use in cultural resource management planning, recreational development, and public education. It is also to serve as the source document for determination of eligibility and nomination for listing on the National Register of Historic Places. Inclusion of these sites into National Park Service and state resource management plans will be an important step in achieving the long-term preservation of the sites. Previously suggested plans for daily management have included mooring buoys to facilitate access by recreational divers (where appropriate) and to alleviate damage caused by boat anchoring on site. Other possibilities include site interpretation for visitors through self-guiding site maps for diving visitors and multi-media museum exhibits for non-diving park visitors. Preservation of the sites will ensure their availability both as a future recreational resource for the park, and as an important and non-renewable source of scientific data relating to Great Lakes underwater archeology, maritime history, marine architecture, and maritime anthropology.

2.0 MADELINE ISLAND REMOTE SENSING SURVEY

Introduction

Lake Superior -- Madeline Island Geomorphology

The recent (historically documented - Stuntz 1870; Ross 1960; Martin 1965) submergence of portions of the Apostle Islands (e.g. Steamboat Island and the southern tip of Madeline Island at Grant's Point) is the result of continuing isostatic rebound of the northern shore of Lake Superior in the wake of Pleistocene glaciation. Like the rest of the Great Lakes, Lake Superior's Late Pleistocene/Holocene geomorphic history chronicles the many processes of erosion, deposition, isostatic rebound, and lake level changes resulting from the advance and retreat of the massive Late Wisconsinan ice sheets.

With a surface area of 82,260 square kilometers (Showers 1979:158 in Farrand and Drexler 1985:19), Lake Superior is the largest of the Great Lakes. It is also the deepest, with a floor exceeding 150 meters in depth in most areas (Farrand and Drexler 1985:19). Except for the present outlet at Sault Ste. Marie, the lake is surrounded by the igneous and metamorphic highlands of the Pre-Cambrian Canadian Shield (Hough 1958:16; Farrand and Drexler 1985:19).

The Apostle Islands consist primarily of red sandstone, Pre-Cambrian (circa 2700 to 520 million years BP) in age, and in areas is sculpted into high cliffs by wave erosion (Hough 1958:78; Martin 1965:435). At one time, these cliffs may have been hilltops formed between preglacial valleys, subsequently shaped by the overriding glacial ice (Martin 1965:466). Each readvance of the Late Wisconsinan glaciers effectively obliterated many previous records of deposition in the Lake Superior basin. The last glacial advance to completely cover the present Lake Superior basin was probably the post-Twocreekan after 11,800 BP. By 10,700 BP, ice had retreated to the north shore of the lake, only to readvance ca. 10,000 BP. It is not certain whether this last advance (the Marquette) reached as far south as Duluth, hence covering the Apostle Islands area once more. Thus, there may have existed a narrow glacial lake between the ice front and the southwestern rim of the basin at this time (Farrand and Drexler 1985:21-22).

During and after the retreat of glacial ice north of the Great Lakes, isostatic rebound of the lakebed has been a dominant process affecting relative lake levels in Lake Superior. In fact, the northeastern end of the lake is continuing to rebound, including the outlet at Sault Ste. Marie. Lake gauges have recorded a rise in the northeast corner of the basin of 27 cm/century, while the Duluth area subsides 21 cm/century (Farrand and Drexler 1985:25). The result is the gradual, but substantial, submergence of the southwestern shore. Many of the former and higher lake shores, which can be seen clearly on the northern edge of the lake, are difficult or impossible to locate along the southern shore.

Documentation of this southern submergence began in the mid-nineteenth century. The

creation of marshes at the mouths of the Bois Brule and Amnicon rivers as well as the drowning of tree stumps at the mouth of the St. Louis River was being noted as early as 1870 (Stuntz 1870:206-207). Likewise, a Minnesota-Wisconsin boundary dispute during the mid-nineteenth century occurred over the historical disappearance of marker rapids in the St. Louis River (Martin 1965:447). More recently, at the turn of the century, Steamboat Island of the Apostles disappeared (Ross 1960:164), probably the result of rising lake levels relative to the southern end of the lake and subsequent wave erosion during the late nineteenth century. Thus, seen in light of the above examples, the submergence of the southern tip of Grant's Point is just one of many such occurrences, the result of continuing isostatic rebound along Lake Superior's northern shore.

Historical Overview: Madeline Island

The following outline of the prehistory and history of Madeline Island is based largely on Birmingham's (n.d.) overview of two major previous archeological investigations on the island (i.e. at the Winston-Cadotte and Marina sites), in addition to published syntheses of various historical documents (e.g. Ross 1960; Hickerson 1962; Kellogg 1971; Holzhueter 1986).

From the mid-seventeenth century through the nineteenth century, Madeline Island came under increasing Euro-American influence with the establishment and growth of the fur trade, the arrival of the missionaries, and the economic and military rivalry of competing French, British, and American institutions. At various times, trading posts, military garrisons, and administrative/distribution centers were established on southern Madeline Island. In particular, over the centuries the village of La Pointe witnessed the growing influx of Euro-American traders, hunters, trappers, lumbermen, miners and quarrymen (for iron, copper, brownstone), missionaries, commercial fishermen, and, by the late nineteenth century, summer tourists. Some of the many names given Madeline Island over the centuries have included: Isle Detour, Montreal, St. Michael's, La Pointe, St. Esprit, Michel, La Ronde, Cadotte, Woodpecker, Yellow Hammer, Middle, and Madeline (variations thereof) (Holzhueter 1986:21).

The prehistory of Madeline Island is not well known. Evidence for occupation of the Apostle Islands area prior to the Marquette advance (ca. 10,000 BP) would have been obliterated by the advancing ice front. Although there is limited evidence for Late Paleoindian and Archaic occupations in northern Minnesota and Wisconsin, many Lake Superior coastal sites may have been drowned by rising Holocene lake levels (Richner 1987:11-12). It was not until ca. 1500 to 400 BP that a more substantial Late Woodland stage occupation appeared on the islands (Richner 1987:13-14). Cleland (1982:761, 764, 768) emphasizes the importance of the "inland shore fishery" during this time, not only as a major subsistence strategy but as a principal factor guiding social organization among the Great Lakes Indians. The first evidence for spearing and angling technology in use on the lakes does not appear until the Late Archaic (ca. 3000 to 1000 B.C.), with the addition of harpoon and net fishing technology by Middle Woodland times. The inland shore fishery continued as a major subsistence

strategy among the Great Lakes Indians into the nineteenth century.

Although Warren (1885, in Holzhueter 1986:13) contends that the Chippewa occupied Madeline Island from 1490 to 1630 before being driven northeast by the Sioux, historical documents do not place them in the area definitively until the late seventeenth century, with the arrival of the fur trade.

French explorers reached Lake Superior in the early seventeenth century. Possibly the first Euro-American to see the lake was Etienne Brule ca. 1622, followed by Jean Nicolet in 1634. However, the first to explore the Chequamegon region were the brothers-in-law Medart Chouart, Sieur des Groseilliers, and Pierre Esprit Radisson in 1659. In 1660, excited by fur-trading possibilities with a band of Ottawa who had settled in Chequamegon Bay, Groseilliers and Radisson built the first Euro-American fort in the area, on the end of Chequamegon Point (Ross 1960:14-23). Besides the Ottawa, a group of Huron had established a village in the Chequamegon Bay area (Richner 1987:14). During this time, other groups, including the Sauk, Fox, Potawatomi and Illinois either lived nearby or came into the area to trade (Richner 1987:14).

Thus, by the late seventeenth century, the French fur trade had established itself in western Lake Superior. At the temporary cessation of French-British hostilities, in the late 1600s, the La Pointe region became the single most important French fur-trading center in Lake Superior (Ross 1960:45). Ross (1960:33) notes an "unconfirmed report" of a small trading fort, however short-lived (it was supposedly abandoned within a year), having been built near La Pointe in 1671. However, Pierre Le Sueur built the first confirmed fort on Madeline, establishing the French trading post on the southern tip of the island in 1693 (Ross 1960:37-40). In 1718, Paul le Gardeur, Sierre de St. Pierre, moved the post (later to be known as the "Middle Fort") to Sandy Bay on Madeline Island (Ross 1960:48). One of the subsequent French commanders, Louis Denis, Sieur de la Ronde, attempted to establish agriculture on the island, as well as develop the copper-mining industry on the lake (Holzhueter 1986:20).

By the mid-seventeenth century, La Pointe was "the assembly point for furs" (Ross 1960:45). Its trading territory reportedly extended from Au Sable Point west to include the southern and western shores of Lake Superior and possibly as far north as Palisade Head of the Sawtooth Mountains (Ross 1960:56). Although Kellogg (1925:336-337) estimates the annual shipment of furs from La Pointe at this time to have been 250 bundles, Ross (1960:55) contends this number is too conservative. For, according to Ross (1960:45), at the height of the French fur trade, furs came to La Pointe from:

> the territory served by the St. Louis River and its tributaries, via Fond du Lac (present Duluth) and the south shore of the lake; from the vast reaches of the upper Mississippi by both the St. Louis and Brule Rivers; from the southwest via both the Namakagan and Chippewa Rivers into Chequamegon Bay by Fish Creek; from the south by the Bad River, through the fabled Penokee Gap . . . from the East via the Montreal River and its trail to Lac du Flambeau, from the Ontonagon

River and its tributaries, and also from still farther east, as far as Baraga, Michigan, east of the Keweenaw Peninsula.

However, due to growing British-French hostilities, the French fort on Madeline Island lasted less than a century. The last French commander of the fort -- Sieur Corne de la St. Luc -- left in 1758 (Ross 1960:56). Subsequently, the fort was destroyed by British soldiers in 1765 (Ross 1960:61).

Following shortly in the footsteps of the early French explorers and fur traders, came the Jesuit missionaries. French missionary influence in western Lake Superior began with the arrival in the La Pointe region of Father Claude Jean Allouez in the mid-seventeenth century. Jesuit efforts in the area were short-lived, however, ending with Father Jacques Marquette's departure in 1671 (Ross 1960:30-32).

During this period, under the influence of the French fur trade, the southwestern Chippewa (Saulteurs) made peace in 1679 with the Dakota Sioux of the southwestern region of Lake Superior. Subsequently, the Saulteurs established the largest of two permanent south shore villages in the Chequamegon/La Pointe region. From 1679 to 1736, a trading alliance between the Dakota and the Saulteurs allowed the latter to hunt in Dakota territory. By 1736, this temporary alliance had fallen apart, leading to a revival of hostilities between the two groups. However, the Chequamegon village did not end its role as a major Chippewa center until 1765, with the end of the French and Indian War and the gradual establishment of British control over the fur trade (Hickerson 1962:65-71).

Earnest British participation in the Lake Superior fur trade began after trader Alexander Henry reported acquiring some 15,000 lbs of beaver skins while wintering at Chequamegon in 1765-1766. Subsequently, some "eighteen canoes carrying £7,481 of trade goods left trading headquarters at Mackinac for Chequamegon" in 1767, and, in 1778, "the British licensed 152 canoes and 374 bateaux for Lake Superior, carrying goods worth £191,013" (Holzhueter 1986:24-25).

Nevertheless, the Great lakes fur trade was the main economic base for the French Canadians (Kellogg 1971:25-26). As a result, they were not about to give it up to British traders, even after Canada became British. Unlike the French, who had allowed their traders to operate fairly independently among the Indians, the British at first attempted to centralize all trade at the main forts (Kellogg 1971:39). After seven years of declining fur profits, however, they finally agreed to re-extend trade beyond the forts. Despite nominal British control of the area, French Canadians continued to dominate the fur trade until late in the century. For example, Kellogg (1971:103) notes the ratio of French to British trading licenses granted in 1770, 1772, and 1774 to have been 62:14, 48:10, and 42:10, respectively.

With the creation of the British North West Company in 1779, La Pointe again became a center for Lake Superior trade. During this period, following the Revolutionary War, the North West Company controlled the entire Lake Superior trade, La Pointe being one of its

two main trading centers west of the Sault (Kellogg 1971:239). Although the company's John Johnston built a cabin on the southern end of Madeline Island in 1791, it was not until Michel Cadotte arrived in 1793 that a trading post was re-established at La Pointe (Ross 1960:59-68).

Although the Chequamegon region came under official American control after the Revolutionary War, the French and British continued to dominate the fur trade until the nineteenth century (Holzhueter 1986:25). It was not until after the signing of Jay's Treaty in 1795 that American traders began to appear on Lake Superior in any great number (Holzhueter 1986:27), following the official transfer of British posts to American troops in 1796 (Kellogg 1971:233). However, British-Canadian traders still remained the plurality, such that Kellogg (1971:238) describes the subsequent decade as the "heyday of the Canadian fur trade." In fact, the post on Madeline remained under British influence, passing to the Michilimackinac Company in 1806, and the to South West Company shortly thereafter. Thus, during the British-American hostilities of the War of 1812, at which time most of Wisconsin's Indian groups sided with the British, Kellogg (1971:285) contends "Wisconsin . . . was even more British than Canada." Eventually, however, John Jacob Astor took over the La Pointe post for the recently created American Fur Company in 1816 (Ross 1960:69-72).

The establishment of American control over Madeline Island by the early nineteenth century ended the "wilderness regime" (Kellogg 1971:329) perpetuated under the French and British. Whereas the key European interest had been military control over the fur trade, America set out to colonize. The missionaries (Catholic and Protestant now) returned and, in addition to the long-established fur trade, La Pointe witnessed the growth of nineteenth-century economic enterprises: the commercial fishing industry, iron/copper mining, brownstone quarrying, lumbering, and, eventually, summer tourism. As a result of America's expansionist policy, a treaty signed in 1854 between the United States and the southern Lake Superior Chippewa led to the establishment of the reservations at Red Cliff and Odanah, and the loss of one third of La Pointe's population (Ross 1960:116).

In 1835, Frederick Baraga arrived at La Pointe to build a Catholic mission, and shortly thereafter, in 1839, the village saw the construction of a rival Protestant church under Sherman Hall (Ross 1960:88-101). Although they shared a common goal -- to "civilize" the Chippewa, particularly through the adoption of agriculture -- the Catholic and Protestant missionaries differed in their respective approaches. In general, the Catholics demanded less acculturation. They were, therefore, somewhat more successful in their efforts to convert the Chippewa (Stevens 1974-75).

The same year Baraga arrived, the American Fur Company was suffering from a glut in the fur market. Subsequently, under the administration of Ramsey Crooks, it expanded into the fishing industry, and La Pointe became "an administrative, fishing, and warehousing center for the entire Lake Superior and Upper Mississippi region" (Holzhueter 1986:31). In his search for a decent harbor, Crooks moved the La Pointe village to the western shore of Madeline Island (Holzhueter 1986:32). In 1837, a cooper established a complimentary

business at La Pointe (Ross 1960:95), and, by 1860, fishing boats were also being crafted there (Holzhueter 1986:51). More than 5,000 barrels of fish were shipped out of La Pointe in 1838 (Holzhueter 1986:44). Although economic disaster to the American Fur Company brought a short-lived demise to the fishing industry, it was soon revived under the growing demand to supply the newly created mining camps around the lake (Ross 1960:112-113).

In 1840, a rival trading company, the Cleveland North Western Lake, arrived at La Pointe. Ross (1960:102) speculates that the company established itself at Grant's Point. At the same time, a small lumber mill was built at La Pointe, and in 1850, it processed some 70,000 feet of lumber. Later, circa 1860, La Pointe's steam-powered saw mill turned out some 1 million feet of lumber (Holzhueter 1986:50-51).

By the 1830s, the beaver population around Lake Superior was declining due to overhunting. Subsequently, a change in European demand led to the replacement of the beaver by the raccoon as the most hunted fur-bearer. Beaver had assumed fifth place to raccoon, muskrat, mink, and fox by 1850 (Holzhueter 1986:28).

In 1837, a treaty with the Chippewa led to the establishment at La Pointe of a subagency of the federal government (Holzhueter 1986:48). Conflict between the Chippewa and United States over prime copper-mining lands led to another treaty in 1842, officially ceding all Chippewa lands in northern Wisconsin to the United States (Holzhueter 1986:49). Finally, the treaty of 1854, which relocated most of the La Pointe Chippewa away from Madeline Island, ended the raison d'etre for the rival missions, which were abandoned shortly thereafter (Ross 1960:118). However, the Chippewa were granted fishing rights off some 100 acres of land on the northeastern end of Madeline island (Ross 1960:117).

By the late nineteenth century, La Pointe had lost its role as an economic center for Lake Superior. The rival port of Bayfield was growing, and Ashland had gained power as a logging city with direct railroad access to the interior of the state (Ross 1960:145). With the decline in the importance of logging and quarrying after the turn of the century, commercial fishing and tourism remained the two largest industries contributing to the economies of the Apostle Islands (Richner 1987:17).

Previous Archeological Investigations on Madeline Island

Previous archeological investigations were conducted on the southern end of Madeline Island at the Winston-Cadotte and Marina sites. Together, these multicomponent sites document the late prehistoric through the late nineteenth/early twentieth century history of the Chequamegon region. Indeed, Birmingham (n.d.:12) suggests that "given the nature and extent of Euro-American and Indian activities on Madeline island from the 1830s-1850s, virtually the whole western side of the island can be viewed as one vast historical archeological site."

The Winston-Cadotte site, located at Grant's Point, was excavated by Dr. Leland Cooper of

Hamline University in 1961, and the data are currently undergoing analysis by State Archeologist Robert Birmingham of the State Historical Society of Wisconsin. Based on preliminary typological studies of the wide range of ceramics found, Birmingham (n.d.:6) suggests the earliest component consists of a large, late-seventeenth-century mixed aboriginal village, the result of several different Indian groups who had come to trade with the French at La Pointe. The latest component consists of a late eighteenth/early nineteenth-century mixed Chippewa and Euro-American occupation, including a Chippewa cemetery (Birmingham n.d.:2).

The Marina site was tested in 1974 by Salzer and Overstreet (1974) and partially excavated in 1975 and 1977 by Beloit College, under Birmingham's direction (Birmingham and Salzer 1984). It is located on a baymouth bar approximately one mile north of the Cadotte site. In addition to a small, as yet unidentified, prehistoric component, it contains a Chippewa village and cemetery, dating (based on Euro-American trade items) from ca. 1718-1775. Birmingham and Salzer (1984) interpret this to be Hickerson's (1962) "Chequamegon Village," the principal Chippewa village in the region in the eighteenth century. A third component, dating from 1830-1860, consists of a mixed Euro-American and Indian occupation that are the remains of Baraga's and Hall's missions. The last occupation consists of a late nineteenth/early twentieth century Euro-American occupation (Birmingham and Salzer 1984).

Survey Methodology

Investigation of the southwest point of Madeline Island (Grant's Point) was designed to accomplish several objectives. The most important objective was the conduct of a proton precession magnetometer survey designed to identify anomalies that could be associated with an early fur trade station. Additional objectives included a visual examination of the bottom surface in the vicinity of the more significant anomalies, examination of a channel along the south side of the point, and attempts to locate features identified in recent aerial photographs of the point (Figure 2.1).

The magnetometer survey was carried out from a twenty-four-foot survey vessel provided by East Carolina University. Magnetic data was produced by a Type 7702 Small Boat Proton Precession Magnetometer manufactured by Littlemore Scientific of Oxford, England. A marine sensor equipped with flotation was used during the survey as water depths in the study area were shallow (3-10 feet). Magnetic data was recorded on a Rustrak analog recorder.

Positioning for the survey was provided by a Motorola Mini-Ranger III radar ranging system provided by the University of Wisconsin Marine Studies Center. The Mini-Ranger III system provided ranges in meters from two transponder stations located on adjacent Long Island. Using the station set up on the west end of Long Island (near Chequamegon Point Light) for control, survey lanes were established as a series of arcs transecting the study area every fifteen meters. Distance data from the second Mini-Ranger III station located at the foot of the abandoned Coast Guard pier at La Pointe Light was used to systematically provide an

Figure 2.1 Aerial photograph -- Grant's Point, Madeline Island. Northwest Regional Planning Commission

exact vessel position every 100 meters along each arc. Positioning data at each station was manually recorded at each 100-meter increment and correlated with event marks on the magnetometer analogue strip records.

Analysis

Analysis of the Madeline Island survey data began with production of a magnetic contour map of the survey area. Positioning data were entered into an automated geographical coordinate plotting system and converted from the range/range Mini-Ranger data to X/Y coordinates. Each survey transect and magnetic data collection point was plotted to produce a series of vessel track plots. Magnetic data were then digitized and correlated with the X/Y station coordinates. Using a contour plotting program, these data were plotted and converted to a magnetic contour map depicting the magnetic gradient of the survey area in five gamma (γ) contour intervals. Anomaly signatures were analyzed to determine potential association with submerged cultural material.

Magnetic data was converted to a contour map by the Surfer program developed by Golden Software. Analysis of each signature was carried out by examination of both the analogue record produced by the magnetometer and the contour data developed by Surfer. A total of fifteen targets or target clusters were identified during analysis. Each of these was classified in terms of signature characteristics, magnetic intensity, and signal duration. Due to geographical proximity, several of the individual signatures were treated as target clusters and could represent associated cultural material.

Targets identified during the survey of Grants Point off Madeline Island include:

TC-1

Target cluster TC-1 consisted of four targets identified on lanes 21, 25, 29, and 30. The center of the target cluster consisting of targets T21-7, T25-1, T29-1, and T30-1 was located at UTM 668650.00 Easting and 5179840.00 Northing. The multi-component signature was associated with a general magnetic disturbance in the area. Target signature T21-7 proved to be a 3 pulse 18γ positive monopolar anomaly. Target T25-1 proved to be a dipolar anomaly of 12 pulse duration and 16γ intensity. Target T29-1 proved to be a 12 pulse, 14γ positive monopolar anomaly and the remaining signature target T30-1 proved to be a dipolar signature of 12 pulse and 16γ intensity. Collectively these targets appear to be associated with a scatter of ferrous cultural material.

TC-2

Target cluster TC-2 consisted of two targets identified on lanes 26 and 27. The center of the target cluster consisting of targets T26-1 and T27-1 was located at UTM 668550.00 Easting and 5179875.00 Northing. The signature complex was associated with a general magnetic

disturbance in the area. Target signature T26-1 proved to be a 21 pulse, 27γ dipolar anomaly. Target T27-1 proved to be a dipolar anomaly of 10 pulse duration and 10γ intensity. Collectively these targets appear to be associated with several ferrous objects.

TC-3

Target cluster TC-3 consisted of six targets identified on lanes 30, 31, 98, 103, 104, and 105. The center of the target cluster consisting of targets T30-2, T31-1,T103-1, T104-1, and T105-1 was located at UTM 668575.00 Easting and 5179925.00 Northing. The multi-component signature complex was associated with a general magnetic disturbance in the area. Target signature T30-2 proved to be a 14 pulse, 46γ dipolar anomaly. Target T31-1 proved to be a dipolar anomaly of 19 pulse duration and 36γ intensity. Target T98-3 proved to be a 10 pulse, 11γ positive monopolar anomaly. Target T103-1 proved to be a dipolar signature of 11 pulse duration and 46γ intensity. Target T104-1 produced a positive monopolar signature of 10 pulse duration and 44γ intensity and the remaining signature target T105-1 proved to be a dipolar signature of 10 pulse and 66γ intensity. Collectively, these targets appear to be associated with a scatter of ferrous cultural material.

TC-4

Target cluster TC-4 consisted of two targets identified on lanes 97 and 105. The center of the target cluster consisting of targets T97-1 and T105-2 was located at UTM 668430.00 Easting and 5180020.00 Northing. The signature complex was associated with a general magnetic disturbance in the area. Target signature T97-1 proved to be a 6 pulse, 12γ positive monopolar anomaly. Target T105-2 proved to be a dipolar anomaly of 10 pulse duration and 20γ intensity. Collectively these targets appear to be associated with a scatter of several ferrous objects.

TC-5

Target cluster TC-5 consisted of four targets identified on lanes 91, 95, 106, and 107. The center of the target cluster consisting of targets T91-1, T95-1, T106-3, and T107-1 was located at UTM 668800.00 Easting and 5179960.00 Northing. The multi-component signature complex was associated with a general magnetic disturbance in the area. Target signature T91-1 proved to be a 6 pulse, 12γ negative monopolar anomaly. Target T95-1 proved to be a dipolar anomaly of 5 pulse duration and 56γ intensity. Target T106-3 proved to be an 8 pulse 76γ dipolar anomaly and the remaining signature target T107-1 proved to be a dipolar signature of 5 pulse and 42γ intensity. Collectively these targets appear to be associated with a scatter of ferrous cultural material.

TC-6

Target cluster TC-6 consisted of two targets identified on lanes 96 and 98. The center of the target cluster consisting of targets T96-1 and T98-1 was located at UTM 668475.00 Easting

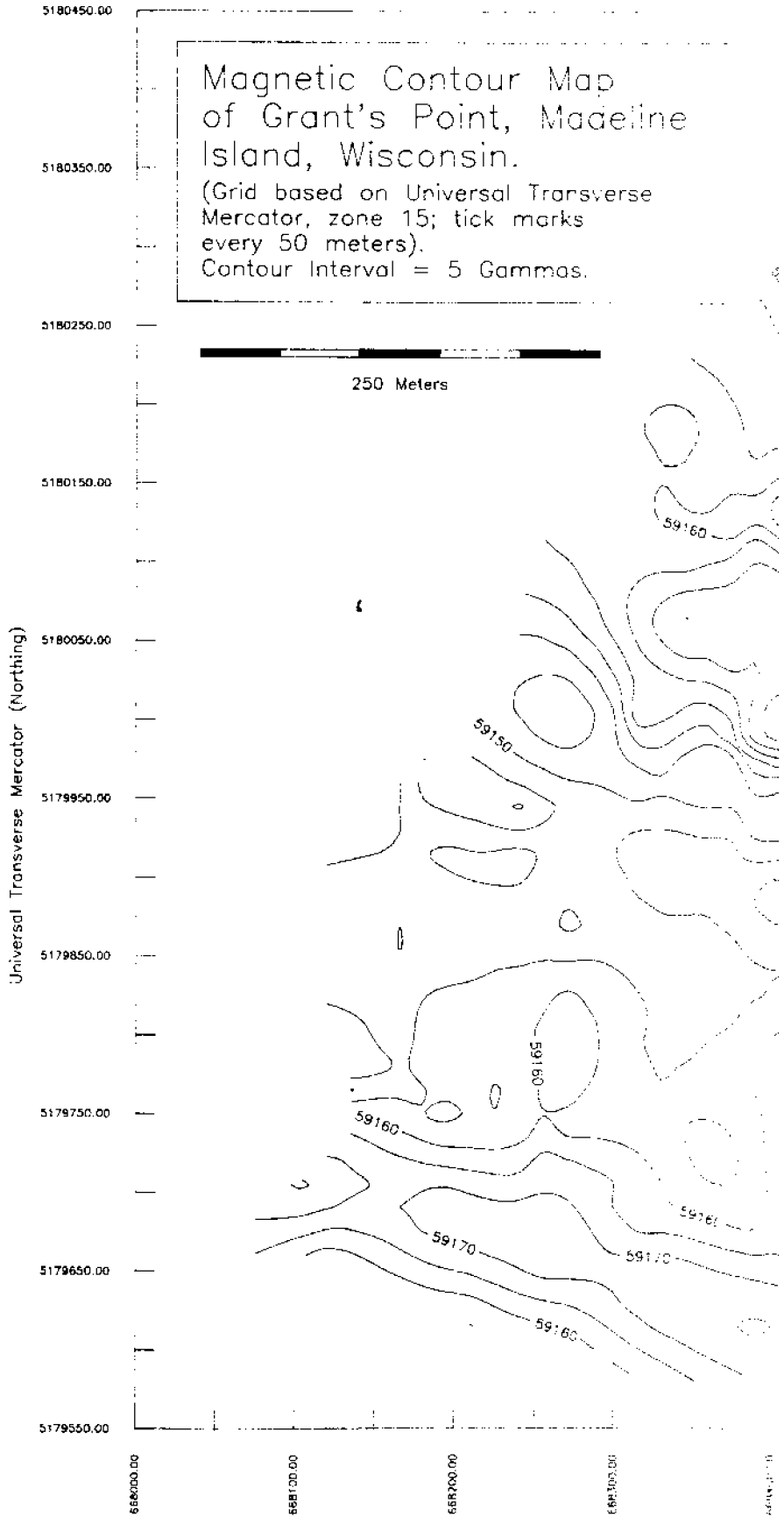
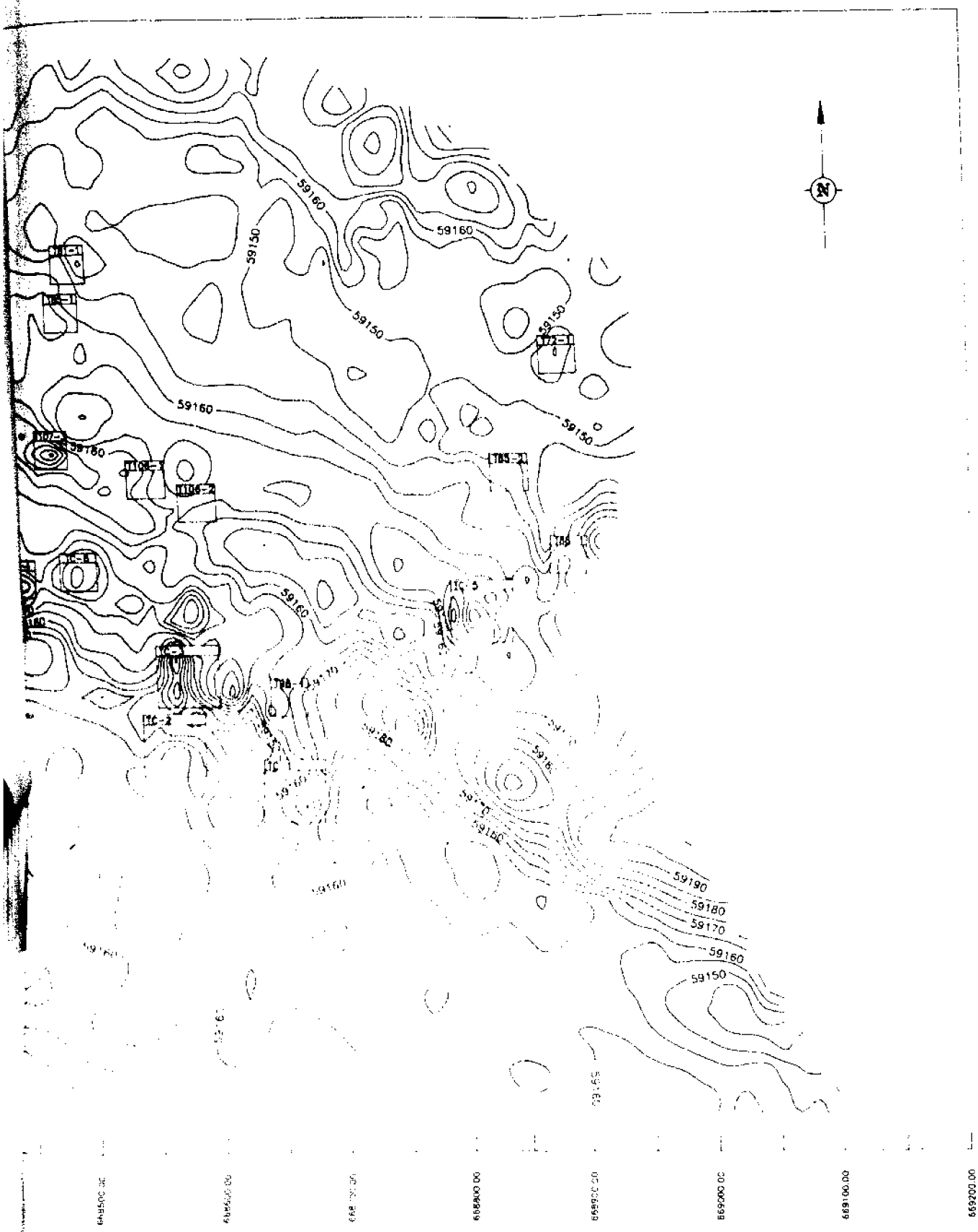

Magnetic Contour Map of Grant's Point, Madeline Island, Wisconsin.
(Grid based on Universal Transverse Mercator, zone 15; tick marks every 50 meters).
Contour Interval = 5 Gammas.
250 Meters
Universal Transverse Mercator (Northing)
5180450.00
5180350.00
5180250.00
5180150.00
5180050.00
5179950.00
5179850.00
5179750.00
5179650.00
5179550.00
59160
59150
59170
59180
688000.00
688100.00
688200.00

Figure 2.2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668900.00
669000.00
669100.00
669200.00
Universal Transverse Mercator (Easting)

and 5180025.00 Northing. The signature complex was associated with a general magnetic disturbance in the area. Target signature T96-1 proved to be a 8 pulse, 10γ positive monopolar anomaly. Target T98-1 proved to be a positive monopolar anomaly of 9 pulse duration and 24γ intensity. Collectively these targets appear to be associated with two or more ferrous objects.

T72-1

Target T72-1 was identified on lane 72 and located at UTM 668867.00 Easting and 5180182.00 Northing. Material at the site generated a dipolar signature of 10 pulse duration and 19γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object.

T81-1

Target T81-1 was identified on lane 81 and located at UTM 6685480.00 Easting and 5180253.00 Northing. Material at the site generated a dipolar signature of 15 pulse duration and 16γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object.

T85-1

Target T85-1 was identified on lane 85 and located at UTM 668490.00 Easting and 5180215.00 Northing. Material at the site generated a positive monopolar signature of 9 pulse duration and 8γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

T85-2

Target T85-2 was identified on lane 85 and located at UTM 668827.00 Easting and 5180082.00 Northing. Material at the site generated a positive monopolar signature of 8 pulse duration and 20γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

T88-1

Target T88-1 was identified on lane 88 and located at UTM 668868.00 Easting and 5180020.00 Northing. Material at the site generated a dipolar signature of 16 pulse duration and 21γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object.

T98-4

Target T98-4 was identified on lane 98 and located at UTM 668644.00 Easting and

5179922.00 Northing. Material at the site generated a negative monopolar signature of 9 pulse duration and 12γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

T106-1

Target T106-1 was identified on lane 106 and located at UTM 668530.00 Easting and 5180072.00 Northing. Material at the site generated a positive monopolar signature of 7 pulse duration and 14γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

T106-2

Target T106-2 was identified on lane 106 and located at UTM 668578.00 Easting and 5180055.00 Northing. Material at the site generated a positive monopolar signature of 10 pulse duration and 10γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

T107-3

Target T107-3 was identified on lane 106 and located at UTM 668472.00 Easting and 5180103.00 Northing. Material at the site generated a negative monopolar signature of 10 pulse duration and 24γ intensity. The signature characteristics suggest that material generating the anomaly is a single ferrous object or a concentration of smaller objects.

Conclusions

Analysis of the magnetometer data highlighted a series of magnetic anomalies (TC-1, TC-2, TC-3, TC-4, TC-6, and T98-4) along a line extending southeast to northwest across the shoal southwest of Grants Point. A second alignment of targets that included, TC-5, T106-1, T106-2, and T107-3, were also aligned across the shoal southwest of Grants Point (Figure 2.2). Both of these target complexes could represent depositions of cultural material associated with human activity, perhaps associated with relict shorelines.

Visual examination of these target areas by divers indicated that the material generating the magnetic signatures was covered by sand, glacial till, and other bottom sediments. The remaining targets appear to be single objects, or, in the case of low intensity monopolar signatures, possible concentrations of small ferrous objects. These several additional targets located in the cove northwest of Grant's Point and along the west side of the shoal were also visually examined. Again, diver reconnaissance of the bottom in the vicinity of each target confirmed that material generating the signature were covered by bottom sediments.

Visual surveys by diver were also conducted on targets identified in recent aerial photography as possibly associated with fur trade era occupation of Grant's Point (Wilhelm and Mueller

1990). Divers inspected a linear pattern of stone, a triangular-shaped concavity in the sand bottom, and a rectangular-shaped target, all clearly visible from the air. The stone was found to be a line of shore-protection boulders that appeared to be of twentieth-century origin. The triangular concavity could not be relocated (it appears to have filled with sand) and the location of the target had no unusual magnetic signature. The rectangular shape was proven to be a bed of peat-type material and some associated small (approx. 8-10 cm. diameter) tree stumps. No cultural material was visible, and the stumps appeared to have been inundated relatively recently (possibly in the early part of this century).

Resurveying the delineated target areas using a more intense sampling technique would be required to more closely delineate these magnetic anomalies, and to eliminate some of the background noise associated with the initial survey, thereby enhancing anomaly detection and identification. Refined survey data would be needed to pinpoint anomaly sources and to plan test excavations of magnetic anomalies. Though the initial magnetic data are promising, additional investigation is needed to better assess the potential of submerged archeological material beneath the sands of Grant's Point shoal.

3.0 MARITIME HISTORICAL OVERVIEW

The Development of Maritime Industries and Lake Shipping in the Apostle Islands

The west end of Lake Superior was one of the last areas east of the Mississippi River to be settled by Euro-Americans. Because the area offered no sustainable industry to spur a resident population growth, it was not until the 1850s that mining, fishing, and lumbering brought a sizable level of settlement to this region. Though the fur industry did bring Euro-American settlers into the area in the seventeenth and eighteenth centuries, Euro-American population stabilized in the late 1830s and early 1840s with the decline of the fur trade in the Apostles.

In 1835, Ramsey Crooks (head of the American Fur Company's former Northern Department) undertook a major overhaul and reorganization of the American Fur Company in the face of declining profits and the outright sale of the company's former Western Department to competitors the previous year. He called for the construction of larger sailing vessels to supplant the company's hand-propelled bateaux and canoes, and had the 112-ton schooner JOHN JACOB ASTOR built to be the hauler of American Fur Company wares on Lake Superior. Crooks also reduced the number of his sub-outfits and had his base of operations changed from Mackinac Island to La Pointe on Madeline Island. In so doing, he transformed La Point into a field headquarters for his company's business encompassing all of Lake Superior and the Upper Mississippi region (Holzhueter 1986:30-31).

Former company oarsman, who had become unemployed by the reduction of fur operations and the use of schooners for transportation were rehired by Crooks as fishermen. Crooks, in his attempt to secure and hold the far west end of Lake Superior for the American Fur Company, foresaw an opportunity to both diversify his company and keep his former oarsmen from seeking employment with his competitors (Holzhueter 1986:31). Thus, in 1835 the American Fur Company began commercial fishing out of its former fur-trading post headquarters at La Pointe, using former company boatmen to harvest whitefish, lake trout, siscowet, pickerel, and lake herring. Company vessels picked up the barrelled, salted catch and fishermen were resupplied by the gathering vessels. This quid pro quo exchange allowed the fishermen to fish uninterrupted and speed up the distribution of the newly harvested fish. Thus, the commercial fishing industry in the Apostles had been born. Fish from Lake Superior were sent to company warehouses in Detroit for distribution to eastern and southern markets. At its peak, the American Fur Company shipped about 5,000 barrels; however, the market failed around the time of the 1837 panic, and depressed conditions caused Crooks to abandon his commercial fishing operations by 1841. Nonetheless, smaller-scale commercial fishing continued at La Pointe (in 1849 La Pointe salted about 1,000 barrels), and later spread to Bayfield where it grew considerably (Holzhueter 1986:43-44; Ross 1960:104-105).

About the same time that the fishing industry began, so began mining exploration around Lake Superior. Mining was later to have a profound economic impact on the Apostle Islands region. With the discovery of rich iron, copper, and silver deposits in Minnesota, Michigan,

and Wisconsin in the late 1830s and early 1840s, and the mining of iron ore beginning in the 1850s, development of the west end of the lake went from a seemingly isolated economy to a booming one in the span of a few decades. Michigan geologist Douglas Houghton sparked interest in the abundant copper resources of Michigan's Upper Peninsula in the 1840s, and another explorer, Charles Whittlesey, discovered the Gogebic-Penokee iron range in northern Wisconsin and Michigan in 1848, the same year Wisconsin achieved statehood (Holzhueter 1986:48; Mansfield 1972 [1899]:I:554-558). Although the mining of copper and silver ore did not prove sustainable, iron ore mining did. Even prior to the construction of the Sault Ste. Marie locks, in 1850 five tons of iron ore from the newly opened Marquette Range (1846) were shipped to Newcastle, Pennsylvania. This was the first shipment of Lake Superior iron ore to a Lake Erie port (Mansfield 1972 [1899]:I:446).

As a result of increasing United States interest in the land and resources of western Lake Superior, treaties were signed in 1837 and 1842 with the Chippewa natives ceding large amounts of Wisconsin and Minnesota to the United States. The latter treaty, signed at La Pointe, had a rather deceptive clause which allowed the President to remove any Indian from mineral lands when necessary. The U.S. government soon took this to mean all of northern Wisconsin and Michigan, and commenced displacing the different tribal bands (Holzhueter 1986:48-49). Significant government pressure resulted in the treaty of 1854, which divided the La Pointe Chippewa into two bands and relocated them to the present Bad River and Red Cliff reservations (Ross 1960:117-118).

The mineral potential and new land in the west brought an influx of settlers and entrepreneurs into the Apostles area. In 1854 the town of Whittlesey (later to become the city of Ashland) was established by Asaph Whittlesey, brother of geologist Charles Whittlesey. In that same year, W. W. Corcoran and others organized the town of Superior, and from 1854 to 1857 over 2,000 lots were sold (Holzhueter 1986:48; Mansfield 1972 [1899]:I:357, 360). In 1856 the town of Bayfield was platted, named for the British officer who had surveyed the region during the years of British control (Holzhueter 1986:48, 50; Ross 1960:120-121). Improvements such as pier construction at both Ashland and Superior, and building of a steam-powered sawmill at Bayfield in 1856 took place, but development was temporarily halted by the nation-wide financial panic of 1857. The panic of 1857 brought temporary hardship and depopulation to the west end of the lake, with many fledgling businesses relocating, or simply disappearing. Through the combination of the panic and the Civil War, by 1863 Ashland's population consisted of only a single family. Despite the panic, Duluth was platted and incorporated in 1857 (Mansfield 1972 [1899]:I:358, 360, 678; Ross 1960:121).

Before 1855, Lake Superior shipping to downlake ports required laborious trans-shipment of cargos at Sault Ste. Marie. With the opening of the "Soo" canal at Sault Ste. Marie in 1855, Lake Superior became a burgeoning giant water highway allowing continuous water transport from Duluth to Lake Ontario, and thence to the sea via the St. Lawrence or Erie canals (Cuthbertson 1931:213, 218-220, 235, 248-249; Mansfield 1972 [1899]:I:243, 673). As economic activity at the head of Lake Superior increased so did the traffic passing north of

the Apostles. Ships carrying grain, lumber, and iron ore came in closer contact with the Apostles, and through this contact roused interest in the area.

The Apostle Islands' first light station was authorized in 1852. It was to be placed on Long Island to provide western bound ships a mark for the south channel between Long Island and Madeline Island. However, this lighthouse was mistakenly constructed on Michigan Island around 1857. The mistake was corrected, and the real La Pointe light was constructed on Long Island in 1858. In 1863 Raspberry Island light began guiding vessels through the west channel to the developing harbors at LaPointe, Bayfield, and Ashland. In 1874 a light station was built on Outer Island to help guide lake traffic north of the islands. Sand Island light was built in 1881 to augment the Raspberry Island light and in 1891 an additional light station was built on Devils Island. The Devils Island Light Station became the cornerstone for navigational course changes to and from the head of the lake (U.S. National Park Service 1988a:1, 7-11).

With the advent of expanding midwest agriculture and railroads in the 1870s and 1880s, Duluth and Superior quickly became important trans-shipping points for grain headed east. By 1885, Duluth had eleven grain elevators, and the first grain elevator was being constructed in the city of Superior. By 1891 that number had grown to ten elevators at Superior and thirteen at Duluth (Labadie 1990:E:48-51). Storage capacity at Duluth-Superior varied from 700,000 to 2,000,000 bushels per elevator, with a total capacity of 24,650,000 bushels; this had more than doubled by World War II (Labadie 1990:E:51; Mansfield 1972 [1899]:I:536).

Lake vessel capacities kept roughly apace of the expansion in the grain trade, increasing from 80,000 bushel capacities in 1880 to 120,000 bushel capacities by 1890, and 400,000 bushels by about 1900. In twenty years freight rates were cut in half by the efficiency of waterborne transportation. Superior had eight flour mills by 1895, and Duluth trans-shipped a good deal of flour produced in Minneapolis, despite competition from railroads. Between the First and Second World Wars, Duluth and Superior handled twenty percent of all grain shipped on the upper lakes, and combined grain shipments from Duluth-Superior peaked between 1970 and 1979 at 226,408,000 bushels annually. As the major transportation outlet for America's midwestern "breadbasket," Duluth and Superior have remained active and important commercial ports to the present (Labadie 1990:E:50-52).

Lake Superior competitive fishing enterprises sprang out of a commercial fishing boom in the latter nineteenth century. One such enterprise was the A. Booth Packing Company (later known as the Booth Fish Company), which began a buyout of smaller fish collecting and packing operations in 1889. This company developed a fleet of vessels, the Booth Line, operating around the Apostles as well as elsewhere on the Great Lakes, picking up the local catches and then processing and shipping those catches onto nationwide markets. Reliable, national distribution had the benefit of steadying prices. The Booth Company provided fishermen an outlet for selling their catch even in bad economic conditions. They also provided fishermen loans in getting started and when storms destroyed their nets and boats (Ross 1960:170).

The town of Bayfield was also involved in the fishing industry with such local operations as the Bayfield Fish Company (later owners of the tug CHARLOTTE) as well as the strong presence of the A. Booth Packing Company. Many warehouses were constructed on Bayfield's waterfront to support the commercial fishing industry. State records of this fishery began in 1888, indicating that 147 fishermen were employed in the Bayfield area, with a total annual catch of 1,766,665 lbs. By 1896, the annual catch rose to 7,880,220 lbs., employing 160 people (Holzhueter 1986:44).

Commercial fishing prospered in the west end of Superior for several decades, beginning in the mid-1880s and peaking around the early twentieth century. The industry came to be dominated largely by Norwegian emigrants, and included Swedes and Finns as well. In addition to the commonly used gill nets, pound nets came into use in the Apostles around 1885. Due to the dwindling number of whitefish in the 1890s, whitefish were replaced by lake trout as the commercial catch; a sign that the fish boom was on the downward spiral. The November lake herring harvest became more important after the turn of the century, eclipsing both whitefish and lake trout. The industry peaked in 1915 (in terms of annual catch), and entered its final decline in the 1920s and 1930s. Many fishermen sought employment in other fields. Destruction of the lake trout population by the sea lamprey in the 1950s, and powerful competition from the sport fishing lobby has placed modern Great Lakes commercial fishing on a very reduced scale. There were more full-time commercial fishermen in just Bayfield in 1888 than in the entire Great Lakes as of 1975 (Labadie 1990:E:15; Ross 1960:170-171; U.S. National Park Service 1988b:15, 24-25).

The lumber industry in the west end of Lake Superior also had its boom period and contributed extensively to economic growth beginning in the late 1870s (Ross 1960:132). Though local lumber had been harvested as long as anyone had occupied the Apostle Islands, more intensive commercial harvesting did not take place until the 1850s and the construction of sawmills at Bayfield, Ashland, and La Pointe (an earlier small water-powered mill had also been built by the American Fur Company at Pike's Creek) (Ross 1960:116, 119, 121).

After the Civil War (and especially after the 1871 Great Chicago Fire), Chicago and other Great Lakes port cities were growing so fast that demand for building material was very great, and good prices were offered on Lake Superior timber. Despite another financial panic in 1873, through the 1870s Ashland saw significant development in its lumber industry, and new sawmills were built until the four-mile-long waterfront was choked. Ashland's first rail connection came in 1877 with the completion of the Wisconsin Central Railway between Ashland and Milwaukee (begun in 1872); Asaph Whittlesey himself drove the final spike on June 2, 1877. This rail link to the interior did much to spur settlement, development, and the burgeoning lumber industry in the Chequamegon Bay region. Washburn was founded in 1879 with two sawmills, the old Pike's Bay mill was back in operation, and other mills were built up the coast at Red Cliff, Cornucopia, Herbster, and Port Wing. The entire Chequamegon area was besieged night and day by the ceaseless shrieks of the saws and the constant burning of waste slabs and sawdust. The logging boom also brought new population in the form of

lumberjacks, lumber speculators, and individuals with talents in such essential support services as saloon- and brothel-keeping (Holzhueter 1986:53-54; Ross 1960:128, 131-133).

The Apostles timber included pine wood for building, hemlock bark for hide-tanning, and hardwoods for fuel and charcoal-making. The Apostles not only offered a diversity of wood, but also accessibility, as the topography of the Apostle Islands made it quite easy to move cut logs towards the shore. The Apostles could also be logged year round: logs cut during the winter were piled near shore and then shipped out the following spring. During the winter months, logs were transported via iced roads prepared by "road monkeys." The colorful language of the logger describes the other jobs done by sawyers (cutting), swampers (brush-clearing), and top-loaders (loading logs onto sleighs drawn by horses and oxen). Varying sizes of camps sprang up on the islands as a base for logging operations and also homes for the loggers. Trout Point on northern Stockton Island, one of the larger camps (at its peak it could house about 100 men), was operated from 1890 until 1920. In the later days of the industry, small railroads were built on Michigan and Outer Islands to transport logs to lakeside landings. The era of lumbering in the area ended in 1924 with the closing of the last mill (Holzhueter 1986:54; U.S. National Park Service:1988b:36-37).

The opening of the Gogebic iron range in 1884 and the development of rail connections from the mines to the Lake Superior coast brought about a parallel phase of major economic activity in the Apostle Islands. The ore and lumber industries helped to provide the Apostles and the west end of Lake Superior with a developing infrastructure ready to support thriving communities, bringing settlers, laborers, and investors alike to the Lake Superior area. Ashland became a primary Wisconsin iron and lumber port, experiencing rapid growth between 1880 (total county population of 353) and 1890 (city population of 9,956). Ashland became the eastern terminus of the Northern Pacific Railroad in 1884, connecting west to Superior, with a branch onto the Chicago, St. Paul, Minneapolis & Omaha Railroad as well (completed in 1883, with its terminus at Bayfield). Ashland's lakeside location and its proximity to the Penokee-Gogebic iron ranges made it ideally suited for development as an ore trans-shipment point. A rail link from Ironwood, Michigan in the Gogebic range to Ashland was completed in 1885 by the Milwaukee, Lake Shore & Western Railroad (later the Chicago & North Western) which also began construction on Ashland's first elevated ore dock (completed in 1886). Dock construction was necessary to create an artificial harbor along Ashland's exposed waterfront for the loading of ships. Other docks followed: the Wisconsin Central built its first ore dock at Ashland in 1887, after completing its own spur from Ironwood to the main track at Mellen (Holzhueter 1986:54; Ross 1960:137, 143, plate 18b).

The advent of technology in the ore industry also helped to make this rapid growth possible. Before the 1880s, ore loading and unloading from vessels was somewhat primitive. Ore was laboriously drawn and hoisted in wooden buckets by horsepower, then placed in wheelbarrows and dumped into large piles, then further distributed. This process was also in practice with the constant incoming coal shipments from the east (Mansfield 1972

[1899]:I:547-553). Coal was a staple in keeping western cities, factories, steamships, railroads, sawmills, and mines going.

In the 1880s, elevated ore docks, using railroad cars fitted with drop-bottoms, allowed ore vessels to load much rapidly than using hand-loading. With newly introduced hoisting and conveying equipment, even the largest ore vessels could unload at downlake ports in twelve to fourteen hours, greatly increasing vessel turnaround times and efficiency. Prior to this technological advancement, Ashland in 1885 shipped 119,563 tons of ore; the next year her new ore dock shipped 721,983 tons, almost exclusively from the Gogebic range. This number was notably increased to 2,391,088 tons by 1898 and to 3,553,919 tons in 1902; over four times the amount shipped by Superior, and comparable to the tonnage shipped by other major iron ports such as Duluth, Two Harbors, Marquette, and Escanaba (Mansfield 1972 [1899]:I:566-567; Chapple 1904:5). By 1899, there were twenty two ore docks on Lakes Michigan and Superior for the loading of iron ore. Just in western Lake Superior, Duluth had two, Two Harbors had five, Superior had one, and Ashland boasted three conveying ore docks (Mansfield 1972 [1899]:I:562). The contract rate for ore shipments from Ashland and other west end ports dropped from $1.15 a ton in 1885 to $.60 a ton in 1898 as competition and technology forced shipment prices down (Mansfield 1972 [1899]:I:569).

By 1902, Ashland was the northern terminus of the Chicago & North-Western, Wisconsin Central, and Minneapolis, St. Paul & Ashland railroads, and connected to the Chicago, St. Paul, Minneapolis & Omaha. Also, the Duluth, South Shore & Atlantic Railroad passed just south of the city. The Chicago & North Western and Wisconsin Central Railway Companies maintained three huge ore docks at Ashland. The city had a population of about 17,000. The 1902 waterfront boasted six sawmills, coal docks, a merchandise dock, pulp mill, and one of the largest pig iron, wood alcohol, and acetic acid plants in the United States, the Ashland Iron and Steel Company. The pig iron produced by this company's blast furnaces was refined using locally produced charcoal (the wood alcohol and acetic acid were by-products from the charcoal-making process), and as this iron lacked the high sulphur content of iron produced using coal or coke, it enjoyed a reputation for high quality. Foundrymen would request it by name; it went under the inscrutable appellation of "Hinkle" (Chapple 1904:5; Ross 1960:137, 146).

Between the local lumber trade, ore shipping, and the grain trade passing from Duluth-Superior, the lake was a flurry of activity. A count was made in 1903 from the Devil's Island Light Station. One hundred twenty vessels were in sight at one time, a spectacle the lighthouse keeper did not consider particularly unusual (Ross 1960:145)

Iron ore shipping on Lake Superior developed into a huge industry, contributing to the wealth of such industrial and financial giants as Andrew Carnegie, John D. Rockefeller, and J. Pierpont Morgan. By the turn of the century, J. P. Morgan's "Steel Trust" (combining Carnegie's, Rockefeller's, and smaller operations) consolidated into U.S. Steel Corporation, controlling furnaces, mills, ships, railroads, and ore fields, totaling three-fifths of the nation's steel business (Labadie 1990:E:28-33).

During the two world wars, iron production and transportation was upgraded and quickened to supply steel and iron works with badly needed raw materials. Though some mines were closed during the Depression of the 1930s, World War II provided a massive demand for iron and steel. However, much of this activity had shifted to the western iron ranges in Minnesota, and many of the Gogebic range mines were closed by the 1960s, the last closing in 1965. Ore production had shifted to the production of low-grade taconite pellets and higher-grade ores from other sources. Even the rich Mesabi and Vermillion ore ranges in Minnesota had been largely exhausted of high-grade ore by the 1950s. The first shipments of processed taconite took place in 1956 out of Silver Bay, Minnesota, and surpassed high-grade ore shipments by 1967. To date, virtually all American ore shipments on Lake Superior originate from Silver Bay, Two Harbors, and Duluth-Superior (Holzhueter 1986:54-55; Labadie 1990:35-36). Ashland no longer ships ore or lumber; as of 1977 its harbor was just a receiving point for coal and limestone destined for local paper mills, the White Pine Copper Mine, and the Ashland power plant (Wisconsin Coastal Management Program 1979:II:100-101).

In the mid to late nineteenth century, expansion in the Midwest led to the need for construction materials, especially durable materials for construction of large public edifices. When in 1868 Milwaukee wanted to build a new courthouse, a quarry in the Midwest was sought out to supply Milwaukee with its building material. Previously scouted brownstone quarry sites on the south end of Basswood Island belonging to Frederick Prentice and Alanson Sweet were chosen to meet that demand. This dark sandstone was heavy and hard, resistant to crushing, and in plentiful supply in the Apostle Islands. Quarrying commenced at Basswood in 1868 under the firm of Strong, French & Company. Records of the Samuel Stewart Vaughn Warehouse indicate that the Basswood quarries were supplied by water from Bayfield. The Brown Stone Company had a boardinghouse on Basswood for its workmen, and received supply shipments from Vaughn, including prodigious quantities of crackers and even tinned oysters. Prentice later started a huge quarry at Houghton Point (north of Washburn) in 1888 and later established other quarries on Stockton Island (1889) and Wilson (Hermit) Island in 1891. Robinson D. Pike also opened a quarry, located about four miles south of Bayfield. Eventually, the area had ten different brownstone quarries (Holzhueter 1986:52; Ross 1960:130-131, 148-149; U.S. National Park Service 1988b:38).

These quarries supplied the Midwest with brown sandstone, which was also widely used in the East in the late nineteenth century as an elegant building material. After the Great Chicago Fire of 1871, many people realized that stone buildings would have better withstood the fire, and Basswood brownstone was abundantly used in the reconstruction of Chicago. Apostle Islands brownstone was also used in buildings around the Great Lakes and down the Mississippi River, even making its way to New York. Cities such as Milwaukee, Detroit, Toledo, Cincinnati, St. Paul, Kansas City, Omaha, and others saw much brownstone construction. It found its way into forty cities in ten states. Prentice even tried to send an obelisk larger than Cleopatra's Needle to the 1893 Columbian Exposition in Chicago from his Houghton Point Quarry: it could not be handled by any lake vessel and had to be cut up and used elsewhere. The Fred Pillsbury Mansion in Minneapolis was also built of stone from this

quarry (operated by the Washburn Stone Company). However, brownstone was also used locally, including the construction of the Bayfield County Courthouse at Bayfield. Around the turn of the century, shifts in architecture preferences towards lighter building materials (including steel structural frameworks) brought brownstone quarrying to a standstill, and by 1910 the quarries were largely put out of business (Holzhueter 1986:40-41, 52; Ross 1960:148-149; U.S. National Park Service 1988b:38-39).

During the epoch of lumbering and mining, the Apostles Islands area began to see the forerunners of one of its major present industries, tourism. Several hotels were built by railroads to lure tourists into the area. The Wisconsin Central Railroad opened the Hotel Chequamegon in Ashland in 1877, and the Omaha Railroad followed with the building of a grand structure at Bayfield, called the Island View Hotel. City folks fleeing summer heat, hay fever, and wishing for some peaceful hunting and fishing became some of the area's early tourists. Though both hotels were closed by 1913, summer residences also began to be built in the area as early as 1894. Tourism and summer vacationing are presently major industries, especially with the creation of Big Bay State Park in 1963 and the establishment of the Apostle Islands National Lakeshore in 1969.

4.0 Schooner LUCERNE Site Survey, Long Island

Vessel History

On the cold morning of November 19, 1886 the LaPointe lightkeeper on Long Island arose to a macabre sight:

> From tower saw a vessel with 2 masts pretty close to the shore. I went down, I found it was a barque wrecked. It appeared that they had let go their anchors. She was lying bow to the east, about 2½ miles from lt. house. I discovered 3 bodies, one in main, 2 in mizzen rigging, did not find any bodies on the shore. Her boat is between the lighthouse and the end of the point. Her stern came ashore ¼ mile east of the lighthouse. On her arch board is LUCERNE, Cleveland. The fishing tugs were out setting their nets in the morning, they saw the wreck and reported it at Bayfield. The fishing tug BROWNE came to the wreck at 1 p.m. and took the bodies from the rigging and took them to Bayfield (U.S. Light House Service 11/19/1886).

The discovery of the wrecked schooner LUCERNE (U.S. #15914) marked the end of an exceptional ship and her entire crew. However, it only began the question of what happened to the LUCERNE. There were no survivors of the wreck to query; only the ship herself as an archeological site offers us these insights into her final moments, as well her history and the everyday lives of the men aboard her.

The historical record for the LUCERNE provides many details of her construction and usage. She was constructed by the ship building company of Parsons & Humble of Tonawanda, New York, for N. O. Winslow, reportedly at a cost of $55,000 (Bureau of Navigation 1873a; Milwaukee Sentinel 4/26/1873; Runge Collection n.d.) She is probably named after the canton and lake by that name in Switzerland, to give a romantic name to a graceful ship.

A painting of the LUCERNE, highlighting her sleek lines and great spread of sail, is in the collections of the Manitowoc Maritime Museum (Figure 4.1). She is depicted carrying a foretopmast raffee, a huge square foresail, gaff-rigged foresail, mainsail, and mizzen, gaff topsails, a club-footed fore staysail, a mainstaysail, as well as an inner jib, outer jib, and flying jib. She is also shown having an after deckcabin, raised forecastle deck, four hatches into the main hold, a white upper hull, and dark lower hull. Tiny crewmen are shown sitting around a capstan between number 1 and number 2 hatches; another small deck capstan is depicted between hatch numbers 3 and 4 (Runge Collection n.d.). The diminutive size of these out-of-proportion figures (about three feet in height!) exaggerates the great size of the LUCERNE; nonetheless, she was an impressive sailing vessel for her day.

She was indeed a large schooner, 194.9 feet in length, 33.7 feet in beam, 13.85 feet in depth of hold, and 727.9 gross tons. LUCERNE carried three masts (with a respectable amount of

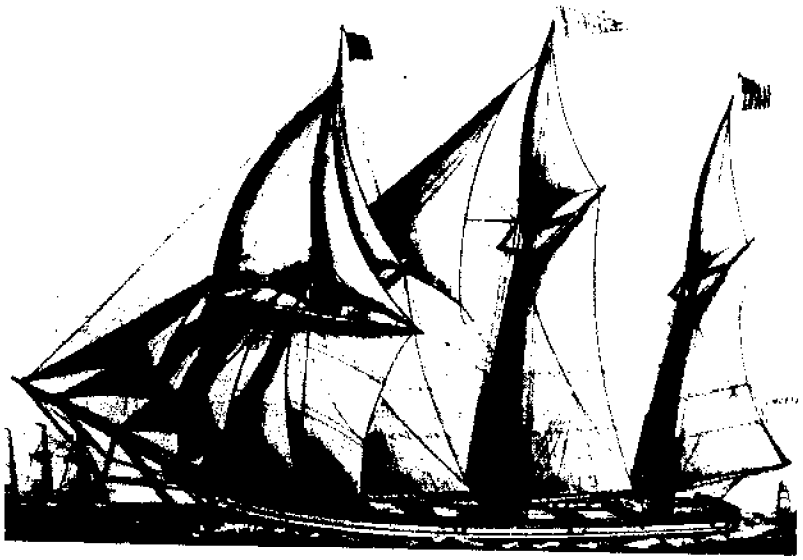


Figure 4.1 *Painting of schooner LUCERNE. Milwaukee Public Library.*

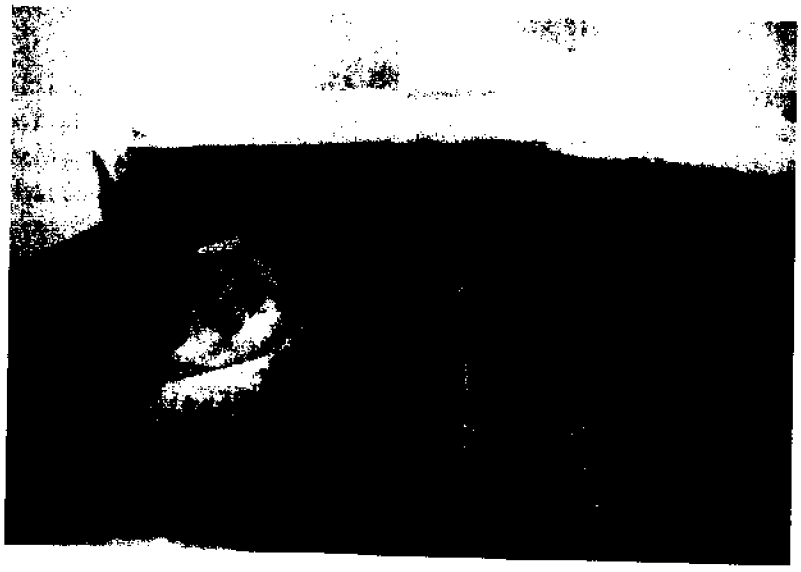


Figure 4.2 *LUCERNE forecastle deck: hawsepipes and port chain stopper in foreground; stempost and knightheads visible rear photo. SHSW photo.*

sail), had a sharp, elegant clipper bow with a scroll head, and a square stern (Bureau of Navigation 1873a).

She was launched on April 23, 1873, and went into service chiefly as a grain hauler, although she did haul other cargos later in her career such as coal and iron ore (iron ore was aboard on her final voyage in 1886). She was constructed to hold 52,000 bushels of corn, and was first enrolled at Buffalo on April 30, 1873, with James Dwyer as master (Bureau of Navigation 1873a; Milwaukee Sentinel 4/26/1873; 11/20/1886).

She was soon after re-enrolled at Buffalo on May 28 with new ownership; Henry C. Winslow and William G. Winslow of Buffalo each assuming 3/16 interest, Mary A. Winslow of New York and Caroline Williams of Baltimore each owning 1/16, and N. O. Winslow of New York retaining ½ ownership. James Dwyer was retained as master (Bureau of Navigation 1873b).

In 1875, Inland Lloyds valued LUCERNE at $39,000, class A1 (Runge Collection n.d.). Throughout the 1870s, she appears to have been actively involved in the booming grain trade between Lake Michigan ports and Buffalo. In February 1877, it was reported that Capt. George McCleod, formerly of the schooner ALICE B. NORRIS, would assume command of the LUCERNE that upcoming season (Milwaukee Sentinel 2/6/1877; Runge Collection n.d.). That August she was reported to have had her mizzen boom broken outside of Chicago while en route to Buffalo with a load of corn; whether by collision or by weather is not known (Chicago Tribune 8/17/1877).

The Chicago Inter-Ocean of January 31, 1878, announced that Captain B. Hawkins would assume command of the LUCERNE that season, and indicated that her grain capacity was 47,000 bushels (somewhat less than announced at the time of her construction) (Chicago Daily Inter-Ocean 1/31/1878). In February, 1879, another change in ownership took place. N. O. Winslow sold almost half his interest in the vessel, assuming 17/48 ownership, H.J. Winslow of New York took 23/48 ownership, and B.T. Wolvin (?) of Pecatonica, Illinois, took 8/48 ownership. George B. Teller was listed as master. Inland Lloyds for 1879 valued LUCERNE at $25,000, class A1 (Bureau of Navigation 1879; Runge Collection n.d.).

In 1882 LUCERNE was valued at $28,000; her Inland Lloyds classification was downgraded to A2. Her 1879 enrollment was also modified to show net tonnage deductions made under the navigation act of August 5, 1882, providing her with a net tonnage of 691.55 (Bureau of Navigation 1879; Runge Collection n.d.).

An odd incident befell the LUCERNE's mate, Neal McCullum, in October, 1883, at Cleveland. While sculling across the river in a skiff near the Pittsburgh slip, McCullum's oar slipped from its socket, somehow causing the mate to lose his balance and fall into the river. He drowned before help reached him. McCullum was reportedly a well-known member of the Seaman's Union in Cleveland. LUCERNE sailed that night without him, laden with coal for Chicago (Cleveland Herald 10/28/1883).

As vessel owners were loath to send empty vessels about the lakes, return cargoes of Ohio coal were common upbound cargoes for Buffalo grain schooners. It can only be imagined what the commingling of coal dust and grain in a ship's hold did for the flavor of Buffalo flour.

New ownership again overtook LUCERNE in March, 1884, with the deaths of her two principal owners. William G. Winslow of Buffalo reassumed partial ownership (8/48), the estate of N. O. Winslow retained 17/48; H. J. Winslow's estate retained 23/48 ownership. Thomas W. Otter was master. LUCERNE was valued at $24,000 but was still classified as A2, though her deck was reportedly in poor condition (Bureau of Navigation 1884; Runge Collection n.d.).

Friction with labor unions also overtook LUCERNE at this time. The Milwaukee Sentinel of May 8, 1884 reported:

> Several vessels carrying non-union crews are in port, and their masters are on the alert fearing a raid by the union men. The schr. LUCERNE, lying at the Northwestern Fuel company's lower dock, was visited by several union men yesterday morning. Word was sent to police headquarters and Officer Foulkes was detailed to guard her until she was ready to leave port. He will eat and sleep on board until her cargo is discharged. Owing to the limited number of the Milwaukee police, Chief Ellsworth will recommend the Cleveland Vessel Owners Association to appoint special police to protect their vessels and crews while at this port (Milwaukee Sentinel 5/8/1884; Runge Collection n.d.).

The article suggests that Cleveland Vessel Owners Association ships were in the habit of carrying non-union crews, and that the LUCERNE was known for this practice. Probably due to her great size and the wealth of her owners (who may have felt themselves above petty union demands), LUCERNE was evidently targeted by union agitators upon her arrival in Milwaukee with Cleveland coal and a non-union crew. It also suggests that LUCERNE's drowned mate Neal McCullum, the well-known member of the Cleveland Seaman's Union, may not have been sorely missed by LUCERNE's master and owners.

Union violence was certainly not unknown at this time, in the seaman's unions or elsewhere. Great disparities in wealth and abysmal working conditions led some sailors into open combat with vessel owners and officers. Non-union longshoremen engaged in loading the schooner ST. LAWRENCE at Chicago attracted a flying squad of Seaman's Union ruffians who boarded the vessel armed with clubs. The longshoremen were driven ashore, but the vessel's mate "stood his ground, and made very effective use of a heavy spike," though he was eventually overpowered and severely beaten by the union men (Chicago Daily Inter-Ocean 7/2/1887). When the schooner F. L. DANFORTH shipped a non-union crew in 1881, four Chicago policemen were called in to quell the ensuing trouble (Chicago Daily Inter-Ocean 6/15/1881).

New ownership for LUCERNE came again in 1885; Helen M. Winslow and Richard Winslow, executors of H. J. Winslow's estate, assumed the latter's 23/48 interest, the N. O. Winslow estate retained 17/48 ownership, and B. H. Jones of Cleveland bought in with 8/48 ownership. George R. Teller was listed as master, as well as attorney for Helen and Richard Winslow. That year, a new deck and coamings were fitted, giving new life to the vessel. LUCERNE's value was raised to $26,000, class A2 (Bureau of Navigation 1885; Runge Collection n.d.).

In 1886, LUCERNE passed out of Winslow ownership and the grain trade. She was acquired by Cleveland owners, W. S. Mack assuming 4/36, Capt. James Corrigan 23/36 and Capt. John Corrigan 9/36. The Corrigan brothers were well-known lake skippers and Cleveland industrialists, with James being the more famous of the two. Captain James Corrigan began sailing the Lakes at the age of seventeen, and later worked in oil refining. He developed several of his own refining processes and plants, which he subsequently sold to Standard Oil. He conducted oil exploration in Austria-Hungary with his brother in the early 1880s, and at the time of the LUCERNE purchase was obtaining controlling interests in Lake Superior iron mines and smelting furnaces. At the zenith of his career, James Corrigan was the owner of some of the largest U.S. oil refineries outside of Standard Oil, owned some of the largest vessels on the Great Lakes, and was one of the largest independent iron manufacturers in the United States (Mansfield 1972 [1899]:II:365-366). As prosperous, enterprising industrialists who had worked their way up from the decks of Great Lakes schooners, Captains James and John Corrigan seem to epitomize the great capitalists of America's Gilded Age.

LUCERNE was officially transferred from the Buffalo customs district to Cleveland in March 1886 (Bureau of Navigation 1886). She proved to be a fleeting acquisition for the Cleveland industrialists. Before the end of her first season in the iron ore trade, the vessel and her entire crew had been lost to a Lake Superior northeaster.

At the time of her sinking, LUCERNE was considered to be one of the staunchest vessels on the lakes. For heavy-duty service on Lake Superior, her new owners had completely outfitted her with new sails and fittings, placing her under the command of Captain George Lloyd of Detroit (Marine Record 12/9/1886). On October 25, 1886, LUCERNE and the schooner NIAGARA, laden with coal, cleared Ashtabula for Washburn, Wisconsin, in tow of the steamer RALEIGH (all were Corrigan ships, and the latter vessel was captained by LUCERNE's part-owner W. S. Mack). After offloading her cargo at Washburn, LUCERNE was towed to Ashland by the RALEIGH on November 12 where she took on a load of 1,256 tons of iron ore consigned to Luttle, Ogleby & Co. of Cleveland. Her cargo was somewhat lighter than her usual summer load of 1,380 tons, probably in anticipation of Lake Superior's rough autumn weather (Ashland Weekly Press 11/20/1886; Marine Record 12/9/1886; Canal Park Marine Museum Library, n.d.; Mansfield 1972 [1899]:II:365-366). As Ashland's elevated ore dock had just been completed late that summer (the first shipment of 1,300 tons went out in the steamer CORMORANT on July 29, 1886), LUCERNE's cargo of Gogebic ore was one of the earliest handled by the ore dock of the Milwaukee, Lake Shore & Western Railroad (Ross 1960:143).

LUCERNE departed Ashland in fair weather on the evening of November 15, 1886, with the intention of joining her tow (the RALEIGH) at Sault Ste. Marie. Due to Capt. Lloyd's pride in the big schooner and confidence in his crew, he "preferred to sail her out of Ashland, and . . . he declared he would rather go out with her under canvas than under the tow of any steamer" (Marine Record 12/9/1886). Go out he did, unsuspectingly, into a vicious northeaster. The barometer, high and steady, showed no signs of the impending snowstorm which would sweep Lake Superior for the next two days. The trip to Cleveland was to be the last run of the season for LUCERNE, but it turned out to be her final voyage as well.

By the time the storm struck, LUCERNE was far from the shelter of Chequamegon Bay, heading northeast up the exposed Michigan coastline towards the Keweenaw Peninsula. Around 4:00 p.m. the following day, the LUCERNE was spotted by the steam barge FRED KELLEY, rolling and pitching in heavy seas off Ontonagon, with all sail set except for her fore gaff topsail. About dark, the mate of the KELLEY indicated that he saw the LUCERNE put about in the heavy snow squalls and gale force winds, evidently heading back towards the safety of Chequamegon Bay (Marine Record 12/9/1886). This was the last seen of the LUCERNE until her discovery on the morning of the nineteenth by the LaPointe lightkeeper, wrecked in seventeen feet of water off the beach of Long Island, with her spars protruding.

It can be surmised from her final location (approximately sixty miles west of where LUCERNE was last sighted) that Captain Lloyd ran before the storm seeking LaPointe light, hoping to navigate around Chequamegon Point into the safety of Chequamegon Bay. Perhaps unable to see the beacon, and unwilling to sail further without bearings in the island-scattered waters of the Apostles, Lloyd dropped anchor, hoping to ride the storm out. However, the vessel succumbed to the violent seas and sank on either November 17 or 18.

The wreck was also discovered the afternoon of the nineteenth by searchers on board the tugs S.B. BARKER and CYCLONE of Bayfield, sent by the LUCERNE's worried owners to locate the missing schooner (the lighthouse keeper may have misidentified the CYCLONE as the tug BROWNE in his account). The tugs' findings were otherwise in accordance with the La Pointe lightkeeper's report, adding that a portion of the LUCERNE's cabin was found drifting near the lighthouse and that the three frozen men found lashed in the rigging were covered with one to six inches of ice. The men were cut down from the rigging by Ed and Charlie Herbert; "[t]o do it required a great deal of skill and nerve, qualities the boys are not lacking in," reported the Bayfield County Press (Ashland Weekly Press 11/20/1886; Bayfield County Press 11/27/1886; Keller 1984:41).

The bodies were brought to Bayfield, and lain out at Bicksler's Bazar [sic], a furnishings store which also doubled as an undertaker's. The Ashland Weekly Press describes the sailors:

> One is heavily dressed, having on five overcoats beside heavy underwear. Feet were bare. Height 5 feet 10 inches; weight about 160 pounds. His age cannot be far from 45. Heavy sandy moustache, but no beard.

> One of the others wore a heavy sandy beard, was 5 feet 10 inches tall, and was about 40 years old. He was also heavily dressed, and had on rubber boots.
>
> The other was a young man, smooth face, 5 feet 9 inches tall, weight 135, and about 21 years old. He was scantily dressed, but wore high top boots.
>
> . . . none of the crew found are recognized, although it is known they all sailed from Cleveland, save the young man, who was from Ashtabula, Ohio . . . [it] is not deemed necessary to hold a Coroner's inquest, and unless some are found who claim the bodies they will be buried to-day (Saturday) (Ashland Weekly Press 11/20/1886).

The body of Robert Jeffreys, the mate, reportedly washed ashore soon afterwards. Managing owner Captain James Corrigan, upon learning of the tragedy, telegraphed that each man should be decently interred (Marine Record 12/9/1886). The bodies were taken to Ashland, "embalmed by Henry Scott, who has preserved a wonderfully natural and lifelike appearance," and buried (Ashland News 12/1/1886; Keller 1984:42). Jeffreys' body was later disinterred and returned to his father, Captain Robert J. Jeffreys. The father was a venerable old lake mariner; it was his son's first voyage on the LUCERNE (Ashland Daily Press 11/27/1886; Bayfield County Press 11/27/1886; Keller 1984:43-44).

Eventually, at least two of the other bodies from the rigging were exhumed and shipped home (Keller 1984:43-44). The Marquette Journal reported that a Mrs. Patrick Henry Madigan of Oakville, Ohio was seeking information on her lost husband, who had shipped on an unspecified vessel at Washburn on November 15, writing her that he expected to be home in a fortnight. As the LUCERNE was one of only two vessels at Washburn that day, and as the other (the steamer COLUMBIA) did not ship on any extra men, it was guessed that Madigan had shipped aboard LUCERNE. Lloyd may have been seeking extra crew in case of heavy weather. Apparently, LUCERNE's crew were mostly boys, and it was speculated that Patrick Madigan may have been the unidentified young man found in the rigging. A partially decomposed body found washed up on Long Island in July of 1887 was also believed to be from LUCERNE, leaving a probable total of four bodies unaccounted for (Bayfield County Press 2/19/1887, 7/30/1887; Holden 1985:56-57).

Contemporaries do not seem to have criticized Lloyd's judgment for not having turned back sooner, nor for spurning a tow from the RALEIGH in the first place. The disaster seems to have been accepted as the misfortune of a heroic crew facing a Lake Superior storm of incredible fury. The Marine Record summarizes:

> . . . the fact she was lying stern on, with her stem in seventeen feet of water, heading to the southeast, showed that she had not foundered because she had cast anchor close to land, and swung around in one of the most severe snow storms that ever descended upon the northwest lakes. She simply pounded to pieces there on the beach, and the terrific weather rendered the crew perfectly helpless.

> The continuous washing of the icy seas effectually prevented the men from getting ashore. The sailors who took to the rigging probably tried to escape the sea, but they only succeeded in running into the jaws of death in another shape than drowning. They were frozen to death. No man could have lived in the rigging on such an arctic night as the one which settled the fate of the Lucerne . . . the burial ceremonies may not have been very imposing, but so far as the richness of heart-felt sorrow of sea-faring comrades of the dead was concerned they were just as good as processions of equipages and cathedral mortuary services (Marine Record 12/9/1886).

The Ashland Weekly Press was moved to similar prose by the crew's last struggle and their silent, icy deaths:

> Of the sufferings of that crew there will never be a written account, but in the unwritten annals which go to make up the history of individuals, there will undoubtedly be found tales of heroism and bravery in the meeting of deaths in the terrible manner which came to them. In our homes the sound of the storm outside only made the comforts of the fireside more highly appreciated, but those men went down to death, meeting it in a double manner, even by drowning and freezing (Ashland Weekly Press 11/20/1886).

The following January, the wreck nearly claimed three more victims by freezing. Three inquisitive Bayfield men ventured out to the wreck walking on the ice, and each suffered severely frostbitten feet on the return trip, nearly not making it back. The same newspaper reported that the wreck had been purchased by Sol. Boutin, Sr. and warned that parties were forbidden from removing items from the wreck (Bayfield County Press 1/29/1887). The wreck was revisited in June, 1887, by a salvage crew under a Captain Brown. Brown's initial assessment of the hull gave him confidence that LUCERNE could be refloated and placed back into service (Bayfield County Press 6/18/1887). However, after a closer look Brown gave up, salvaging only a few items including her large anchor (reportedly weighing over two tons) which was found to have been dropped overboard along with eighty fathoms of chain (Holden 1985:56).

The anchor and chain, which Brown had left at the Bayfield docks, were later used in releasing the stranded steamer AUSTRALASIA at Madeline Island and evidently were taken away with that vessel after its release (Bayfield County Press 5/11/1889; Holden 1985:57). As James Corrigan owned the AUSTRALASIA as well, it seems the anchor and chain were coincidentally being returned to their rightful owner, though somewhat circuitously. With no hope of raising the vessel, LUCERNE's final enrollment was surrendered June 25, 1887, "vessel lost" (Bureau of Navigation 1886).

A second salvage effort was planned in 1892 by salvors from Port Huron, using the tug SYLPH and the services of the Holly brothers as divers (Holden 1985:57). The Long Island lightkeeper recorded on June 8, 1892, "A party came to find the Lucern [sic] with two

divers -- found her and gave her up (U.S. Light House Service 6/8/1892)." The most extensive salvage took place in the late 1970s by a group of sport divers under the direction of LaMonte Florentz, who conducted amateur archeological excavations in the bow and stern of the ship. A wealth of artifactual material was recorded, recovered, and placed in the U.S. Army Corps of Engineers Duluth Canal Park Marine Museum collection (Holden 1985:57; Wolff 1990:47). Much of this material has since been transferred to the collections of the Apostle Islands National Lakeshore (Appendix A), although legal title to both the Army Corps and Park Service collection remains with the State of Wisconsin. Other materials from the LUCERNE are on display in Superior, Wisconsin, inside the whaleback S.S. METEOR.

Site Description

Today, the hull of the LUCERNE is remarkably intact, with the bow and starboard midships preserved up to the deck level (Figure 4.3). The wreck lies in twenty-four feet of water, and substantial portions of the hull have settled into the sand bottom. The top of the LUCERNE's stem is located fifteen feet below the surface of the water; the top of the centerboard is 12 feet 5 in., the top of the sternpost is located at fifteen feet. A 3 ft. deep sand scour lies aft and to the port of the stern; a similar scour 2½ ft. deep is located to port and starboard of the bow. It is possible that this scour action, caused by wave action acting against the original hydrodynamics of the hull, is actually digging the LUCERNE into the bottom. At the very least, it seems to be deflecting sand overburden into the midships area where it has buried the cargo.

A portion of the forecastle deck is intact, including the ship's windlass and capstan, beneath which is located the chain locker. The stern is intact up to the top of the sternpost and transom, but the rudder and steering gear are missing. The absence of the stern is consistent with eyewitness reports of the stern and cabin having come ashore soon after the wreck (Ashland Weekly Press 11/20/1886; U.S. Light House Service 11/19/1886). The vessel's spars are gone: these were probably either salvaged soon after the wreck or were carried away by ice.

The midships area is chiefly occupied with iron ore, which has buried part of the port side frametops. The centerboard trunk and many of the hold stanchions survive in an upright position, and the centerboard itself can still be seen inside the trunk. The trunk was supported by beams and lodging knees to port and starboard (only the starboard supports are extant). Reportedly, the centerboard winch was one of the items salvaged by sport divers in the 1970s. The deck is gone (save for the small section of foredeck) and deck beams and fallen stanchions lie in the hold atop the ore. On the starboard side, a shelf and row of hanging knees mark the former upper deck level. Also in the hold and tangled about the wreck are a number of dead trees and stumps that have become snagged on the vessel. The sole feature on a stark sand bottom, the LUCERNE wreck appears to be a trap for driftwood and dead trees eroding and washing out from the shore of nearby Long Island.

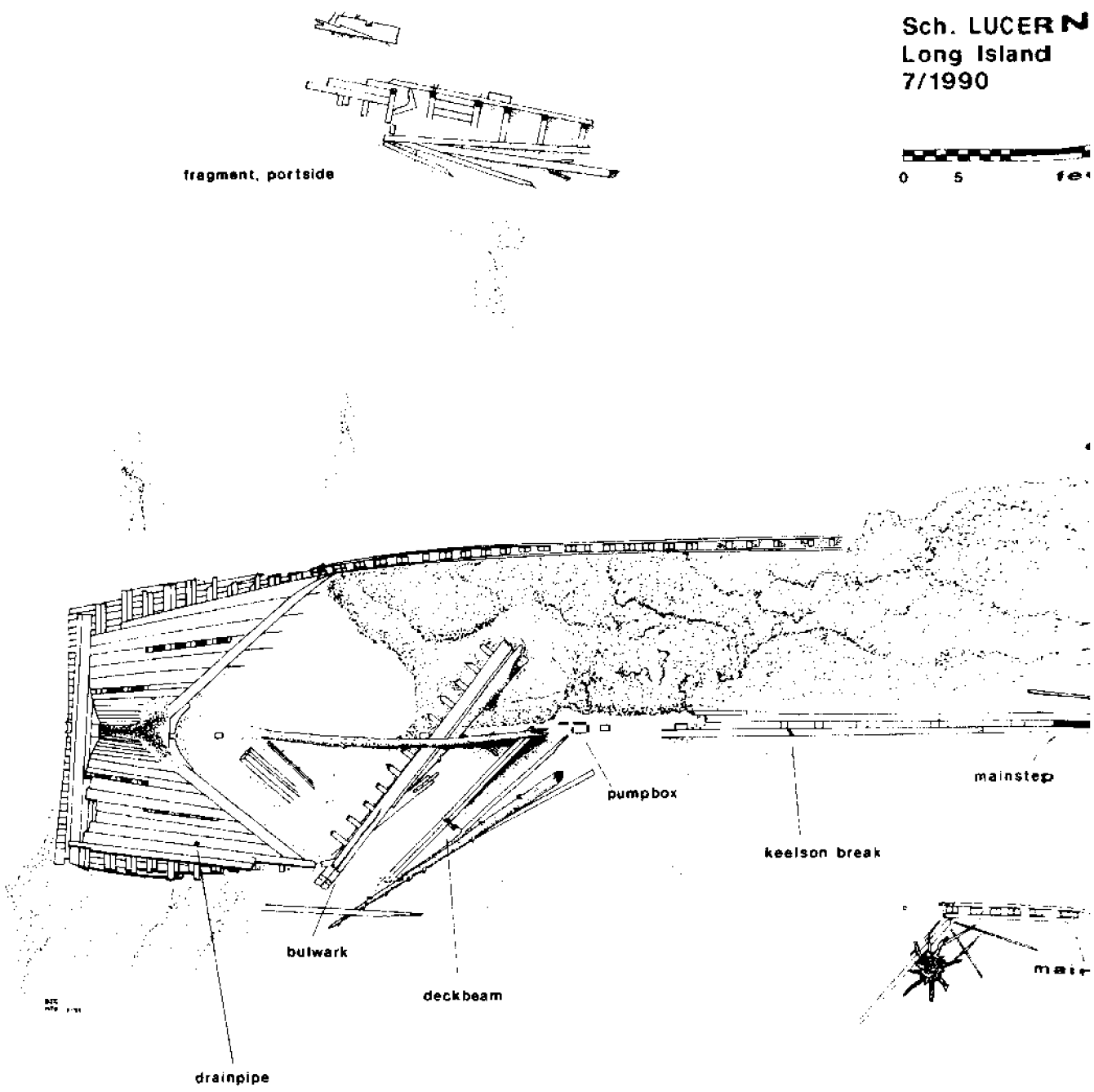
Site Investigations

Six and a half days were spent in surveying the LUCERNE site. An initial baseline was laid stretching from the tops of the stempost to the sternpost. The port and starboard frametops were tagged with consecutive numbers, and other features and structural members were marked with numbered tags to facilitate mapping and identification. The upper baseline was used for mapping the vessel at the upper deck level, including the forecastle, deck equipment, frametops, and stern. This line ran flush with the former upper deck level, over the windlass and atop the centerboard. A second baseline was placed inside the hull, from the inside of the stempost to the stern deadwood. This was used to map internal elements, such as fallen deck beams, hold stanchions, the after pump box, keelson, and cargo. The lower baseline ran flush with the top of the keelson, and was placed to the starboard of the centerboard trunk and keelson assembly.

Triangulation and offset measurements from the baselines were used to document the hull shape, and to place scattered structural members into the site plan. Deck equipment, including the ship's windlass, capstan, and anchor chain were documented using measured sketches and photography. Diagnostic elements such as fastenings, framing pattern, and scantlings were measured and recorded. An inclinometer was used at several places in the hull to document the distortions brought about by the wreck incident, including major breaks to the keel beneath the aft pumps and forward of the centerboard trunk, as well as fore and aft twisting of the hull. Accurate soundings were taken from the surface on a calm day to document the pitch and list of the wreck as it sits on the bottom, as well as to record its height above the bottom for eventual production of a profile view of the site. Measured sketches and schematics of hull architecture were supplemented with extensive video and still photography. Site documentation was deemed adequate to complete nomination of the site to the National Register of Historic Places.

Seventy-two exposed starboard frame tops and fifty-four exposed port frame tops were tagged and mapped, including cant frames, knightheads, and hawseheads. A large section of the port side frame tops are broken down and covered over with ore. A large break also exists in the starboard aft hull where frametops are obscured by overburden. Sample measurements of frame room and space indicate that LUCERNE had an average room of 11 to 12 inches and space of 9 to 11 inches. Her double frames were molded 6 to 8 inches at the sheerline. Sided dimensions at the sheer varied from 3½ to 6½ inches for the after frame in the set; 4 to 6 inches for the foremost frame. Some variation in frame dimensions may be due to partially eroded wood surfaces.

Sample measurements of LUCERNE's planking indicate her exterior planking measured 7½ inches in width by 3¾ inches in thickness. A heavier wale of 4 inches thickness was noted between starboard frames 13 to 28. This wale was mortised ½ in. on her inside surface to fit flush with the other planking over the exterior of the frames. LUCERNE's upper bilge ceiling widths ranged between 6 to 8¼ in. by 4 to 4½ inches in thickness, with large strakes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deckbeam
drainpipe

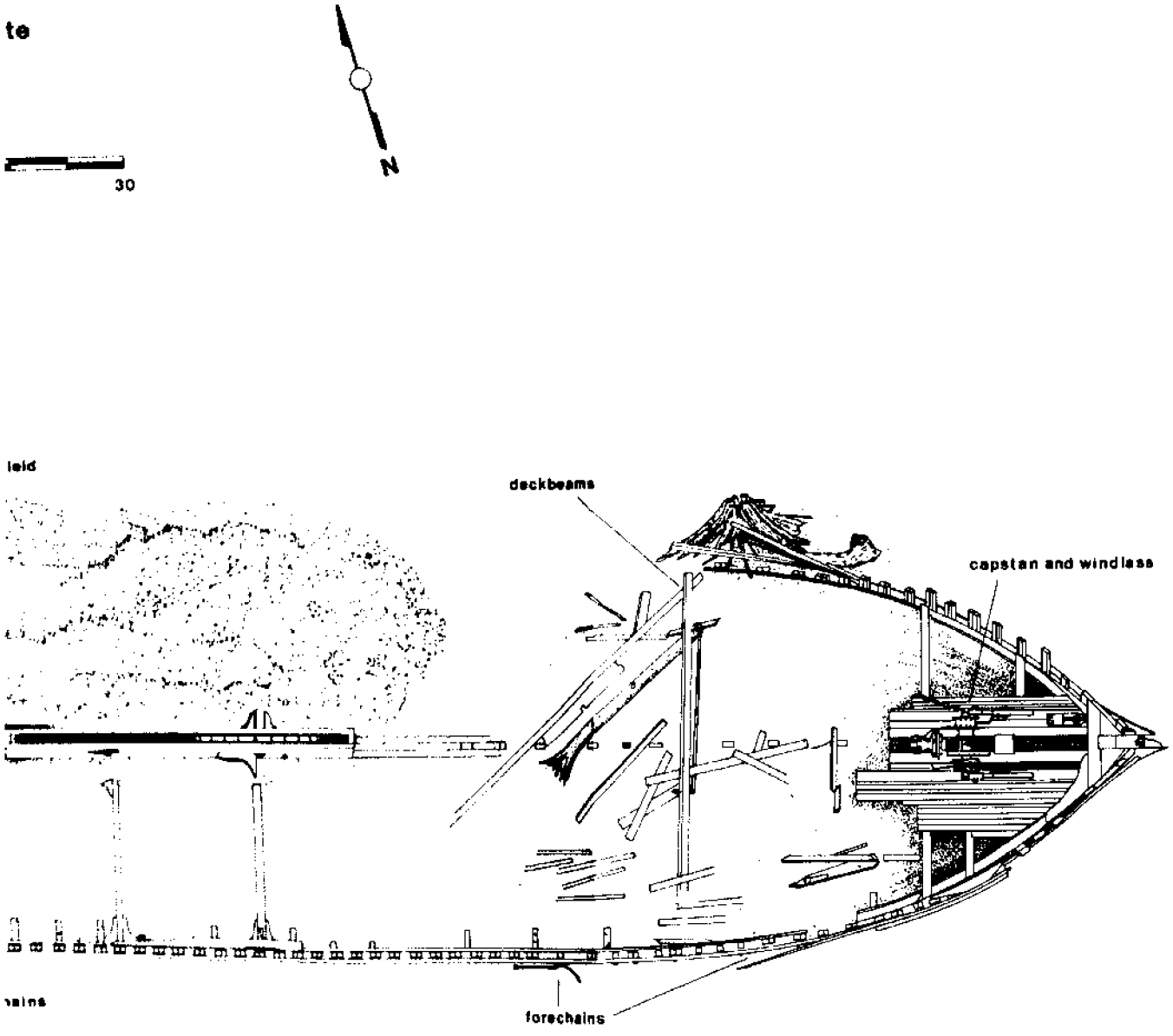


Figure 4.3

in the stern as much as 15 inches in width. The windlass foredeck beams were supported by a lower beamshelf measuring 5½ in. sided and 10½ in. molded dimensions fastened directly over the frames, and by a lower deckclamp measuring 11 inches in width by approximately 4 in. thick. Due to the presence of cargo and overburden, limberboard, lower bilge ceiling, and (obviously) garboard dimensions were not accessible.

LUCERNE was fastened with 7/16 in. square-shank spikes on her exterior planking; 13/16 in. drift pins with 1⅞ in. diameter clinch rings on her knees, and 1 in. drift pins with 1⅞ in. diameter clinch rings on her ceiling.

Fifteen hanging knees for the upper deck were extant on the starboard side, as well as the remains of lodging knees around the centerboard trunk hold beams. The hanging knees measured 28 to 30 inches horizontally, approximately 38 in. vertically, and 6½ to 7½ inches in thickness. Hold beam lodging knees measured 38 to 41 in. fore to aft and 27 to 29 in. athwartships. Small remnants of the shelf (15½ in. wide by 3 in. thick) and covering board (12 in. wide) were found along the frametops on the starboard side.

Eleven of the hold stanchions remain in an upright position; the stumps of five others are extant. These stanchions are set into steps atop the keelson, between the sister keelsons. A number of the stanchions have (or had) 2½ in. wide iron straps at the top to reinforce their juncture with the deck beams. These U-shaped straps were placed over the top of the deck beams and were through-fastened with iron fastenings over the top of the stanchions. The U-straps are sized to accommodate a deck beam measuring 10 to 12½ in. (sided) by 7 to 9 in. (molded). This was confirmed by sample measurements of fallen deckbeams. Two deckbeams retained a notched saddle timber which was fastened to the underside of the beam, and mortised to accept the hold stanchions.

An iron or steel horse (also called a traveler) 14 ft. 7 inches in length, and 3 inches in diameter was found still mounted upon a fallen deckbeam in the forward hold. As this beam may have been displaced by excavations in the 1970s, the horse's original provenience is unknown. It is possibly for the foresail sheet (though it lies too far forward in the hull for this), and is more likely for LUCERNE's club-footed fore staysail. Other hardware about the hull associated with the vessel's rigging include the remnants of the starboard forechains, mainchains, and headgear still affixed to the hull, as well as a lone mizzen chainplate protruding from the sand off the starboard quarter. A chainplate for the starboard bowsprit shroud is located fastened through starboard frame seven.

Notes from the Florentz investigations indicate that three of the forward lower deadeyes and chain from the starboard bowsprit shroud were still extant as of 1977 (Florentz 1977). These rigging items were evidently broken from their iron mountings and later removed by unknown parties. Wire rope (whether from standing rigging or the centerboard winch cable is not known) was observed in the forward hold area. Two wire rope types were noted: 1 in. diameter in the forward end of the hold, ¾ in. near the centerboard trunk. Both types were shroud (right-hand) laid.

A section of the bulwark and rail lying aft (facing outboard up) provides evidence of the configuration of LUCERNE's rail. Bulwark stanchions measure 4½ molded by 5 inches sided and are spaced 16 inches apart. As was typical in wooden ship construction of this period, the stanchions are simply staggered extensions of the upper futtocks passing through the covering board to provide the upright supports for the bulwark. The bulwark, approximately 37 inches in original height, is planked inside and out, and is topped with a 3½ in. thick railcap.

The bow was stoutly constructed, with a stempost molded 31 inches and sided 15 inches, backed by a 15 by 15 inch apron piece. The stempost is flanked by two 15 in. sided by 7½ in. molded knightheads. Behind the apron is mortised a 4 ft. 11 in. long by 13 in. wide transverse beam. Two lodging knees were placed behind this transverse beam. Only the starboard knee is extant; it measures 35 in. athwartships and 37 in. fore to aft. Two triangular filler pieces occupy the spaces between the apron and the athwartships beam. The use of the beam/knee combination here replaces the older-style single breasthook construction.

Architecturally, the built-up beam/knee configuration more or less mimics the support offered by a single breasthook, but using smaller segments of sawn timber. As the use of three separate timbers over a single timber can hardly be interpreted as an architectural improvement, this type of construction seems to reflect the increasing scarcity of large compass timber for ship construction in the post-Civil War East. A variation of this construction method, using two large lodging knees with their ends overlapping and scarphed, has also been noted in contemporary shipbuilding literature (Desmond 1984:104).

The LUCERNE's once-elegant scrollhead lies in tatters below her stem, victim of ice and wave action as well as (presumably) human agency. The cutwater is broken off raggedly, the trailboards and scroll are gone completely. Only the trailknees remain, with delicately rabbetted out edges. Nonetheless, viewing the LUCERNE's bow from directly forward provides a sense of her former elegance. The sharp, clipper lines of her hull are quite evident, complemented by the converging lines of the cutwater and trailknees, and flanked by her hawse eyes. Indeed, the clipper bow's hydrodynamics are evident in the symmetrical scours in the sand running under and away from her sharp clipper bow. The hawsepipes running into her forecastle are 24 inches in outer diameter and 11 inches in interior diameter. Traces of white hullpaint and dark green trimwork are evident in the bow and elsewhere on the hull's exterior. This paint scheme is consistent with the original drawing of the LUCERNE (Figure 4.1).

Aft of the bow lies the forecastle deck, set approximately three feet below the level of the main deck. A portion of the actual decking (including oakum caulking) remains over the forecastle deckbeams, which also supports the LUCERNE's windlass and capstan. The all-iron windlass is mounted on upright oaken carrick bitts braced forward by huge knees and is also braced by an iron pawl plate secured forward to the pawl bitt (or sampson post). The pawl bitt is a heavy 20 by 20 inch vertical timber which may also have been used to support the heel of the bowsprit. The pawl bitt is braced against the bow assembly with a 1⅛ in. fore

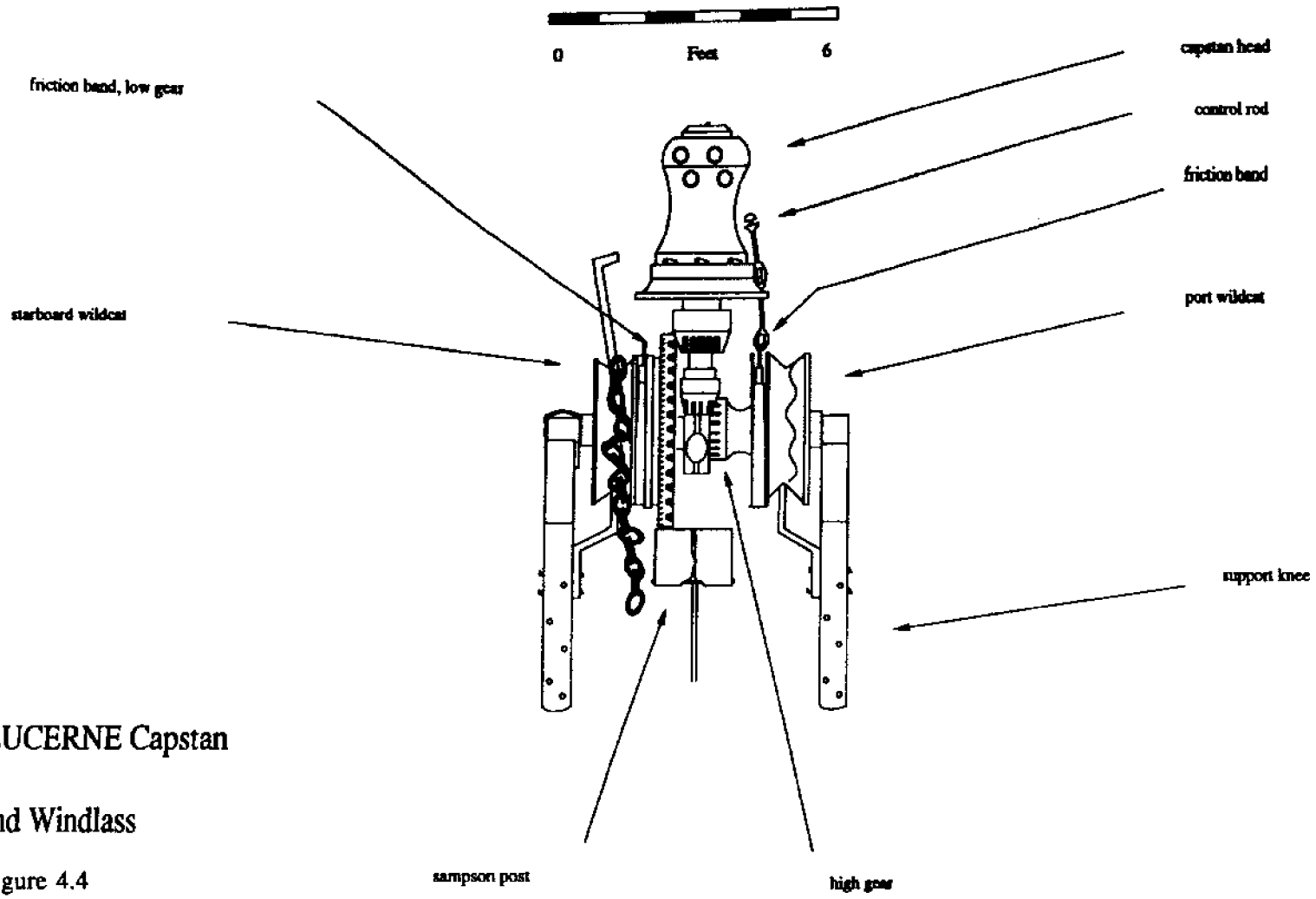
to aft- running iron tie rod, and is likely stepped down into a mortise in the bow deadwood. As confirmation of this construction would require excavation below the forecastle into the chain locker, this is hypothetical and is based on known construction practice (see Chapelle 1973:602). The LUCERNE's capstan is connected to the windlass via a pinion gear arrangement. It was formerly mounted above the windlass on the forecastle head: the demolition of this upper deck by ice action has pushed the capstan down onto the forecastle deck, where it lies aft of the windlass (Figures 4.4, 4.5).

The LUCERNE's windlass and capstan combination is almost identical to the Emerson and Walker patent-type, manufactured by the Emerson Ship's Windlass Company of Boston (MacGregor 1984:116). This windlass pattern was an advancement on the older "Armstrong" pump-brake lever design common in the pre-Civil War era. Due to marine fouling and corrosion, no manufacturers marks could be seen on LUCERNE's windlass, and it must be assumed that this is either a patented Emerson and Walker windlass, or a close copy. A similar design to the Emerson and Walker, called the "Union Power Windlass," was produced by the Coffin and Woodward Company of Boston and is illustrated in Dorr (1876:59, Appendix).

The 1840s and 1850s saw considerable improvement in anchor-handling gear, with a number of patents issued to different manufacturers. These improvements had the ultimate goal of more efficient use of either manpower or steampower for doing heavy shipboard labor (such as heaving in the anchors). The most important handling gear patents at this time came from the Brown and Harfield firm (Great Britain) and Emerson and Walker firm (United States) (MacGregor 1988:146).

Bigger ships in the nineteenth century meant bigger crews and heavier anchors, and the capstan made more efficient use of many hands. It was no coincidence that much of the heavy work in naval vessels (which carried large crews) was done with a capstan. Many men could be placed on the capstan bars and marched in a circle, limited chiefly by the size of the foredeck and the length of the capstan bars. An Armstrong pump-brake lever design, conversely, could only make efficient use of the labors of two to six men, depending on the size of the brake handles or "heavers."

Although the Armstrong-type was a definite mechanical improvement over eighteenth-century designs using handspikes, heaving in chain was still slow and labor-intensive: it took about four hours to haul in forty fathoms of chain, one link per minute (MacGregor 1988:146). Brown and Harfield's 1847 patent was a "modernized version of the old naval practice in which the motivepower was supplied by a capstan" (MacGregor 1988:147), using an upper capstan for the men to work at, and a lower capstan for heaving up the anchor chain. Presumably, walking around a capstan was somewhat less fatiguing over long periods than the vigorous upper-body work involved with the Armstrong design. Indeed, it is thought that because no patent for this windlass design can genuinely be attributed to an actual individual named Armstrong, the name was probably a wry joke on the physical demands the windlass



LUCERNE Capstan

and Windlass

Figure 4.4

placed on the crews' arms (MacGregor 1988:146), much like the modern joke about Armstrong power steering in old cars.

The Emerson and Walker design was much more complex than either of its predecessors: it transferred the upper capstan action (vertical rotation) to a lower windlass action (horizontal rotation) through the use of bevelled pinion gears. The design operated in this manner: the capstan was located on the top of the forecastle, with the windlass mounted below on the forecastle deck. The capstan had an upper head and lower body geared to work independently, in opposite directions, connected to the windlass below by a rotating shaft. The shaft carried two bevel pinion gears. An upper pinion (working clockwise) was fitted against a large gear on the starboard side of the windlass barrel; this large gear turned slowly, providing power for heaving the anchor. Turning the capstan head in the opposite direction worked the lower bevel pinion against a smaller, faster gear on the port side of the windlass, providing speed when needed at the expense of heaving power. Pawls prevented the pinion gears from turning in the wrong direction; other pawls were used for the common function of preventing the windlass or capstan from reversing against the weight of the anchors (MacGregor 1984:116).

The anchor chain was brought up on notched windlass drums called wildcats; notches in the wildcats caught and held the individual anchor chain links (MacGregor 1984:116). LUCERNE used 5⅝ in. long by 1¼ in. open link anchor chain. The anchor chain passed in a half-revolution over the wildcats and was sent down chainpipes into the chainlocker below. As a security measure for heaving or riding at anchor, grooved wooden chain stoppers with iron guide eyes were placed aft of the hawsepipes in the bow, and a movable iron jaw held the chain from reversing back out the pipes unintentionally. LUCERNE's port chain stopper is extant; the starboard chain stopper was recovered by Florentz and comprises part of the collection at NPS headquarters (Appendix A; Figure 4.6). Though LUCERNE's anchors and eighty fathoms of her chain were salvaged in 1887 (Holden 1985:56), a small amount of chain still remains draped over the starboard wildcat, running down into the chain locker. Another length has been displaced from the port wildcat, and lies similarly draped over the foredeck down into the chainlocker. Weirdly, an iron bar approximately 4½ ft. long and 1¼ inches in diameter was found jammed under the chain into the starboard wildcat. As it is concreted into place, and is equally encrusted with marine fouling as the rest of the windlass, it must be assumed to have been lodged in the windlass before the wreck occurred (see **Wreck Analysis**).

The port and starboard windlass gears could be connected or disconnected to the windlass barrel by iron keys, allowing for release of the barrel from the gears for dropping anchor (or to work the capstan independently of the windlass for other tasks). For controlling the release of the windlass, friction rings banded the windlass barrel inboard of the wildcats. The friction rings were controlled via a lever-and-cam arrangement above on the forecastle head (where paying out anchor chain could be viewed and controlled) and were connected by a pair of iron control rods (one for each friction ring). The friction bands were braced by two

Figure 4.5 *LUCERNE capstan; starboard profile. SHSW photo.*

Figure 4.6 *Chain stopper; port elevation. SHSW photo.*

stationary iron rods running from the top of the bands and bolted through the deck under the windlass (MacGregor 1984:116). With the displacement of LUCERNE's capstan and upper deck, her friction ring control rods now lie loose alongside the fallen capstan. These rods employ turnbuckles, enabling the tension on the control rods to be adjusted.

The Emerson and Walker pattern appeared around 1860, and was used in the first all-steel fully-rigged ship in the world, the FORMBY, built at Liverpool in 1863 (MacGregor 1984:116). In the FORMBY, auxiliary steam power could also be used to run the windlass, as well as various other shipboard tasks such as pumping and cargo handling. Due to its confined location in LUCERNE's forecastle, and the absence of auxiliary warping heads (this is the chief difference between LUCERNE's windlass and that depicted in the Emerson and Walker catalogue; see MacGregor 1984:116), it is apparent that LUCERNE's windlass was meant to be used exclusively for heaving up her anchors.

Though LUCERNE was neither of steel, nor equipped with auxiliary steam, the presence of the Emerson and Walker-type windlass on LUCERNE is indicative of her builder's use of the most up-to-date large ship equipment in her design, placing her (at least to a certain degree) in the same advanced class as the FORMBY. It also indicated the owner's desire to maximize the labors of a larger than normal crew: LUCERNE's six capstan bar holes would allow at least six men to operate the capstan/windlass (she carried at least nine crew); another six could easily be accommodated on her forecastle head using longer (up to 8½ foot) capstan bars. For heaving in LUCERNE's main anchor (reportedly weighing two tons; Holden 1985:56) using only manual power and the mechanical advantage of the patent windlass, the more hands the better.

Aft of the bow, LUCERNE's midships is dominated by her centerboard trunk, 10 feet 1½ in. high (from the top of the keelsons), 31 ft. 8 in. long , and 1 ft. 10½ inches in width. The board inside the trunk is of the usual edge-joined construction, and is pivoted on a keyed iron kingbolt. The actual length of the centerboard was not accessible for measurement as the board is lodged down in the trunk at an approximately 30 degree angle. The trunk, built up of eleven edge-joined planks on each side, was supported transversely by 6½ by 6½ in. square hold beams running from a shelf on either side of the trunk to a shelf on both sides of the hull. These beams were supported at either end by lodging knees. Only the starboard beams are extant, and both have fallen from the shelf on the centerboard trunk (Figure 4.7).

The mainmast step is located directly aft of the trunk. The step is simply a 9 by 26 inch long gap in the rider keelson; the sides are formed by the rider sister keelsons. Though much of the keelson assembly is buried and inaccessible for measurement, the construction of the mainstep suggests that what are exposed are riders, and that the main keelson and sister keelsons lie below, obscured by cargo. The three riders (central and two sisters) measure approximately 9 in. sided by 10 in. molded. Excavation would be needed to ascertain the actual construction and dimensions of the lower main keelson and its sisters.

According to the roughly contemporary Rules for the Construction, Inspection, and Characterization of Sail and Steam Vessels (published three years after LUCERNE's construction), a sailing vessel of LUCERNE's size should have had a total keelson cross-sectional dimension of approximately 30 in. sided and 60 in. molded (Dorr 1876:35). Though she is sided approximately correctly, it is doubtful that LUCERNE even approached this in her molded keelson dimension. Her centerboard trunk height subtracted from her 1873 admeasured depth of hold suggests that her keelsons probably did not total more than 42 in. molded. It is also apparent that LUCERNE's mainstep was not constructed as per Dorr's 1876 rules which specified that "masts are not to step into the keelson, but into steps securely bolted thereon" (Dorr 1876:57). Evidently, as LUCERNE was certainly thought to be well-built for her time, Dorr's 1876 rules may have represented a major shift in philosophy regarding stronger internal reinforcement of sailing vessels. It is not known how strictly these rules may have been adhered to even after 1876, a subject which warrants future archeological and archival investigation. Neither is it known what an extra 18 inches of keelson thickness would have done to prevent LUCERNE from breaking her back on the bottom off Long Island.

To the port of the mainstep lies one of the metal shafts for the mainpumps, which measures 2⅝ inches in outer diameter and 9 ft. 3 inches in length. Aft of the mainstep (in the approximate location of the mizzenstep) are the remains of what appears to be the after pumpbox. Though badly eroded, it seems to have been a two-chamber design, with one chamber forward, one aft. The chambers are formed by wooden planks set vertically. Excavation would be required to confirm this feature as being the after pumps, and to learn more of its actual construction.

The stern of LUCERNE is largely buried up to the frametops on the starboard side, but is scoured deeply on the port side, exposing much of her after run. The exterior planking around the sternpost, deadwood, and transom is clearly visible. Internally, the stern is reinforced with two 15 in. wide timbers, acting partially as a giant breasthook, but also (quite likely) as a shelf for the after cabins. At their juncture near the inner sternpost, these timbers are reinforced with two lodging knees, 31 in. by 21 in. The extremely sharp inside of the stern is obscured by a very light, silty overburden which is easily disturbed, and which precludes closer inspection (or even decent photography) of this interesting stern reinforcement. A through-hull fitting consisting of a four-inch diameter copper drainpipe is located on the starboard side below the former stern cabin, and probably represents the drain for the ship's sink and/or "watercloset."

A portion of the upper portside, including hanging knees and waterway, is located approximately fifty feet off the port quarter of the wreck. A similar section of wreckage, including protruding hanging knees, was noted off the forward bow by Florentz's team in 1977 (Florentz 1977). However, probably due to a buildup of sand overburden, this section was not visible in 1990.

Figure 4.7 *Starboard hanging knees and hold beams. SHSW photo.*

Figure 4.8 *Break in after keelsons, looking aft. SHSW photo.*

The entire hold from the chainlocker to aft of the mizzen pumps is still full of LUCERNE's cargo of iron ore to the approximate level of the keelsons. It is not known if this was the full extent of LUCERNE's cargo, or if portions were salvaged. The ore is much more evident on the port side, where wave scour has cleared away lighter sediments leaving the rough clumps of ore exposed. Disturbance of the light sediments reveals the brilliant orange hue of the underlying ore, and produces similarly colored clouds in the water. Upon exiting the water, the unwary visitor is treated to a Midas-like frolic, as powdery but irrepressible smears of ore dust appear on anyone and anything which is subsequently touched. Having been shipped from Ashland, it is probable that LUCERNE's ore is from the nearby Penokee-Gogebic range. This ore is described as a "soft hydrated hematite" (Ries 1947:442-444).

Wreck Analysis

Careful documentation of the hull remains produced a clearer view of the LUCERNE's breakup at the hands of the gale. Measurements with an inclinometer indicated that there is a pronounced twist in the hull, with the stern heeled over at approximately eight degrees to starboard, and the bow at three degrees to port. The centerboard trunk is heeled over at five degrees to port; however, this may be the result of the board actually heeling over from the loss of the supporting hold beams. Interestingly, the centerboard is jammed down into the trunk at an approximate angle of thirty degrees.

Though it cannot be confirmed by direct observation, the downward position of the centerboard indicates that a portion of the board must be fixed into the bottom, impaling the LUCERNE into the sand. This is clear evidence that the LUCERNE reversed into her present position: centerboards were pivoted on their forward end, allowing the board to swing upward into the trunk if the vessel struck bottom while the vessel was moving forward. Also of great interest, the vessel keelsons are broken directly forward of the centerboard trunk and aft between the mainmast and the mizzenmast. The after break is dramatically clear, having forced the keelsons upward, breaking the LUCERNE's back (Figure 4.8). This was probably caused by the centerboard striking bottom, forcing upward on the trunk, and transferring this stress to the keel/keelson assembly. This hull distortion is confirmed by the fact that the centerboard trunk now protrudes 2½ ft. above the sheerline between the stern and the stempost.

Cumulative archeological and historical evidence allows us to partially reconstruct the LUCERNE's final hours. After being last sighted by the mate of the FRED KELLEY coming about on the evening of the sixteenth, LUCERNE ran before the gale seeking the safety of Chequamegon Bay (Marine Record 12/9/1886). She probably covered the approximately sixty miles back from Ontonagon is less time than the day it took her to beat east into the storm. Lloyd, perhaps unwilling to go further and risk running ashore, dropped anchor and determined to ride it out, probably around afternoon of the seventeenth. The centerboard was still down, possibly to stabilize the vessel while riding at anchor, possibly because the winch was frozen. Had Captain Lloyd known of his proximity to Long Island (it was doubtlessly

obscured by snow squalls and is low-lying and difficult to see in any case), it is not likely the centerboard would have been left down where it would be at risk of striking bottom.

The board did indeed strike bottom, holding the vessel in place, and stressing the trunk and keelson. Perhaps the anchors dragged or there was some critical delay in dropping them, causing the vessel to get closer to shore than Lloyd intended, and causing the board to strike. The windlass provides grim evidence of problems with LUCERNE's ground tackle. Doubtlessly, heavy seas were spurting through the open hawsepipes onto the windlass, perhaps causing it to freeze up. The iron bar shoved into the starboard wildcat may have been an effort to loosen the frozen windlass to allow the starboard anchor to be dropped. It is also possible that the ship's wild jerking on the anchor chain, with the vessel heavily loaded, could have caused the windlass pawls to give way, allowing the anchor chain to pay out uncontrollably. As the ship neared shore, a sailor may have made a last-ditch effort to stop the action of the windlass by jamming an iron bar into the works. Such an effort in the dark, heaving, water-drenched forecastle would have been a desperate act indeed.

Knowing where LUCERNE's anchors were when the wreck was found would have helped answer some questions. Unfortunately, the fact that LUCERNE's anchors were removed subsequent to the wreck prevents us from understanding exactly what went wrong. It is not known how long she rode at anchor before she struck bottom. Divers working with LaMonte Florentz reported that LUCERNE's stoves contained the charred remains of furniture and cabin partitions and that the underside of the windlass deck bore evidence of charring, possibly scorching from the cabin stove (Potvien, personal communication 4/24/1991). Though the latter evidence could have come from some previous accident in the forecastle, the unusual contents of the stoves suggests that the crew had rapidly used up their normal supply of stovewood or coal, and they were tearing apart the interior of the ship trying to keep warm. LUCERNE could have ridden at anchor through the night of the seventeenth and most of the eighteenth before she actually struck.

Regardless of circumstances, LUCERNE's first indication of her perilous proximity to shore may have been her centerboard striking bottom. As the waves pounded LUCERNE up and down, the stress on the centerboard trunk would have opened up seams, allowing the hold to flood. Working the pumps was probably hampered by heavy seas rolling down the decks, perhaps even freezing the pump mechanisms. In any case, the pumps were obviously unable to keep ahead of the incoming water. As the vessel rode lower, her hull may have even begun to strike bottom (18 to 24 feet depth currently), pounding, twisting, and causing her to open up and sink. At this point (possibly during the night of the eighteenth) the crew must have taken to the rigging. The frozen bodies in the rigging suggest that the sinking must have come quickly and caught the crew unprepared; one man was barefoot, one had no heavy coat (Ashland Weekly Press 11/20/1886). The two in the mizzen rigging were probably in the aftercabins when the wreck occurred; the body in the main may have been on the maindeck or in the forecastle (the foremast had evidently come down during the gale and the mainmast would have been the closest refuge for the men forward) (U.S. Light House Service 11/19/1886).

It is interesting that of the three bodies, two seemed to be senior crewmen (they were described as being in their forties, but the bulk of the crew were said to have been boys) (Bayfield County Press 2/19/1887). Perhaps the younger men were unfamiliar with the escape route offered by the rigging, or were unable to escape in time. However, Capt. George Lloyd followed the ancient requiem: he went down with his ship.

It is possible that a certain amount of blame may be placed on Capt. Lloyd for the wreck. The arrogant decision to forsake a tow to the Soo and to blaze out of port under sail reflects something of the old "clipper fever" of the Buffalo grain trade, where the right combination of fluctuating grain prices, fast vessels, and hard-driving masters meant high profits for vessel owners. LUCERNE, with her great spread of sail, was built for just such speed. However, the hard-driving, hell-for-leather attitude that was the hallmark of a successful grain clipper captain making the spring dash from Chicago to Buffalo could be deadly to a heavily laden oreboat in an autumn Lake Superior blow. It is important to note that this was the LUCERNE's first season operating on Lake Superior. Though we have little biographical data on Capt. Lloyd, he was said to be from Detroit, and it is quite possible he may have not been an experienced Lake Superior mariner. Thus, he may not have exercised proper caution regarding the lake's notorious autumn gales. Such an assertion, however, warrants more biographical research on Lloyd himself. Unfortunately, the Detroit city directory for 1886 does not list a vessel master named George Lloyd (only a clerk by this name is listed) and the directory acknowledges that it only includes one-third of the city's population (R.L. Polk & Co. 1886:11).

Material Culture

As mentioned previously, the 1977 investigations of the site by Florentz produced a great amount of artifactual material, as well as documentation of the hull. Unfortunately (and very sadly), LaMonte Florentz died in a car accident before the report of these investigations could be completed. An unsuccessful effort was made to borrow Florentz's original excavation notes from his widow to allow a better understanding of these investigations and so that the recovered cultural material could be better provenienced. Until the original notes might become available, the results of these investigations must be interpreted through the interim reports and artifact inventories Florentz supplied to the State Historical Society of Wisconsin and the Duluth Canal Park Marine Museum. Many of the LUCERNE artifacts have been placed into an exhibit at the Duluth Canal Park Marine Museum, which interpret both the excavation as well as the vessel itself. These exhibits include a reconstruction of the forecastle cabin using some of the original artifacts.

Interim sketches show that the major focus of Florentz's work were excavations in the forward cabin area beneath the forecastle deck and in the stern beneath the aftercabins. Artifacts in the bow were provenienced and mapped in situ in six-inch levels. A good amount of measured sketching was also done of the hull architecture, fittings, and the windlass. Plans appear to have been made to excavate the forward hold and the chain locker; however, it is not apparent how much of these areas may have actually been excavated.

Some of the interim sketches were used during the 1990 survey for comparative purposes and for supplementary data. It is evident from these sketches that a loose deck capstan was formerly located just forward of the centerboard trunk, and a smaller windlass (probably for the centerboard or halyards) lay aft and to the port of the centerboard trunk atop the ore cargo. These items are not part of the existing collection, and their disposition is unknown. Florentz's sketches also show the hull slightly more exposed than at present, and it is apparent that a certain amount of new overburden has accumulated since the 1970s.

The bow excavations for which sketches exist took place in the lower forecastle cabin, located aft of the chain locker bulkhead (beneath the windlass on the forecastle deck) to approximately the first hold stanchion, a distance of about nine feet. Though the original configuration is unknown, based on known designs this space could have accommodated double bunks (placed fore to aft against the side of the hull) for about four men, and double bunks down the center for another four men. The configuration of the forecastle deck itself (where the windlass stood) is unknown, though it may have contained sail lockers and items such as bosun's stores.

The port bunks contained a variety of personal items from one or more sailors, including an overcoat, three felt hats, two vests, trousers (fragmentary), suspenders, socks, shoes (six), rubber boots (one pair), a rubber slicker, a woolen cap, kaolinite pipes (whole and fragmentary), pocketknife, bottles, a liquor flask, remains of a horsehair mattress, an iron rattrap, a glass oil lamp chimney, a glass syringe, sewing needles, and many miscellaneous items. Ship's equipment from below the port bunks included five blocks, a number of hooks, thimbles, an iron belaying pin, iron splitting wedges, brass grommets, iron rings, and a tin can smelling mildly of paint (see Appendix A).

Inboard of the port bunks beneath the windlass, lay a potbelly stove, bowler hat, sock, coal, and intrusive portions of the ore cargo. Other unprovenienced materials from the Florentz excavation which doubtlessly originated from the bow area include the starboard anchor chain stopper and a devil's claw from the windlass (for handling anchor chain).

Artifacts listed as from the stern excavations include items more pertinent to the ship's officers, navigation, maintenance, and the galley. Personal items included brass binoculars, an inkwell, calipers, a Grand Army of the Republic Civil War medal with artillery insignia (crossed cannon), boots (rubber and leather), fragments of trousers, an ornate leather Bible cover with gilt lettering titled "SCHOONER LUCERNE," metal trunk lid, and a brass alarm clock, providing some glimpses of the men who officered the LUCERNE. Cabin items such as a gimballed brass oil lamp, sections of burlap-backed linoleum, potbelly stove, a ceramic spittoon, door hinges, porcelain doorknobs, window sash fittings, tongue and groove pine boards, lamp parts, a fragmented ceramic washbasin, and brass faucets provide a contrasting view of the better-appointed aftercabin furnishings afforded to the officers and steward. Tins, lids, flatware, a dinner bell, galley utensils, bottles, jars, a bucket of lard, many ironstone china dinnerware sherds and intact dinnerware bearing markings of various English manufacturers, a duck call, as well as other materials are evidence of shipboard food

preparation and subsistence. Many paint stores (cans and brushes, some with intact paint), a ship's white signal lantern, blocks, sheaves, barrel hoops, firehose, carpentry tools, thimbles, grommets, leather sailmaker's palm, and a sailmaker's needle horn, still containing wax and eight needles, provide rich evidence of shipboard work routines and ship's stores (Appendix A).

Clearly, the complete analysis and interpretation of material culture from the LUCERNE site would be a major study. Factors such as shipboard life, vessel maintenance, subsistence, hierarchy, shipboard spatial arrangement, activity areas, relative value and origins of manufactured goods (tools, fittings, dinnerware) used aboard, personal apparel, and the histories of the individual men might all be gleaned from elements of LUCERNE's material culture. Individual artifacts present some interesting interpretive challenges. Was the syringe from the sailor's bunk part of a medical kit? Or was one of the sailors a drug addict, victim of poor working conditions, abused patent medicines, or addictive doses of morphine in a Civil War field hospital? How many of the various bottles might also have contained liquor? May we someday begin to extrapolate the physical and even mental health of nineteenth-century Great Lakes sailors? Do rat traps, syringes, and liquor bottles in the forecastle cabin, and gilded Bibles and porcelain wash basins aft tell us anything about relative social and living conditions aboard a large Lakes schooner? Were there specific reasons that seaman's union agitators singled out LUCERNE when she arrived in Milwaukee two years earlier? Better artifact proveniences for all the materials will be required to make more detailed analysis of these data; however, it is evident that the collected artifacts are a valuable and unique artifact assemblage, offering many important insights into Great Lakes maritime anthropology.

Recommendations for Further Research

The 1990 survey work has only scratched the surface of the LUCERNE's research potential. The material cultural alone offers great potential for comparative, problem-oriented research. The hull retains a great amount of integrity, allowing a much more detailed analysis of architectural elements including hull lines, joinery, fastenings, and scantlings. Additional excavation could be undertaken in undisturbed areas, including the outside of the hull. The synthesis of the Florentz excavation data is a great priority, and should precede any additional field work. It is hoped that a future investigator may undertake a cooperative effort with Mrs. Florentz to synthesize and document LaMonte's important work.

Management Recommendations

The LUCERNE wreck is certainly of great significance, and should be nominated to the National Register of Historic Places. It easily meets Criteria A (association with broad patterns of history), C (embodies characteristics of type, period, or method of construction), and D (yields important information in history). The combined elements of its use as a significant participant in the Great Lakes grain, coal, and iron trades (Criteria A), hull integrity, exemplary large vessel architecture and engineering (including a near-intact

Emerson and Walker-type windlass) (C), and abundant material cultural data (D), would combine to make it a significant and valuable addition to the National Register.

Beyond simply designating and registering the LUCERNE, the site has more important needs. A collections analysis should include recommendations for conservation, interpretation, and display of the remaining materials now residing at the Apostle Islands National Lakeshore. Such an exhibit would be of great interest to Lakeshore visitors, divers and nondivers alike.

Though the Florentz investigations apparently did not expose any human remains, it is possible that the remains of the missing four or five crewmen may still be in the hull or around the site. The site should be treated as a potential burial site for the purposes of any future archeological investigations or disturbances, which should be coordinated with the State Historical Society of Wisconsin Burial Preservation Office in accordance with Wis. Stats. 157.70. Consideration should also be given to cataloging the LUCERNE as a protected burial site.

The site should receive periodical monitoring for any artifacts or human remains which may be exposed by shifting sands, and observed materials should be reported to the National Lakeshore and the State Archeologist. Where possible, artifacts should be documented in place and left, unless there exists a compelling reason (and adequate conservation and curation provisions) for their removal from the site. Although the wreck will probably be largely unimpacted by visitation, the site itself should also be periodically monitored for visitor impact including any illegal efforts at excavation. Longer-term deterioration may someday be a problem, however. It is probable, for example, that the foredeck will eventually collapse under the weight of the windlass. It is also possible that the port list of the centerboard trunk (perhaps exacerbated by boat anchoring) could reach a critically dangerous point for visitors. Though nothing appears imminent, these are all potential situations that would bear future monitoring by NPS staff, SHSW archeologists, and local dive charters.

The recent scourge of zebra mussels in the lower Great Lakes and their reported appearance in Lake Superior places the LUCERNE site at great potential risk. As the sole hard feature on a sandy bottom, and being in relatively shallow, sun-lit water, the LUCERNE is a prime target for zebra mussel habitat. The windlass and capstan may be particularly vulnerable, being located higher in the water column and nearer to warm surface water. Site monitoring should also provide for inspections for zebra mussels. Encrustation of the wreck by these intruders would destroy much of its archeological and recreational value, and could lead to the deterioration of the vessel fabric. The University of Wisconsin Sea Grant Institute Zebra Mussel Watch (414/465-2795) should be consulted for updated information on zebra mussel sightings on Lake Superior, as well as suggestions for mitigative or damage-control measures.

There was some question as to whether the LUCERNE was actually within National Lakeshore boundaries and whether it came under joint NPS management and dive permit regulations. That question was settled through a careful survey using a theodolite and an

infrared distance meter (with an accuracy of 1/100 of an inch). LUCERNE is indeed just within the one-quarter mile boundary of the Apostle Islands National Lakeshore. Efforts are currently underway by NPS to produce a dive site brochure for the Apostle Islands National Lakeshore; a more detailed LUCERNE site guide could be produced including a site plan and synthesized history and archeological description. Also to be considered, an on-site NPS mooring buoy would facilitate diver access and prevent anchor damage to the wreck. Increased visitation resulting from a mooring buoy would, however, necessitate more frequent site monitoring for visitor impacts and exposed artifacts, as well as periodic inspection and seasonal maintenance, installation, and removal of mooring tackle.

5.0 Steamer R. G. STEWART Site Survey, Michigan Island

Vessel History

One of the small multi-purpose wood screw steamers of her day, the R. G. STEWART (U.S. #110341), served the west end of Lake Superior as a proven packet vessel carrying freight and passengers. She was constructed by George H. Notter of Buffalo, New York and finished in January of 1878. She had two decks, no masts, plain head, round stern, and one stack (Figure 5.1). STEWART was powered by a steeple compound engine with 14 and 24 inch cylinders and a 22 inch stroke producing 230 horsepower at 95 revolutions per minute. The engine was built in 1877 by the Pount Manufacturing Company of Lockport, New York. The 6.6 foot x 14 foot firebox boiler was built by the R. Riter Works of Buffalo, New York. This boiler generated 90 pounds of steam. STEWART's hull dimensions were: 100.0 feet in length, 23.0 feet in width, and 8.2 feet in depth of hold. Her total tonnage was listed as 149.26, excluding her engine room and pilot house, which were located above the tonnage deck. She was enrolled at Buffalo in January of 1878, with Margaret A. Auchinvale, John O. McDougal, and Henry Thornton co-owners, and McDougal as master (Bureau of Navigation 1878; Canal Park Marine Museum Library n.d.; Runge Collection n.d.; University of Detroit Marine Historical Collection n.d.).

The R. G. STEWART was originally constructed as a ferry and excursion boat to be used between Black Rock, New York, and Fort Erie, Ontario, on the Niagara River (Canal Park Marine Museum Library n.d.). In April of 1882 she was purchased by Capt. Ira F. Holt of Detroit, temporarily enrolled at Buffalo (presumably to get her papers for a trip uplake), and seven days later was re-enrolled at Detroit. Though Holt ran vessels from Detroit to Lake Huron ports (such as Bay City and Alpena) at this time, STEWART appears to have been running between Detroit and Duluth, at least intermittently. Later that year, she was readmeasured for net tonnage deductions under the act of August 12, 1882. Her gross tonnage was recorded as 149.26, net 121.66 (Bureau of Navigation 1882a, 1882b; Holt 1958:164).

The next year (1883) R. G. STEWART was rebuilt at the John Oades shipyard in Detroit, enclosing and greatly reinforcing the popular little rivership for Great Lakes passenger and freight service. From private correspondence with Capt. Holt, the Duluth Tribune learned of the revamping:

> From a ferry and excursion boat she has been transformed into one of the neatest and best arranged little passenger and freight propellers on the lakes. On what was formerly the hurricane deck a full cabin has been built, containing fourteen staterooms, a kitchen, ladies' toilet room, and linen closet. A large wash room and smoking room, clerk's office, engineer's room, and lamp room have been fitted up on the main deck. She has a new deck and outside guards, which increase the width of her deck to twenty-seven feet. Her hull has been covered with new and heavier iron. Ten-inch double frame timbers have been put in her

> bow back to her boiler, there being spaces of but two inches left between pairs. The side keelsons are 10x14 inches, whole length, and everything is bolted firmly through and through. The new Stewart is, in fact, as strong as iron and oak can make her. She has been fitted up especially for winter service, at an expense of seven or eight thousand dollars (Duluth Tribune 10/5/1883).

STEWART was re-enrolled at Detroit in October, and sent up to Duluth under Capt. McQueen to join Holt's sidewheeler DOVE in the winter north shore Lake Superior packet trade. This was later to become Holt's North Shore Line. The construction of the Duluth & Iron Range Railroad to Agate Bay and the Vermilion mines, sixty miles to the north, required vast quantities of men and material to be shipped up to the north shore (Canal Park Marine Museum Library n.d.; Duluth Tribune 10/26/1883; Holt 1958:164). Ironically, ships like the STEWART went into business helping to build the railroads which would eventually replace them.

STEWART's 1883 enrollment showed her new tonnage as 197.57 gross and 169.97 net tons; her enrolled dimensions did not change (Bureau of Navigation 1883) Unsubstantiated reports claimed that due to the increased weight above deck from the cabins, she rolled more than previously. This was roundly denied by her owner and officers, who countered that she was actually more seaworthy following the rebuild. STEWART was to run between Duluth and Prince Arthur's Landing (where workmen were building the Canadian Pacific Railway) until the end of November, at which time she was to replace DOVE on the Agate Bay (later called Twin Harbors) run and stay operating as late as the ice allowed (Duluth Tribune 10/26/1883).

In 1884 STEWART was given an Inland Lloyds rating of A2 and valued at $12,500. Until 1887 she continued her north shore service up to Port Arthur (previously Prince Arthur's Landing, later called Thunder Bay), making two trips weekly between 1884 and 1886 (Canal Park Marine Museum Library n.d.; Holt 1958:164). By 1888 she was upgraded to an Inland Lloyds A1½ rating. In 1889 she was repaired, rated A2 and valued at $18,000. From 1890 to 1894 she depreciated from $18,000 to $10,000 (Canal Park Marine Museum Library n.d.; Runge Collection n.d.).

In April of 1894 the R. G. STEWART was sold to Captain Cornelius O. Flynn of Duluth and in July of that year, Samuel C. McQuade came in as half owner. In October, 1895, McQuade became the sole owner of the STEWART (Bureau of Navigation 1894a, 1894b, 1895a). She was valued at $8,000 the following year, class A2 (Runge Collection n.d.). In 1896 the R. G. STEWART was chartered to carry Kirkhart & Ryan's Circus around Lake Michigan for the amusement of port townspeople (Canal Park Marine Museum Library n.d.). Amongst her other unusual trips was an alleged New Year's Eve excursion out of Duluth onto frigid Lake Superior, which led many Southerners to doubt the sanity of their Yankee brethren (Holt 1958:164). After S. C. McQuade's death around October of 1896, STEWART's enrollment came under the name of Abbie E. McQuade, administrator of the estate of S. C. McQuade (possibly a wife or daughter) (Bureau of Navigation 1896a).

In April of 1898 Gertrude O. Flynn became the sole owner of the R. G. STEWART, with Cornelius O. Flynn captaining the vessel. The STEWART began making runs along the south shore that April as far as Eagle Harbor, Michigan, reportedly in spite of heavy spring ice. In June, 1899, the vessel was transferred to Cornelius O. Flynn's sole ownership (Bureau of Navigation 1898; Canal Park Marine Museum Library n.d.).

Flynn was STEWART's final owner, and was himself in command the night of her last run. While en route on June 3, 1899, to Duluth from Ontonagon in darkness and heavy fog, the R. G. STEWART ran hard aground on Michigan Island. It is unclear whether she was just passing the island on the way to drop off a load of cattle at Bayfield, or if she was actually trying to make a night landing at the lighthouse dock (Duluth News Tribune 6/7/1899; Canal Park Marine Museum Library n.d.).

The next morning an attempt was made to get the craft off the bottom by using her engine and kedge anchor. This only allowed the vessel to be moved 150 feet. In an attempt to get up more steam, the blower was put in the stack, causing the stack to get, in Flynn's words, "pretty warm." Soon after, the fireman discovered the deck afire over the boiler and shouted a warning to the skipper. Flynn ordered the engineer to start the pony engine which ran the firepump. However, in two minutes the engine room was completely afire, and the black gang abandoned firefighting and fled for their lives. The fire quickly spread to the deck, whereupon the cattle were untied and allowed to make their escape through the open gangway. The three passengers and the eight crew ran for the yawl, which was sitting by the gangway after being launched for the kedging operations. Wheelsman George McKenna was last aboard, and excitedly jumped into the yawl from the deck. Unfortunately, he landed on the gunwale, upsetting the boat and spilling everyone into the water. Six crewmen (including Flynn and McKenna) along with the cattle started swimming for the nearby shore, leaving the three passengers and two crewmen clinging to the overturned yawl (Duluth News Tribune 6/7/1899).

Perhaps due to an injury from his unsuccessful jump into the yawl, McKenna was the only crewmember who did not make it, drowning close to the beach. Crewman William Murphy made efforts to resuscitate McKenna, but was unsuccessful. Wheelsman George Shortall assisted another exhausted crewman in making it to shore. However, the men clinging to the yawl could not reach the rope painter to cut themselves loose from the burning STEWART, and were forced to endure the scorching flames until the painter burned away and the yawl floated free. The crew and passengers watched from the shore of Michigan Island as the STEWART burned down to the waterline. The following day, the Michigan Island lighthouse keeper took the passengers, crew, and McKenna's body to Bayfield in the station boat, where they were placed aboard the steamer HUNTER for Duluth. The STEWART's three passengers were Sam O. Lee and his son of Fergus Falls, Minnesota, and Michael Close of St. Paul. It is possible that the cargo of cattle belonged to Sam Lee, who was a drover (Ashland Daily Press 6/6/1899; Ashland News 6/6/1899; Duluth News Tribune 6/7/1899).

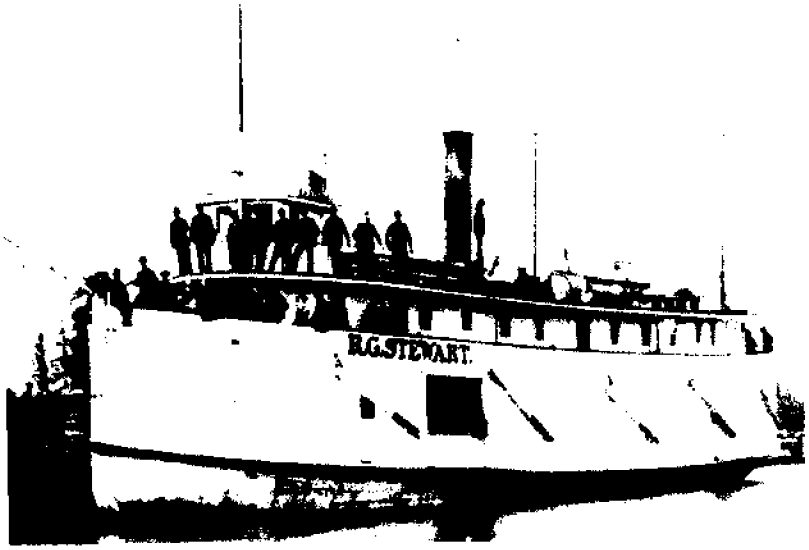


Figure 5.1 *Steamer R.G. STEWART at Grand Marais, Michigan. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

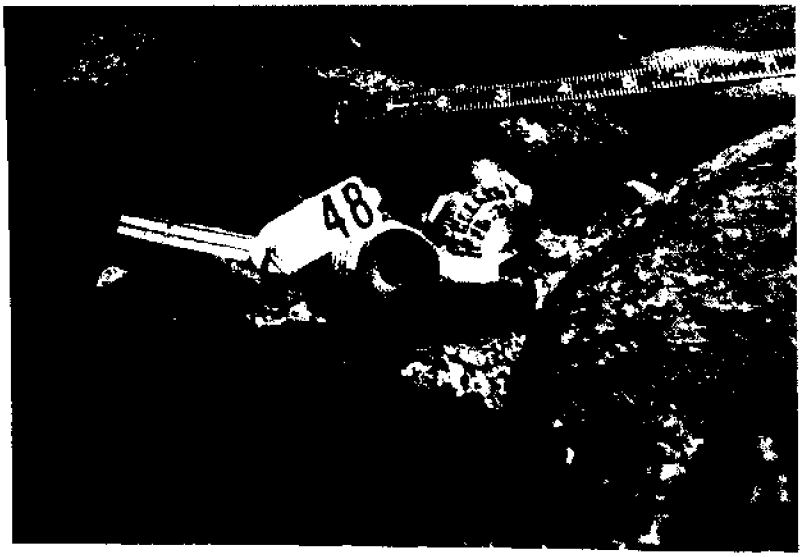


Figure 5.2 *Penberthy steam injector fragment, R.G. STEWART site. SHSW photo.*

Not surprisingly, the fire was believed to be caused by the boiler overheating. The ship proved to be a total loss. The R. G. STEWART was insured by the Duluth firm of Graves and Manley for $6,000. Flynn indicated that while he managed to snatch the compass and glasses from the pilot house, he lost $300 in silver left behind in his stateroom. Reflecting on his 1,000 foot swim in cold water, Flynn thought it was just as well the silver was in his other trouser pockets. STEWART's documents of enrollment promptly were surrendered at Duluth June 7, 1899, cause of surrender: vessel and documents lost (Bureau of Navigation 1898; Duluth News Tribune 6/7/1899).

Site Description

The site of the R. G. STEWART wreck was discovered accidentally on the southeast side of Michigan Island in 1983 by an NPS volunteer tending the Michigan Island lighthouse. In 1984, NPS staff and volunteers made a reconnaissance of the site, producing preliminary sketches of artifacts and debris located in the shallows. Almost no structure was visible, leading NPS staff to suspect that the vessel hull had been broken up and moved away from the site by ice (Snyder, personal communication 9/26/1989). At the time of the discovery, the NPS decided that the site's many artifacts would be too tempting for diving visitors, and have not been issuing park dive permits for the site, nor has the site location been publicized pending more complete archeological evaluation.

The STEWART site consists of a debris field approximately 130 feet long and 100 feet wide, oriented east to west. The main debris concentration approximates the original outline of the vessel's hull. As the historical records indicate the vessel was oriented with the bow pointed inshore at the time of her stranding and loss, the west end of the site is believed to represent the STEWART's bow. The bottom over which the wreckage is strewn consists of mixed cobble and large boulders as well as pockets of coarse sand. Due to the firm bottom, site visibility is exceptionally good, varying from between thirty and fifty feet. The precise site location and depth is confidential pending resolution of management issues between the National Park Service and the State of Wisconsin.

During the 1990 survey, archeologists relocated the site with the assistance of NPS staff, and undertook four and a half days of surveying and mapping. Comparisons with NPS field notes and maps from 1984 confirmed that this was the area inspected by NPS staff and volunteers, and that most of the artifacts visible in 1984 were extant and visible in 1990 (Submerged Cultural Resources File, Apostle Islands National Lakeshore; n.d.). If the site has been visited since its discovery, it has not been visibly impacted.

A fixed datum was established on shore near the site, which was used to map in underwater subdatums around the site, as well as land transponder locations for the Mini-Ranger III system and the adjacent shoreline area. A baseline marked in one-foot increments was laid over the main debris field to facilitate mapping, and the ends of the baseline were plotted in relation to the shore datum using a theodolite and electronic distance meter (EDM). A second baseline was later established on the south edge of the debris field parallel to the first

baseline to encompass a larger portion of the site. This was also tied into the shore datum with the theodolite/EDM unit.

Divers then undertook mapping the artifact scatter on site, using trilateration and offset measurements from the baseline. An inventory of visible artifacts was completed, and numbered tags were placed on diagnostic artifacts and construction features to facilitate identification by mappers and photographers. All diagnostic artifacts were documented with photography, video, and measured sketches, and the entire debris field was mapped to scale using the baseline references and trilateration. A total of fifty-four dives (fifty-four man hours) were made on the STEWART site. A second team spent an additional day conducting a marine magnetometer survey of the site vicinity to a distance of 500 meters from shore (just beyond the NPS quarter-mile boundary) in an attempt to locate structural remains or artifact scatters associated with the STEWART wrecksite.

The artifacts from the STEWART site may be classified in six basic categories: [1] engineering (those artifacts pertaining to operation and maintenance of the ship's propulsion, heating, and steering systems); [2] cargo (that material pertaining to vessel cargo and its handling); [3] fittings and rigging (artifacts related to the rigging, mooring, and operation of the vessel); [4] cabin and galleyware (artifacts related to the living and eating areas of the vessel which would comprise portions of the vessel's equipment); [5] structure and fastenings (portions of the actual hull and hull fastenings of the ship); and [6] personal effects (artifacts belonging to the captain, crew, and passengers of the vessel which were not part of the vessel's equipment and which would be taken off the ship when the individual completed his/her voyage or term of employment). All the diagnostic artifacts from the site are consistent with the date of the STEWART's loss, and some are even illustrated in contemporary hardware catalogues (John Pritzlaff Hardware Company [1884]; Montgomery Ward & Company 1913).

A tally of artifact distribution on site indicates that most of the artifacts probably originated from the vessel's upper works (cabins, pilot house, and superstructure) and were deposited around the site during the course of the fire (Figure 5.3). The intense heat from the fire is reflected in the present condition of some of the artifacts. Brass and lead were found melted into unrecognizable shapes, iron blocks were found with the lignum vitae sheaves burned away, iron artifacts had charred surfaces, and many were encrusted into clusters. Almost no wood was found on site, nor any other type of artifact made from a burnable material. Lower hull structure is not visible, leading investigators to the hypothesis that the bilge is either buried under colluvial deposits from the eroding bluffs along the Michigan Island shoreline, or the hull has been raked away by ice.

Both theories present some objections. To the former, how could the lower hull be buried, but artifacts be exposed? Would not postdepositional colluvial deposits cover all elements of the site equally? It is possible that some of the upper hull was still intact after the fire, and that artifactual material from these upper areas was deposited on the lakebed some time after the lower hull had filled in with cobble and sand.

KEY

1 - hand truck tongue and axle mount
2 - hand truck wheels and axle
3 - iron railing
4 - shackle
5 - poker
6 - brass pipe, 2 1/2" dia.
7 - brass pipe union
8 - Penberthy steam injector, brass
9 - cast iron seat leg
10 - square head pipe plug
11 - flat nose pliers
12 - dinner fork, rounded handle
13 - brass ornamental knob
14 - dinner fork, flat handle
15 - iron single hook block
16 - pry bar or scraper
17 - axehead, felling axe, Michigan-pattern
18 - flanged iron casting

St.s. R.G. STEWART Site
Michigan Island
7/1990

0 feet 25

N

18 - boiler overpressure valve counterweight
20 - hook and thimble
21 - iron double-block strapping
22 - chisel
23 - small hook
24 - square head plug
25 - brass nut
26 - patented iron lever linkage
27 - brass valve handwheel
28 - Ansonia Clock Co. clock movement backplate
29 - cast iron stoveleg
30 - turnbuckle and eyebolt assembly
31 - pipe wrench, upper jaw missing
32 - brass globe valve
33 - flattened copper pipe, 5" dia.
34 - iron cleat
35 - iron wrench
36 - large hook
37 - T-wrench

38 - melted lead conglomerate
39 - unidentified iron casting
40 - iron bar or tool handle
41 - iron wrench
42 - monkey wrench, wooden handle
43 - iron wrench
44 - iron framing or hatch coaming

b - boiler firebox brick
c - conduit, 1" OD
d - hatch dogs
f - misc. fastenings
g - boiler firebox grating
lk - door locks, vertical rim-type
p - piping, 2" and 1 5/8" OD
r - iron rubrail
s - iron cookstove lid

BJC 3-91

Figure 5.3

This hypothesis is partly confirmed by oral history interviews with Edna Lane Sauer, daughter of former Michigan Island lighthouse keeper Ed Lane. Mrs. Sauer remembers seeing the blackened hulk of the STEWART during her childhood (between the years approximately 1902 to 1911). At the time, the hull (or a portion of it) lay on the beach, and Mrs. Sauer indicated that it appeared to have been burned fairly flat, perhaps no more than one or two feet off the ground. She remembered that the old burned skeleton frightened her and her siblings, and that they had to scramble up the base of the bluff to avoid it while walking the beach (Sauer, personal communication 3/1/1991). Due to active erosion of the bluffs (which is visibly an ongoing process), it is probable that this former stretch of beach was submerged as the bluff eroded back, and is in fact the current offshore location of the site. Scouring of the site by wave action may have randomly exposed surface finds, leaving the rest of the flattened hull buried.

Magnetometry

The hypothesis that the lower hull and machinery was removed by ice seems to be largely disproven by the marine magnetometer survey which was conducted in the vicinity of the STEWART site. The magnetic background in the immediate vicinity of Michigan Island is extremely stable and is ideal for magnetometry. Ranging from a low of 58:990γ to a high of slightly over 59:010γ, the background scale seldom varied five gammas over the length of a single survey transect.

Methodology

Initial magnetometer passes were made over the main artifact concentration, revealing a multicomponent anomaly of 115 gammas total distortion with a 42 second maximum duration. As it was theorized that the artifact concentration was probably the original grounding site, a survey plan was designed to maximize the possibility of locating the hull should it have moved seaward of this point. Magnetometry survey transects were run in expanding arcs seaward of the artifact concentration, delineating a wedge-shaped survey area with the site shore datum and Mini-Ranger control transponder at its apex. The maximum width of the survey wedge at its furthest extent from the island was 500 meters. The survey area narrowed to 150 meters at its closest pass to the artifact concentration.

The survey began initially 350 meters offshore of the shore datum. Each survey arc of the initial sixteen transects moved progressively towards the artifact concentration in 10 meter increments. However, as the water grew shallower the arcs were increased to 20 meters apart. The second Mini-Ranger transponder, located at an oblique angle to the survey area, allowed researchers to triangulate the position of any anomalies. No anomalies were recorded during the inshore phase of the survey.

As many shallow-water wrecks on the lakes are known to have moved long distances via the action of ice and currents (see Cooper and Rodgers 1990:10, 48-49), it was decided to extend the magnetometer survey beyond the initial 350 meter mark. Transect arcs 17 through 23

were run at 20 meter increments starting at 380 meters extending out to 500 meters from the Michigan Island shore.

Magnetic Anomalies

Seven small anomalies were located in the final series of transects. These targets ranged from 3 to 5 gammas total distortion, six being monopolar in nature, one being dipolar. The magnetic anomalies were much too small to indicate the presence of the hull of the R. G. STEWART, especially as the water depth did not exceed twenty feet. However, several of the anomalies seemed to extend to adjacent survey transects and were, therefore, ground truthed. No cultural material was located during the ground truthing.

Anomaly-1 Transect 17 Arc 380 Meters

Distance from Transponder 1	395 Meters
Distance from Transponder 2	1075 Meters
Description	4γ monopolar
Duration	10 seconds
Water Depth	16 feet
Ground Truthed	7/24/90 no cultural material

Anomaly-2 Transect 18 Arc 400 Meters

Distance from Transponder 1	366 Meters
Distance from Transponder 2	1099 Meters
Description	4γ dipolar
Duration	18 seconds
Water Depth	N/A
Ground Truthed	no

Anomaly-3 Transect 19 Arc 420 Meters

Distance from Transponder 1	402 Meters
Distance from Transponder 2	913 Meters
Description	5γ monopolar
Duration	14 seconds
Water Depth	N/A
Ground Truthed	no

Anomaly-4 Transect 20 Arc 440 meters Distorted by Interference

Distance from Transponder 1	430 Meters
Distance from Transponder 2	937 Meters
Description	monopole interference distorted 20γ
Duration	18 seconds
Water Depth	18 feet
Ground Truthed	no

Anomaly-5 Transect 20 Arc 440 Meters Distorted by Interference

Distance from Transponder 1	435 Meters
Distance from Transponder 2	830 Meters
Description	monopole interference distorted 10γ
Duration	8 seconds
Water Depth	14 feet
Ground Truthed	7/24/90 No cultural material

Anomaly-6 Transect 21 Arc 460 Meters

Distance from Transponder 1	445 Meters
Distance from Transponder 2	920 Meters
Description	3γ monopolar
Duration	10 seconds
Water Depth	NA
Ground Truthed	no

Anomaly-7 Transect 22 Arc 480 Meters

Distance from Transponder 1	480 Meters
Distance from Transponder 2	755 Meters
Description	4γ monopolar
Duration	8 seconds
Water Depth	14 feet
Ground Truthed	7/24/90

Magnetometry Analysis

The magnetic signature of the R. G. STEWART site is somewhat larger than would be expected from the debris which is exposed on the bottom. It seems probable from this data that the bilge of the R. G. STEWART lies buried under the glacial till and bluff colluvium at the original site of her grounding.

It is also unlikely, based on the magnetometry, that any major pieces of the ship's propulsion system remains on site. During several passes over the site, no large magnetic spikes indicative of the presence of engines, boilers, or other large ferrous metal objects appeared.

Extensive visual and remote-sensing survey around the site failed to discover additional wreckage from the ship. The offshore anomalies discovered in the survey are extremely faint in nature and were, even prior to ground truthing, not judged to be likely candidates for cultural material. When these targets were located and buoyed, they formed a line roughly parallel to the eroding shoreline. This indicates that the offshore anomalies were probably natural, produced by a discrete geologic stratum eroded back from the island.

Wrecksite Artifact Distribution

The area identified by historical records as the bow (the west end of the site) produced artifacts which mostly related to vessel structure (miscellaneous fastenings), scattered iron conduit, and artifacts associated with cargo handling (the iron wheels, tongue, and axle mount of one or more hand trucks). Historical photos (Figure 5.1) indicate that this would also be the vicinity of the pilot house and a small foredeck area. One would expect to encounter artifacts related to the navigation, steering, and anchoring of the vessel in this area (such as anchors, steering gear, windlass, etc.). From historical reports, it is clear that the crew departed in quite a hurry and that the captain only managed to rescue a few items from the pilot house (Duluth News Tribune 6/7/1899). A single loose shackle lying forward many have been associated with the anchor chain. Nothing else identifiably related to the pilot house or foredeck of the vessel was encountered, suggesting that most of the pilot house and the STEWART's foredeck equipment was destroyed and/or salvaged. A few engineering artifacts including a poker (probably related to the ship's boiler -- it is much larger than a cabin-stove would require) and a piece of boiler firebox grating were also found in the bow area (these may have been displaced by ice or wave action).

The midships area was a much greater source of artifacts, containing all categories of material. While the site is fairly evenly spread with materials related to structure (fastenings and sections of iron rubrail) as well as quantities of conduit and steam piping, midships presents a great deal of engineering artifacts, cabins/galley material, and possible personal artifacts. This is not surprising: historical photos show the STEWART's steam engine and boiler were located amidships and the cabins were located on the upper deck directly aft of the pilot house. As the vessel was carrying a cargo of cattle (which all escaped) and apparently little else, there is little evidence of other cargo-related material beyond the hand truck remains in the bow area.

Engineering artifacts produced amidships include such tools as a flat-nose pliers, 5 in. overall length (artifact tag T37, Figure 5.6), what appears to be a small (8½ in. long) prybar (possibly for opening barrel lids) or scraper (of the type used for cleaning engine bearings), a cold chisel, and a felling axe head (7 in. long) of the Michigan-pattern. Michigan-pattern axes had a single bit with concave sides (Kauffman 1972:134, 143). As a felling axe was very general

purpose (it was widely used for dropping trees, cutting up wood into smaller sizes, and a variety of other tasks) it is difficult to know whether the axe was a tool for engineering (cutting firewood, emergency use aboard ship) or was a personal possession of a passenger (who may have been an itinerant logger or farmhand transporting his tools to new employment). A historical photograph of the STEWART (Figure 5.1) depicts a similar axe mounted outside of the cabin amidships (evidently for fire-fighting purposes), and it is possible that the axehead found amidships is the very one which appears in the photograph.

Two artifacts discovered in the midships area were part of the ship's boiler equipment. One, a fragment of a one-piece cast brass artifact, was stamped PENBERTHY INJECTOR (Figure 5.2). Research on this proved it to be a steam injector, which was a device used to feed water to the boiler. A steam engineering handbook describes it thus:

> The injector is perhaps the simplest pump; it is a device to lift and force water into a boiler which is operating under pressure. It operates on the principle of steam's expanding through a nozzle, imparting its velocity energy to a mass of water . . . the heat energy in the expanding steam not only provides sufficient energy to force the feedwater into the boiler but in addition heats the water, thus providing both a pump and a heater in one operation . . . the maximum water temperature that an injector is considered capable of handling is 130 to 150 degrees F. Increased lifts must be accompanied by a decrease in water temperature. When the water comes in contact with steam, the heat causes some of the impurities to drop out in the injector. This tends to scale up the nozzles, and the injector will fail to function properly.
>
> Injectors are very inefficient pumping units. They are practical only on small boilers, and they are not entirely reliable . . . since an injector cannot handle hot water and also is unreliable, this method of feeding boilers has been largely discontinued. Injectors operate satisfactorily where load and pressure are somewhat uniform (Woodruff and Lammers 1976:325-327).

Having no internal moving parts, the steam injector was a practical and low-maintenance solution suited to a particular nineteenth-century engineering problem. The Penberthy injector seems to have been an industry standard. A Metropolitan Automatic Injector for sale in 1913 advertised that "it takes the same pipe connections as the Penberthy, U.S., and other injectors of this type" (Montgomery Ward & Co. 1913:713). While apparently out of use in modern steam engineering due to inefficiency and limited applications, Penberthy injectors (in an automatic version) as well as injectors by other manufacturers could still be found for sale in the late 1950s (Wisconsin Supply Corporation 1956:46). It is not known when the Penberthy injector was first introduced or patented.

The other boiler artifact was associated with the boiler emergency overpressure or "bleed-off" valve. While the valve itself was not located, a 27 in. long metal lever with a 9 in.-square iron weight at one end was found in the midships debris field slightly to the south of the site

(Figure 5.3:19; Figure 5.4). Based on comparison to a period engineering plan of the steam tug JULIAN V. BRIAN (built in Buffalo in 1888) and conversations with marine historian C. Patrick Labadie, the artifact was identified as the lever and counterweight which controlled the action of the overpressure valve (Labadie 1988:appendix). Labadie indicated that the counterweight could be adjusted along the lever and fastened with a set screw, so as to adjust the overpressure valve action for different boiler pressures. Some contemporary accounts of the foolhardy and high-spirited steamboat races of the day (which sometimes ensued between competing tugs racing to tow a commercial vessel into port) indicate that occasionally, a particularly audacious engineer would sit atop this counterweight to eke greater pressure out of the boiler and more speed out of the vessel (Labadie, personal communication 2/7/1991). It is not known how many of these daredevil stunts may have ended in a tragic boiler explosion. However, interfering with the bleed-off valve was clearly an ad hoc means of obtaining greater boiler pressure than was deemed safe by the government steamboat inspectors. Other miscellaneous engineering artifacts in the midships section include steam pipe fittings such as a brass pipe union, square head pipe plugs, a brass valve handwheel, a brass globe valve, a flanged iron casting probably related to the steam engine, and a good deal of conduit. A cast iron lever and linkage marked "PAT.D" (the rest of the markings were obscured by corrosion and charring) was found in the midships debris near the wreck's centerline (Figure 5.3:26; Figure 5.5). It appears to have had a wooden handle (now burned away) and a catch for releasing some type of gear or ratchet. This was very likely associated with the engine, possibly part of the mechanism for shifting the vessel from forward to reverse. A few fragments of brick probably associated with the lining under the boiler firebox were also located amidships.

Though no record of salvage could be found (nor oral history confirmation from Mrs. Edna Lane Sauer, who was unaware of any salvage attempts on the STEWART) the fact that neither the engine or boiler could be found on site suggests that the STEWART's machinery was completely salvaged (save for small items like the steam injector, bleed-off valve counterweight, and steam piping). It is possible that this machinery was removed during Duluth salvor J.B. Wanless' grand sweep of the Apostle Islands and Minnesota's North Shore in 1917 in quest of salvageable scrap iron to be used for the World War I war effort (Holden 1985:96). While Wanless is only reported to have worked on the SEVONA, H. D. COFFINBERRY, EMERALD, and R. W. CURRIE, it is believed that he also salvaged the machinery of the FEDORA (Holden 1985:37), and it stands to reason that the R. G. STEWART could have been salvaged at this time as well. This would explain why Mrs. Sauer was unaware of any salvage effort, having departed Michigan Island around 1911. Other large artifacts such as the windlass and anchors may also have been salvaged by Wanless' wrecking crew.

Artifacts classified as galley and cabinware were mostly concentrated amidships (beneath the original cabins and what must have been the galley). These artifacts included a cast-iron ornamental bench leg, four door latch assemblies (of the vertical rim-lock type), two forks, an ornamental brass knob (as from a bedstead), fragments of ceramics, a cast-iron stove leg, and four cast-iron stove lids (of 6½ in., 8 in. (2) and 9½ in. diameters). This appears to be all

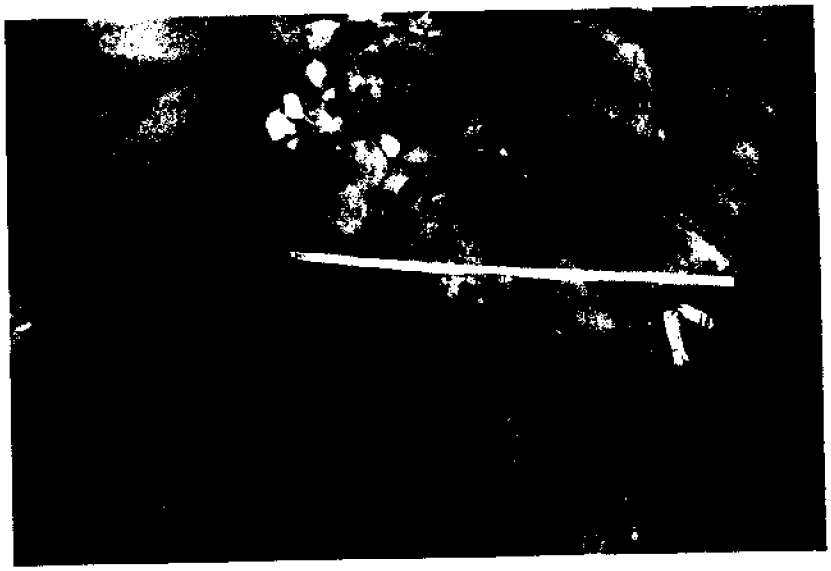


Figure 5.4 *Boiler over-pressure valve counterweight, R.G. STEWART site. SHSW photo.*

Figure 5.5 *Unidentified lever assembly, artifact 33, R.G. STEWART site. SHSW photo.*

that survives of the STEWART's "fourteen staterooms, a kitchen, ladies' toilet room, . . . linen closet . . . large wash room and smoking room, clerk's office, engineer's room, and lamp room" (Duluth Tribune 10/5/1883). Very similar door latch assemblies of the "upright rim knob lock" type, with decoratively cast brown-lacquered iron cases are found illustrated in John Pritzlaff Hardware Co. Catalogue No. 3 ([1884]:411).

The door latch assemblies and stovelids are rather widely dispersed (see Figure 5.3), suggesting that portions of the upper works fell some distance away to the portside of the hull. While the cabinworks doubtlessly burned away quite quickly, it is speculative what became of nonburnables such as the galley stove, cabin stoves (if they had them), wash basins, and the like. These may have been salvaged soon after the wreck by local parties, or may also have been picked up by Wanless' wrecking crew. They could as well be buried onsite.

One small but interesting artifact was found directly amidships which cannot conclusively be categorized as either cabinware or personal. The artifact is a 2¼ in. stamped square of thin brass, (appearing like a small, light belt buckle) with "ANSONIACLOCK Co" stamped onto one edge. This proved to be the movement backplate from a clock manufactured by the Ansonia Clock Company, of Ansonia, Connecticut. Based on the marking, the plate was probably manufactured by Ansonia's Brooklyn, New York, factory sometime between 1879 and the time of the STEWART's loss in 1899 (Palmer 1967:325).

Ansonia was a "prolific producer of many good American clocks, timepieces, and watches, some very unique" (Palmer 1967:325). Movement backplates appear in a variety of forms, some decorative, some quite plain (as is that from the STEWART site). The purpose of the plate was to form the mounting for the variety of springs and other clock components which made up the movement of the clock itself. As these plates were internal components and are not profusely illustrated in either the contemporary or modern literature on clocks, it is impossible (without exhaustive research) to identify the clock-type that this movement originated from. Ansonia manufactured a bewildering array of clock types, from simple wall and shelf clock designs to elaborate cast bronze ornamental clocks with reclining classical figures, gaudy cherubs, and other examples of Victorian extravagance (Bailey 1978). It is not known what different backplates were employed by these varied designs. However, a very similar type of rectangular movement backplate is illustrated on an octagon long drop wall clock, manufacturer unknown (Miller and Miller 1972:85), a clock manufactured by the Ingraham Company (Palmer 1967:240), and in the eight-day movement on a clock manufactured by the Waterbury Clock Company (Palmer 1967:223).

About all that can be easily said of the STEWART site Ansonia backplate is that it would not have come from a watch, as watch movement plates appear to have usually been round in shape and smaller. Also, were it part of the ship's clock, it would probably have made use of a "marine movement" (available after about 1850), which employed an oscillating balance wheel (like a watch) instead of a pendulum. This would have allowed the clock to function unhindered by wave action while at sea (Palmer 1950:5). The backplate provides no clue as

to the presence or absence of a marine movement, therefore the clock may either have been part of the cabin or pilothouse equipment, or it may have been a pendulum-type clock which was part of a passenger's personal possessions.

Rigging and fitting artifacts from the site were concentrated in the midships area, though a few were scattered forward and aft (Figure 5.3). Midships rigging artifacts include an iron single hook-block (with the sheave burned away), a hook and thimble (possibly part of the falls for the yawlboat), and the iron strapping from a double block (sheaves and block cheeks burned away, also possibly associated with the lifeboat falls). A small iron hanger hook (probably for suspending equipment, line, or piping on a bulkhead) was found port amidships. Two iron hatch dogs, one lying forward and one lying port amidships may have been used to secure deck hatches or doors to internal compartments. An iron fairleader bolted to a wood mount was located aft on the port side, and is of a size which would accommodate the ship's docklines. Also aft was a large iron or steel hanger hook (of the size which would accommodate firehose or a life-ring) bearing traces of red paint on its surface.

As noted previously, steam piping, conduit, and structural materials such as fastenings and iron rubrail are spread in almost uniform abundance over the site. These unburnables dropped out of the hull as it burned, and make up the most visible portion of the STEWART debris field. Fastenings include a variety of nails and screws (probably from the cabins), square spikes (of the type used for planking and decking) and numerous iron drift pins of 5/8 in. diameter, some with 1½ in. iron roves or clinch rings.

Pieces of iron rubrail (visible in historical photographs of the STEWART as two single strakes on her upper hull and one double strake on her lower hull) were found twisted and fallen around the site. The rubrail, a flattened semi-circle in cross-section, is 2 3/16 inches to 2¾ inches in width, and 13/16 inches in thickness. It was fastened to the hull with ¾ in. square-shank spikes. An iron plate, located approximately 100 feet south of the center of the site, may have been part of the (unsuccessful) fireproofing in the boiler area, or it may have been part of the "new and heavier iron" with which the hull was covered in 1883 as part of the STEWART's upgrade for freight and passenger service on wintry Lake Superior (Duluth Tribune 10/5/1883). The plate is 25 in. wide by 10 foot in length by 1/16 inches in thickness. It is pierced with ¼ in. round fastening holes with a spacing of 1½ in. to 2¼ inches. This plate must have been overlooked by the presumed salvage effort which removed the STEWART's machinery and the rest of the accessible iron hull sheathing.

Steam piping from the site was of two predominant types: one with an outer diameter of 1 5/8 in. and interior diameter of 1 5/16 in., and a second with an outer diameter of 2 inches. All the pipe was threaded, and appeared to be of cast iron. Iron conduit of 1 in. outer diameter appears in great quantity. While this resembles electrical conduit, it is improbable that this was used for shipboard electrical lighting. Historical records do not mention the STEWART having anything other than the usual oil lamps for illumination (a special lamproom was part of her 1883 refit) and no wiring could be found on the site or in the

conduit. The absence of junction boxes on the conduit also argues against this being for electrical purposes.

As the first public electrical power station in the world was begun in London in January of 1882 (Encyclopedia Britannica 1976:617), and the Canadian steamer ALGOMA of 1883 was the first lake vessel known to have been built with electric lighting (Murphy and Holden 1987:83, 85) it seems unlikely for the STEWART to have received onboard electrical power as early as her 1883 refit, much less at the time of her construction in 1878. Also, had she been fitted with electrical lighting at a later date, it would be enough of a novelty (especially for a small lakeboat) that it is hard to imagine it being overlooked in the vessel's historical records. It is far more likely that the conduit is from the ship's railing (visible in historical photographs of the vessel, and very similar in appearance to the conduit on site) and may also be partially related to some of the ship's washroom plumbing and/or heating, assuming the vessel used steam heat instead of cabin stoves.

The aft (east) end of the wrecksite contains a wealth of engineering materials, chiefly tools. It is probable that this was the area of the "engineer's room" mentioned in the description of the ship's layout (Duluth Tribune 10/5/1883). Artifacts located here (see Figure 5.6) include a pipe wrench with its upper jaw missing (T38, handle markings obscured by corrosion), a broken iron spanner wrench (T39), a type of T-wrench resembling a modern tire-iron (T21) with a 5/8 in. socket head and 1¼ in. spanner head, a 34 in. long wrench (T12) with a 1¾ in. hex spannerhead set at a right angle to the handle axis, an iron bar or tool handle, and a monkey wrench (T32) with a wooden handle. Also in the after area is a flattened copper pipe of 5 in. diameter (possibly part of the steampiping or firefighting equipment) and an iron window framing or hatch coaming. This may be one of the numerous cabin window frames visible in historic photos of the R. G. STEWART (Figure 5.1), though it is not apparent if these window frames were of iron or wood. Several unidentified artifacts were also located in the stern area including a melted lead conglomerate and an unidentified metal casting which resembles (somewhat incongruously) the frame and handle from a small currycomb or woolcard.

It is evident (and logical) from the array of engineering tools on board that the STEWART's engineer was required to perform a variety of frequent maintenance tasks on the ship's machinery, that the vessel was to a certain degree self-sufficient as far as general maintenance, and that certain components of the engineer's toolkit were custom-made (possibly hand forged by a local blacksmith) for the special requirements of individual machinery elements. Both wrenches T21 and T12 appear to be special-purpose tools designed to perform a single function, which required a long reach (as between steam piping, into the engine itself, or some other confined area) to do a job (probably a routine job) which could not be satisfactorily accomplished with smaller, adjustable handtools.

Thus it appears, at least on board this vessel, that certain engineering tools had to be supplied locally subject to specific needs of the engineer, while other tools such as the pipewrench, monkey wrench, and pliers were mass-produced, commonly used mechanic's tools. It is

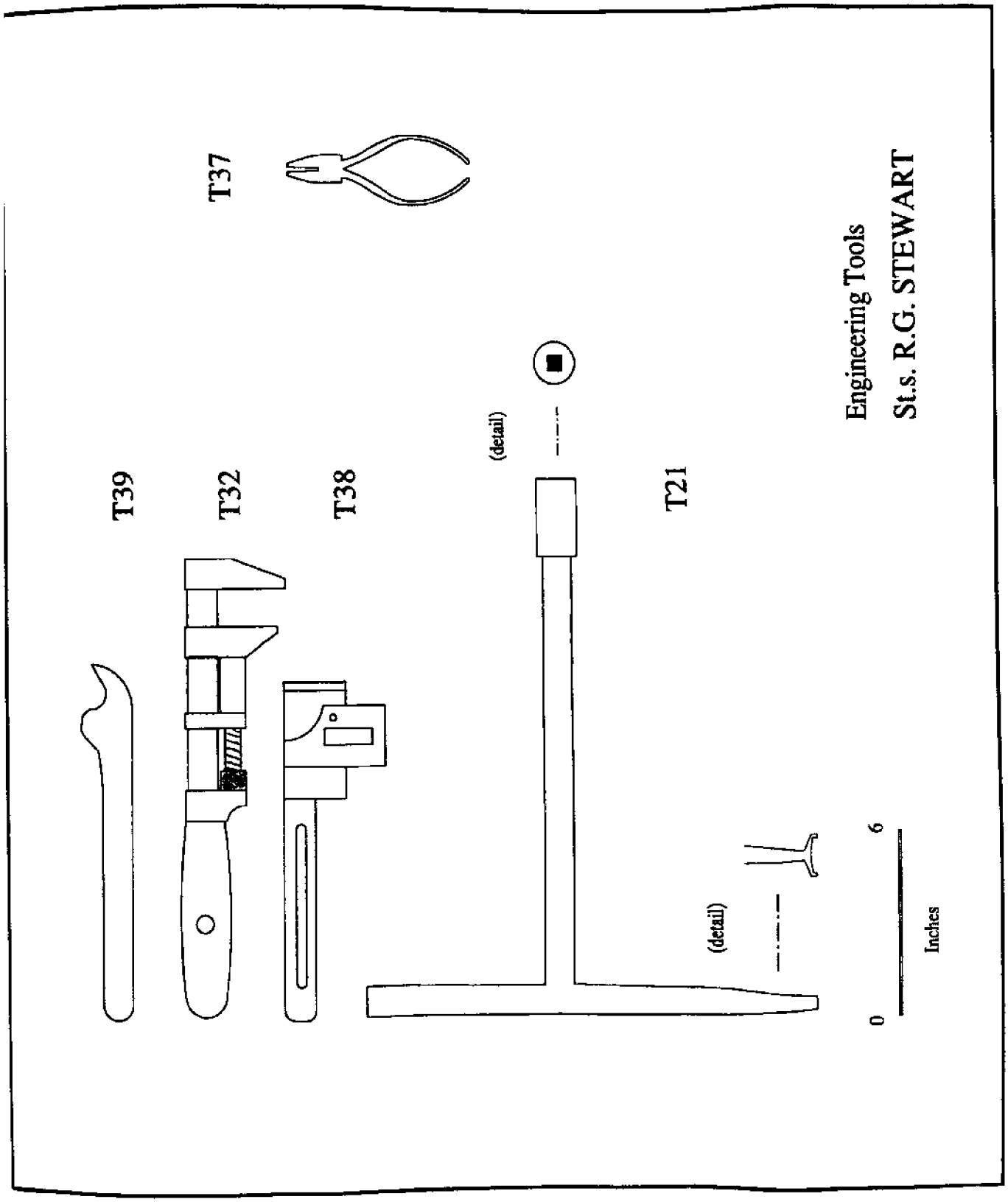


Figure 5.6 Engineering tools, R.G. STEWART

reasonable to assume that this was typical of many other ships' engineering needs, and that quite large steam vessels might even possess the ability to fabricate their own special-purpose tools (using portable forges, anvils, and other smithing equipment). While some fine studies of woodworking tools may be found (Salaman 1972), little appears to have been written on marine engineering tools, and what they may reflect of shipboard maintenance activities, personal innovation, and technological adaptation. However, like all tools, they are potentially revealing of many aspects of past human technology and behavior, and merit further study as more data become available.

Recommendations for Further Research

The R. G. STEWART site possesses both a rich assemblage of surficial artifactual material as well as the potential through additional excavation and analysis for new archeological insights into nineteenth century marine engineering, marine architecture, and shipboard life on the Great Lakes. The site appears to be relatively pristine in terms of modern human impacts (such as artifact collecting) and undisturbed subsurface deposits from below the vessel's waterline may contain unburned artifacts of wood, leather, cloth, paper, etc. For these reasons, the site should be considered potentially significant, and eligible for listing on the National Register of Historic Places under Criteria D (significant information in prehistory or history). The State Historical Society of Wisconsin Division of Historic Preservation will undertake nomination of the site to the Register upon acceptance of its upcoming multi-property nomination for Great Lakes submerged maritime resources.

Additional research at the site should include test excavations to confirm the presence of the lower hull and to assess its significance and contents. These excavations would be complicated by the removal of significant quantities of cobbles and rock overburden, much of which has been concreted into place in the presence of ferrous artifacts. Excavation units should be placed in the amidships areas with additional test units fore and aft, as required. Test excavations might also be undertaken on the beach to ascertain the original location of the hull. However, these excavations would not be a management necessity unless the NRHP nomination for the site were to be rejected, based on inconclusive evidence from surficial site remains.

Management Recommendations

The future management of the STEWART presents some difficult and potentially controversial decisions. Since the site's discovery, the NPS had not been issuing diving permits, nor has it advertised the site location. However, a number of sport diver challenges have been made to this management approach, both at Apostle Islands and elsewhere. Sport divers greatly resist management efforts to limit site access, despite the fact that such limitations have been made in the best interests of the site, and are never taken lightly by managers. However, sites such as the STEWART which are rich in loose, portable artifacts (including many brass items) may prove to be quite tempting to even well-intentioned visitors. The presence of many portable artifacts such as tools, brass valves, cutlery, and ship

fittings makes the STEWART site archeologically very sensitive to recreational use, and it is probable that even moderate visitation would cause many of these finds to disappear at the hands of thoughtless souvenir collectors.

The loss of the artifacts would remove most of the visible elements of the site, to the detriment of both its archeological value as well as possible recreational usage of the site in the future.
Such illegal collecting is not unknown within the National Lakeshore, and is rampant on most state-owned bottomlands. Lakeshore staff have reported a number of actual or suspected incidents (including use of metal detectors), despite park staff, dive shops, and dive charter operators routinely and clearly informing visitors about park regulations banning artifact collecting. Illegal collecting has taken place at the NOQUEBAY site, where park staff report the loss of certain small artifacts (such as jib hanks and other material) from the site subsequent to its opening for sport diving after its 1984 discovery (Johnson, personal communication 10/30/90).

However, the vast bulk of the visitors to the NOQUEBAY have shown themselves to be trustworthy, and park and charter efforts to inform and monitor visitors have largely been successful. Many other small artifacts have survived on the NOQUEBAY, and were relocated during 1990 state and NPS monitoring efforts. Nonetheless, while artifact poaching seems to be less of a problem within the park than elsewhere, it is still a threat to any visited site, especially as sensitive a site as the R. G. STEWART. It should also be noted that the NOQUEBAY lies in a fairly visible and much-used cove, where it may be better monitored by marine patrols or shore-based rangers.

The following options are suggested as scenarios for future site management for the R. G. STEWART, with respective advantages and disadvantages stated:

(1) Leave the site undisturbed. The site will be nominated to the NRHP, site location will be kept confidential, dive permits will not be issued for the site, and little or no further archeological work will be conducted. NPS staff will monitor the site for unauthorized visitation or illegal artifact removal. Zebra mussel monitoring should also be done.

Advantages: the site will be preserved for future study and recreation when the NPS and state have adequate resources for its management. Visitor ethics regarding artifact collecting will likely improve in the future as diver educational initiatives gain momentum, and future diver access to the site would probably present far fewer problems than at present.

As the site does not contain any visible vessel structure, it would not likely be a much sought-after destination for diving after initial curiosity has dissipated. Prior to making this decision, managers may wish to consider inviting key figures in the local dive community to the site to inspect it and conduct their own assessment. Local divers may agree that the wreck would not be of overwhelming interest to sport divers, and that without adequate protection, the site would eventually disappear. Reaching such a consensus amongst the

managers and users would help ensure that the site remains preserved, and is the lowest-cost option.

Disadvantages: diver pressure to visit the site will likely continue, and the access issue may damage the otherwise cordial and constructive relations between local diving interests and resource managers. With inadequate monitoring, it is possible that efforts will still be made by certain individuals to illegally visit the site and remove artifacts. This activity would go unobserved and unreported by responsible visitors.

(2) Attempt to mitigate visitor damage to the site. Prior to opening the site to visitation, certain portable artifacts should be removed from the site (assuming their provenience has already been documented), conserved, and returned for display at a NPS interpretive facility. This would protect the artifacts from theft, allow for their interpretation to non-diving visitors, and ensure their long-term preservation. Mitigation may be undertaken by the State Historical Society of Wisconsin (SHSW) and/or the NPS Submerged Cultural Resources Unit. Conservation should be arranged with either the SHSW or with the NPS Midwest Archeological Center. At a minimum, the engineering tools and clock component are the most "collectible" artifacts which would need to be removed from harm's way.

Following mitigation, the site may be opened to visitation under the existing park diving permit program. The site may be buoyed for easier access, may be advertised through NPS and commercial dive literature, and may be interpreted through a variety of means, including an on-site plaque, interpretive exhibits at Michigan Island lighthouse, and an NPS interpretive guide/brochure. Monitoring should consist of regular park marine patrols, and monthly or seasonal inspections of site condition (including presence of zebra mussels) by the APIS dive team and/or the SHSW. Other monitoring responsibilities could be delegated to area dive charters, such as reporting of mooring buoy maintenance problems, artifact theft, or user conflicts at the site. NPS staff, dive charters, and dive shops will need to work actively to prevent artifact theft from the site through a combination of visitor orientation, education, and regular site monitoring.

Advantages: opening the site to visitation would be a positive move in terms of NPS public relations, demonstrating that park managers are willing to compromise with sport divers on access issues, after first having mitigated potential damages from thoughtless collectors. This would underscore the fact that access limitations are never taken lightly by managers, and that good compromises may be struck which allow preservation and visitation to coexist. Additionally, opening of the site would allow its interesting history and archeology to be interpreted to the diving and nondiving public.

Disadvantages: even moderate visitation is certain to have some adverse impact on the site. Well-meaning visitors often pick up artifacts to inspect or photograph them, and the cumulative effect of such movement can displace artifacts from their archeological context and hastens deterioration of site integrity. Although many other artifacts are probably buried under cobble and are inaccessible to all but the most determined looter, many artifacts lie on

the surface and in the shifting sand pockets where they may be periodically exposed. The current inventory of artifacts from the site cannot be considered as complete; only an indication of what was visible on the sand at the time of the 1990 survey. Continued monitoring of the site would be needed to evaluate new finds, and if necessary, remove them from the site to a more secure public repository.

(3) Open the site to visitation immediately, leaving all artifacts in place. Access to the site would be via the existing park diving permit system, which provides visitors with a brief orientation to the park and park regulations on artifact collecting. This orientation, coupled with occasional site monitoring by the NPS and local diving interests would act as a deterrent to illegal collecting of the site. This is essentially the management option pursued with the NOQUEBAY site.

Advantages: making the site immediately accessible would ease pressure from diving groups who wish to visit the site and prevent site access from becoming a political issue amongst diver-visitors. This would also help managers focus on more positive aspects of visitor education and interpretation and avoid a potential public relations backlash. Leaving artifacts in place would provide visitors with a view of the shipwreck as it was discovered, and would also be less expensive than recovery and conservation efforts. Similar site marking and interpretive efforts may be undertaken as with above Scenario 2.

Disadvantages: as seen with the NOQUEBAY, not all visitors are respectful of park regulations or other divers' rights to visit an unpilfered site. Diver access will doubtlessly cause some, if not many artifacts to disappear, through random and illegal collecting. In time, this will significantly reduce both archeological and recreational values at the site. Artifacts removed through this type of collecting will be lost forever to the public.

Ultimately, the decision regarding the future management of the R. G. STEWART site will have to be a consensus amongst users and managers for it to be effective. Such a decision will have to balance the needs of the present generation of users with the need of future users, tempered with the recognition that all archeological sites are finite, non-renewable resources. These ideals must then be reconciled with the abilities and resources available to present-day resource managers.

6.0 Steamer FEDORA Site Survey, Chicago Creek

Vessel History

The steamer FEDORA (U.S. 120746), an extremely respectable vessel of her day, was built in West Bay City, Michigan, by the renowned ship building company of F. W. Wheeler. The Wheeler company was known for building ships of very stalwart designs. FEDORA's keel was laid down September 8, 1888 (F. W. Wheeler & Co. n.d.). The completed vessel, Wheeler hull number 48, had a length of 282.2 feet, 41.5 feet in width, and 20.1 feet in depth of hold. She had four masts, two decks, a plain head, and a rounded stern (Figure 6.1). FEDORA had a gross tonnage of 1,848.81 and a net of 1,476.93 (Bureau of Navigation 1889a; Runge Collection n.d.).

She was powered by a 900 horsepower, triple-expansion steam engine with cylinders of 20 in., 32 in., and 54 in. diameters, a 42 in. stroke, driving a four-bladed, 12 foot 6 in. diameter propeller at eighty-five revolutions per minute. Her engine was built by the Frontier Iron Works of Detroit in 1889. Steam was provided by two Scotch boilers, eleven feet in diameter and twelve feet in length, at a pressure of 160 pounds per square inch. The boilers were built by Lake Erie Boiler Works of Buffalo, New York in 1889 (F. W. Wheeler & Co. n.d.; Runge Collection n.d.).

The FEDORA also had an iron boiler house, steam-pump well, and diagonal iron strapping reinforcing her hull. With a composite construction of oak and iron, she was classified as amongst the best-built vessels on the Great Lakes, A1* (Inland Lloyds 1895:24). At the time of completion she was worth a total of $125,000. However, F. W. Wheeler made one fatal error in his design: the location of the pumps for firefighting. These pumps and their controls were located in the engine room, a place where a fire had the highest likelihood of starting (Keller 1984:75). Though aftercabin and rudder shoe plans exist for the FEDORA, plans of her machinery and firefighting equipment do not seem to have been preserved. The surviving plans show her aftercabin to have consisted of a large central space forward for the engine, a central dining room, chief engineer's and engineers' cabins, a linen closet, spare cabin, wash and bath room (with water closet), steward's cabin, pantry, ice box, kitchen, crew's mess, and a refrigerated locker (Institute for Great Lakes Research [IGLR] 1888). As FEDORA's upper works were completely burned away at the time of her loss, it is fortunate that we have this portion of the vessel documented in the historical record.

The FEDORA was built for James McBrier, E. D. Carter, and Lewis Steuben of Erie, Pennsylvania, and was launched April 17, 1889. With 13/20 interest in the ship, McBrier was also managing owner. Apparently, the FEDORA's name came from a popular stage play of the time, and she was actually christened by Miss Fanny Davenport, the play's starring actress (Ashland News 9/21/1901).

Initially, the FEDORA was temporarily enrolled at Port Huron on May 6, eight days later was permanently enrolled at Erie, and was captained by C. H. Wilson (Bureau of Navigation

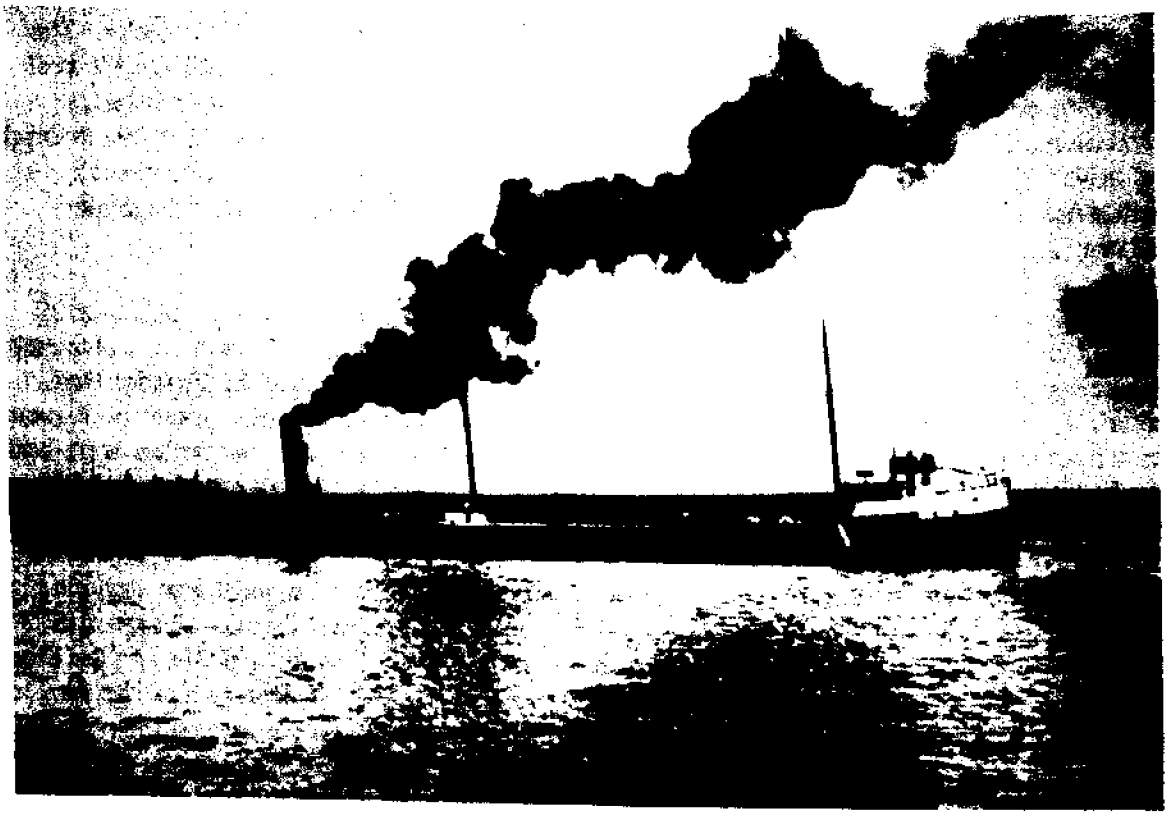


Figure 6.1 *Steamer FEDORA. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

1889a; 1889b). In 1892, FEDORA was re-enrolled at Erie, adding another owner, Capt. Frank W. Fick (also the vessel's new master), to the existing consortium. Fick purchased 2/20 of an interest in the ship from McBrier (Bureau of Navigation 1892). As of 1895, she was valued at $95,000 and still rated A1 (Inland Lloyds 1895:24). The FEDORA made a name for herself in the Lake Superior grain trade, reportedly carrying more grain out of Duluth than any other single vessel (Keller 1984:73).

In April, 1900, the FEDORA was sold to the Cowle Transit Company of Mentor Special District, Lake County, Ohio, with W. W. Brown as company secretary and master. She was enrolled at Cleveland, in the Cuyahoga Customs District (Bureau of Navigation 1900a). The sturdiness of FEDORA proved itself soon after, when on May 29, 1900, she stranded on Minnesota Point near Duluth. With the assistance of surfmen from the Duluth station and a tug, she was pulled off without any apparent damage (U.S. Life Saving Service 1900:154-155).

On the night of September 20, 1901, the FEDORA was making a run from Duluth to Ashland, light, with the intention of loading iron ore at the latter port (ore probably destined for Cleveland). Capt. Frank A. Fick was at the helm. As the ship passed between Basswood Island and Red Cliff Bay, a kerosene lamp exploded in the engine room. This explosion quickly spread to combustibles which engulfed the entire engine room. The fire expanded throughout the ship so rapidly that the engineering crew were forced to abandon their posts, and the entire crew was driven to the extreme forward end of the vessel. So quickly was the FEDORA's crew driven from the ship that the captain is said to have abandoned a valuable collection of bric-a-brac with the vessel (Ashland News 9/21/1901; Holden 1985:37).

Nothing could be done to save the doomed steamer. Captain Fick later reported:

> Had the fire started any other place on the boat we would have had a fighting chance of putting it out before much damage could be done. As it was the pumps which are utilized in case of fire are all in the engine room and in the same apartment where the large oil cans are stored. When the lamp exploded the oil in the cans ignited, and before we could get anywhere near the pumps, the entire hold was inflamed. A strong southeast wind was raging at the time and fanned the flames into furious fiery tongues which, running high into the air, illuminated the lake for a great distance and showed us a place of vantage to beach our sinking ship (Ashland News 9/21/1901).

With the engines steaming unattended at full speed, Fick beached the FEDORA onto the beach near Chicago Creek, north of Red Cliff Bay. While the seventeen-man crew escaped in lifeboats, the vessel was consumed by flames and burned to the waterline. The Bayfield County Press reported that the lumber yards and mill of the nearby Red Cliff Lumber Company narrowly escaped being burned along with the ship. Fick's crew was later brought to Ashland by a local vessel, and returned to Cleveland (Ashland News 9/21/1901; Bayfield County Press 9/28/1901).

The wreck instantly became a popular attraction for locals, as tugs, naphtha launches, and yachts loaded with Sunday excursionists ventured out from Bayfield and Washburn. The Ashland Daily Press reported that the trip was worth it:

> The fire consumed everything of wood above the water line, and her frame remains a twisted and contorted mass of ribbons and beams, a most gruesome sight indeed. Her great engine stands erect, towering above the warped and shapeless iron boiler house, some twenty-five feet and seemingly unbroken. Some of the steam pipes, with asbestos covering, still remain connected with the cylinders, which also retain their jackets. Undoubtedly it is worth taking out of the wreck, as well as the shaft, rudder, and wheel . . . [T]he vessel went ashore with great force, as her wheel lies partially uncovered. The loss is complete, in fact there are few wrecks recorded on the Great Lakes, where so little of value to the wreckers remain (Ashland Daily Press 9/23/1901).

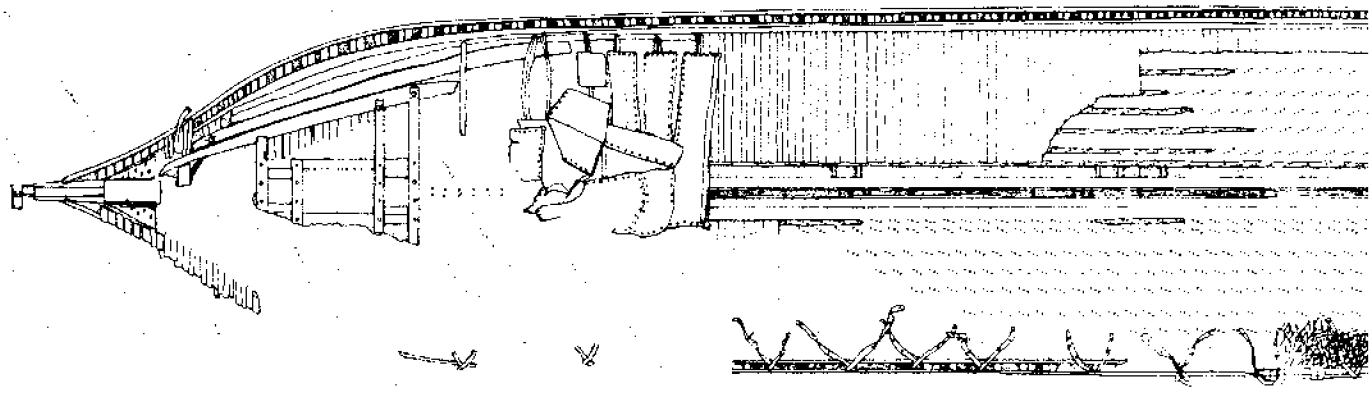
Material at the Institute for Great Lakes Research indicates that by November 1, 1901, the wreck was sold to the Red Cliff Lumber Company, and was "completely broken up" (Poole Collection, n.d.). The twelve-year-old FEDORA was listed as an $80,000 loss (Bayfield County Press 9/28/1901). It is not known what became of the machinery. Engman reports that "[m]ost of her machinery was salvaged soon afterward," though he does not say by whom (Engman 1984:37). Holden (1985:37) indicates that the Bayfield papers do not report any salvage immediately after the wreck, and that the wreck may have been salvaged as part of the 1917 work on the SEVONA and others.

FEDORA's documents of enrollment were surrendered at Cleveland on March 31, 1902; cause of surrender: burned. Deputy Collector of Customs George A. McKay noted that a copy of the enrollment was transmitted for surrender, the original having burned with the vessel (Bureau of Navigation 1900a).

Site Investigations

A two-day examination of the remains of the FEDORA indicate that the surviving wreckage consists primarily of the lower hull. The site is located on a silty-sand bottom, with the vessel's bow close to shore, and the stern angling away. Portions of the vessel's sides and lower hull are covered with sand overburden. On the starboard side, the hull has been burned to the approximate level of the turn of the bilge. The port side of the hull survives several feet above the turn of the bilge at the bow and almost five feet above the turn of the bilge in the vicinity of the stern. Portions of the starboard futtocks and iron cross-bracing protrude above the water's surface, making the site easy to locate. Although fire has extensively damaged much of the interior of the hull, many important construction features survive to provide insight into the construction of large bulk freighters. While the vessel's machinery has been removed, structural evidence in the stern records its location, including beds for the engine and boilers, as well as the shaft log.

St.s. FEDORA
Chicago Creek
7/1990



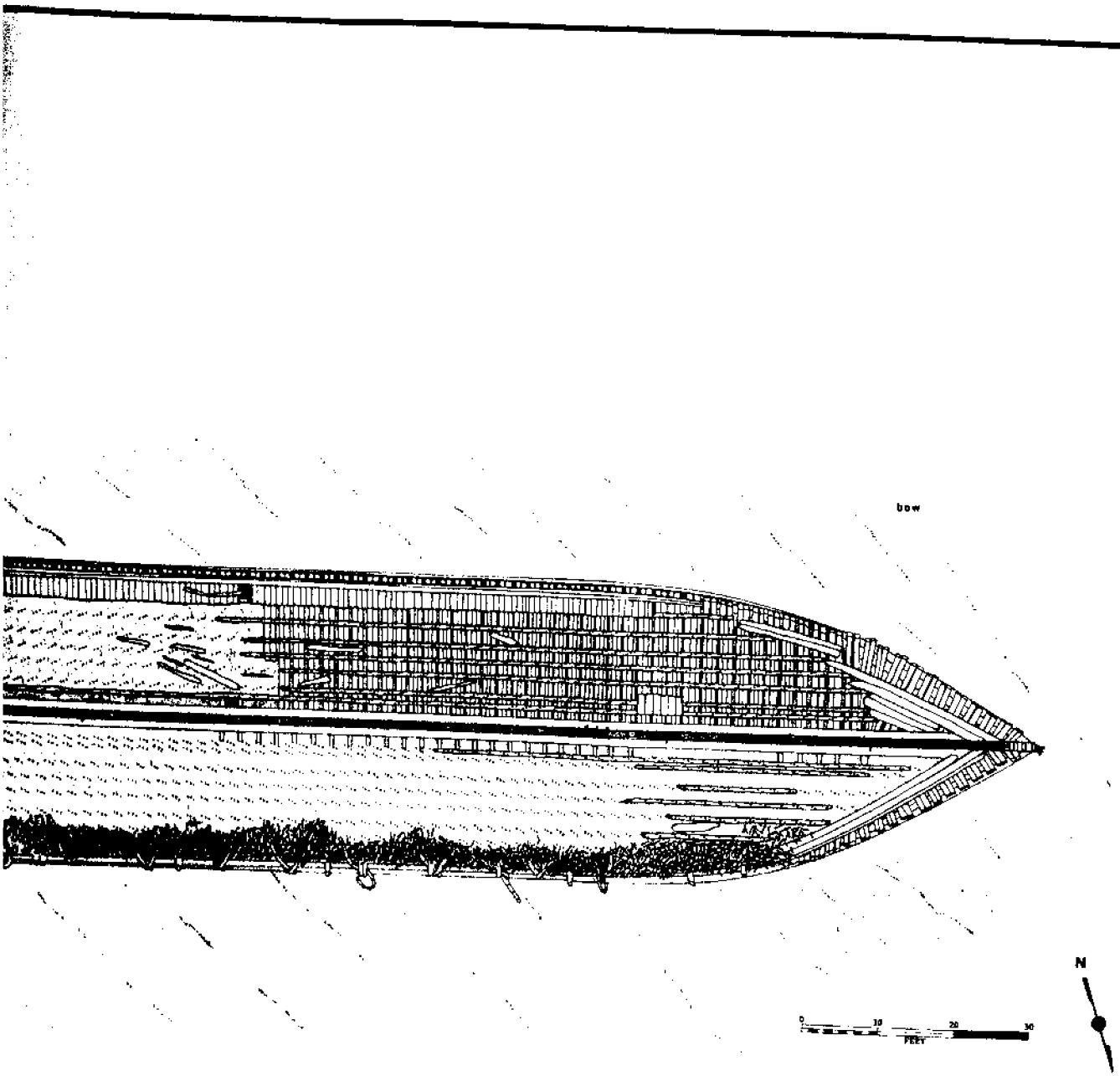


Figure 6.2

The keelson assembly survives intact from the bow to the stern and was reinforced and stiffened by iron plates bolted to either side of the upper timber. FEDORA was double-framed using 6 in. sided oak timbers, and in some places was triple-framed. Newspaper reports (Ashland Daily Press 9/23/1901) which indicate she was completely iron-framed appear to be in error; rather, she was iron strapped and some of her members were iron reinforced. Diagonal hull strength was accomplished by a complex pattern of diagonal iron strapping over the outside of her frames, underneath the exterior planking.

To facilitate mapping the FEDORA, a baseline was established from the stem to the end of the shaft log at the stern. The basic outline of the wreck was established using athwartships measurements every ten feet along the baseline at the bow and the stern. Aft of the cant frames, athwartships measurements were made every twenty feet along the baseline. Elements of the structure were sketched in sections, and were tied to baseline measurements. Significant features were sketched and measured. Using this technique, a reasonably accurate sketch map of the entire 280-foot vessel was developed in the two days allotted for initial documentation. Additional field documentation completed in 1992 included photography, measured sketches, and a more complete site assessment.

The extant hull of the FEDORA measures 281 feet 4 inches in length from the sternpost to the stem. The maximum beam measured immediately above the turn of the bilge was 41 ft. 1 in., although the sides of the hull have collapsed outward, increasing beyond her original beam measurement. The FEDORA's sternpost was broken off at the level of the propeller shaft, apparently at the time that the vessel's machinery was salvaged. Two 8 in. wide steel straps that reinforced the sternpost protrude from the sand, identifying the location of the sternpost. Sixteen inches forward of those straps, the lower half of the FEDORA's shaft log extends into the hull.

At a point 3 ft. 4 in. forward of the sternpost, the hull planks were rabbeted 4 in. into each side of the shaft log. At the forward end of the shaft log, FEDORA's aftermost frames protrude from the sand bottom. Frames on the starboard side of the hull had deteriorated to the approximate level of the bottom surface and extended only as far as the engine beds. Forward of the remains of the boiler, frames and planks on the starboard side of the hull were visible all the way to the bow, with the exception of a break approximately 75 to 90 feet forward of the sternpost. On the port side, both frames and planks remained intact from the rabbet in the shaft log to the stem. Exterior planks were 4 inches thick and ranged between 8 and 11 inches in width.

The first seven frames on either side of the hull forward of the shaft log were fitted tightly together, without adjoining space. The next three sets consisted of frames composed of butt-scarphed futtocks. At the after end of the engine beds, six frames were also tightly fitted without space. From the engine beds forward to the stem, most frames (with the exception of an area of the midships) were found to be composed of paired, butt-scarphed futtocks forming double-timbered frames. These were, almost without exception, sided 6 inches and molded 12 to 14 inches above the turn of the bilge. Together, the paired futtocks produced a timber

room of 12 inches, except for areas where a small deadspace increased the measurement to 13 inches overall. Space measured 10 inches providing a room and space measurement of 22 inches above the turn of the bilge and between the cant frames.

Approximately 190 feet forward of the sternpost, several floors were observed to have been fabricated from three separate timbers (triple-timbered frames), with individual sided dimensions ranging from 4½ to 6 inches, and molded dimensions of 13 inches at the keelson. These tripled floors/futtocks increased the overall room from 12 inches to between 15 and 18 inches, and decreased the space from between 8 to 9 inches to between 6 to 6½ inches. This tripling appeared to be an effort to compensate for undersized timber and did not appear to be a common practice in the construction of the hull.

Inspection of the location of butt scarphs on the frames indicated that the floors extended to random points well inside the turn of the bilge. First futtocks butted under the keelson and extended to the turn of the bilge. The second futtocks butted to the floors and extended through the turn of the bilge. As most of the framing above the turn of the bilge was covered by ceiling, it was difficult to confirm the extent of this pattern. All timber used in the scantlings appeared to be highly uniform as a consequence of industrialization of shipbuilding production processes.

The frames of the FEDORA were secured by a massive keelson and a series of parallel bilge stringers. The keelson assembly was composed of seven timbers that formed a base 39½ in. wide. Sister keelsons flanking the central keelson measured 20 in. molded above the floors, and 12 in. sided. A central rider 7½ in. molded by 14 in. sided was centered on the lower keelson and sisters. The rider was additionally reinforced by ¾ inch thick and 7½ in. wide iron plates, running forward to the bow. In the bow, the keelson was additionally reinforced by thicker metal plates that extended to the after face of the stempost. The reinforcing plates were through-fastened to the sides of the rider by iron or steel peened drift pins of ¾ in. diameter. Lighter longitudinal scantlings approximately 3 to 5 in. sided and 5½ in. molded were fastened 8 in. apart on either side of the rider, probably to provide a step for hold stanchions. The keelson extended from the remains of the boiler to the stem assembly, terminating 265 feet 8 inches forward of the sternpost baseline datum.

The stem assembly was composed of three timbers. The outermost timber (cutwater) measured 28 inches molded and 25 inches sided across its leading edge. The outer stempost was 18 in. molded and 25 in. sided. The inner stempost was 10 in. molded and 25 inches sided, and was beveled to form the rabbet. All were secured with heavy iron pins of approximately one inch in diameter.

The bottom of the FEDORA was also strengthened by a series of up to seven bilge stringers. The stringers varied from 4 to 5 inches sided, and were spaced on 19 to 24 in. centers, 17 to 19 in. apart. Each stringer ranged from 11 to 20 inches molded. A series of ½ inch diameter pins arranged diagonally in sets of three had been used to attach the stringers to each frame. Where the stringers had been burned, on the port side of the hull amidships and

along most of the starboard side, the pins remained in situ identifying the location of the original timbers. The port outboard stringer terminated 245 feet forward of the sternpost baseline datum and the port inboard stringer terminated 265 feet 8 inches forward of the stempost baseline datum. Due to extreme fire damage, only the remains of fasteners marked the starboard bilge stringer locations apart from a few extant charred remains in the bow.

Between the keelson and the first stringer a series of carlings placed on random centers had been mortised to hold removable beams that supported the limber boards. Along the port side of the ship, from the engine beds to a point approximately thirty feet forward of the remains of the boiler, the stringers were covered with athwartships bilge ceiling composed of two layers of 1 in. thick planks, ranging from 6 to 12 inches in width. Longitudinal ceiling of 4 in. thickness and ranging from 6 to 10 inches in width continued above the turn of the bilge to the point that the hull began to narrow near the bow. FEDORA's ceiling was fastened with ¼ in. square shank spikes.

Evidence of the fire that destroyed the FEDORA was most apparent along the starboard side of the hull. From a point approximately amidships, the turn of the bilge was covered with iron fasteners that fell from the side of the hull as it burned. The starboard side of the hull also contains the remains of a series of iron straps that strengthened the hull. The 5 in. wide by ⅝ in. thick straps had been mortised into the exterior face of the frames and arranged to form a diagonal web beneath the exterior planking. The straps were attached to the frames by 1 in. diameter iron pins and appeared to cross approximately every eight feet, where they were fastened with ¾ in. diameter rivets. The first strap in the stern was located aft of the engine beds and the last strap at the bow was located approximately ten feet aft of the stempost. While there was no indication of how far the straps proceeded beneath the turn of the bilge, the length of the straps indicated that they could have reached as high as the sheer strake.

Evidence of the FEDORA's boiler was found fifty-five feet forward of the sternpost baseline datum and extended for twenty-two feet. Unsalvaged boiler plate lay in long lengths above the iron beams that supported the boiler bed. Beds for the engine were found sixteen feet aft of the remains of the boiler. The beds consisted of a series of heavy longitudinal timbers that rested on the floors. Across these, four additional timbers were placed athwartships to provide a base for the steam machinery. Sixteen bolts of 1½ in. diameter protruded from the bed timbers to provide anchoring points for the engine. At the port ends of the forward two timbers, two 8 in. diameter holes had been drilled. These holes perhaps served the ship's steam bilge pumps. Aft of the engine beds on the port side a 7 in. diameter hole had also been cut through the hull. Each of these three holes had been lined with lead and surrounded with six bolts to secure a flange or valve.

Artifacts on the site were restricted to a brass valve, trademarked JENKINS, located just aft of the engine beds. Some fragments of firebox brick, as well as sherds of ironstone ceramics were also encountered. One sherd, found outboard of the stern, contained a maker's mark of J & G. ME... EASTWOOD W... HANLEY, ENG..., and a coat of arms, including a rampant

lion flanking a shield. However, the site appears to have been heavily surface-collected by divers, and any surviving artifacts would have to be well-buried to have evaded removal.

Conclusions and Management Recommendations

Located in shallow water, the FEDORA is valuable as a source of accessible construction data. The site offers general data on large Great Lakes wooden bulk carriers, and specific data on Wheeler-designed ships. A predecessor to the SEVONA, the FEDORA also offers the opportunity to make comparisons between late wooden and evolving steel vessel designs produced the same builder, using these two Wheeler wrecks as a data source. Significant comparative studies may also include other extant Wheeler-built vessels, such as the 1890 wooden schooner-barge A. C. TUXBURY (renamed EMBA), abandoned in 1932 off Milwaukee (Wisconsin Submerged Sites Inventory, n.d.). FEDORA's own research potential includes a more detailed analysis of architectural elements, hull lines, joinery, fastenings, and scantlings. Test excavations could be undertaken around the hull to assess potential for undisturbed material culture, as well. However, the fire would have destroyed much of the material in the upper hull living spaces, and the heavily salvaged and scavenged nature of the site decreases its potential to yield significant quantities of artifactual material.

Nonetheless, FEDORA may still qualify for listing on the National Register of Historic Places, at least under Criteria D (yields significant information in history). Her extant architecture has potential archeological significance, and the presence of artifacts on site indicate some potential for buried material (as seen with the R. G. STEWART site), allowing study of shipboard life, vessel operation and maintenance, subsistence, and other maritime anthropological questions.

The site's chief value may be recreational, as it is visible from the surface, and can be easily visited by divers, snorkelers, and kayakers. Though outside of the National Lakeshore boundaries, the FEDORA should be considered for inclusion in any future designation of state bottomland preserve areas or National Marine Sanctuaries in the Apostles area. In the interim, apart from random artifact collecting, the site does not appear to be threatened by recreational usage. Fire, ice damage, and scavenging have done their best to obliterate the site, and only the latter appears to constitute any sort of continued threat. The site should receive periodic monitoring for any artifacts exposed by shifting sands, or any illegal efforts at excavation. Observed materials should be reported to the State Archeologist. Artifacts should be documented in place and left undisturbed to be seen by other visitors. As the site is in shallow water, monitoring for zebra mussel encrustation should also be periodically undertaken.

7.0 Steamer H. D. COFFINBERRY Site Survey, Red Cliff Bay

Vessel History

The wooden bulk freighter H. D. COFFINBERRY (U.S. 95285) was built in 1874 in East Saginaw, Michigan (Figure 7.1). She was constructed for the firm of Rust, King & Company of Cleveland, Ohio, by shipbuilder Thomas Arnold. Initially, she was used in the coal trade, towing the big East Saginaw schooner-barges D.K. CLINT and L.C. BUTTS and in the corn trade with the BUCKEYE STATE amongst her consorts. These were all Arnold-built ships and were owned by Rust, King & Company. COFFINBERRY later carried iron ore, and eventually she was adapted to carry lumber (National Board of Lake Underwriters 1874; Keller 1984:147; Poole Collection n.d.; Runge Collection n.d.).

She measured 191.4 feet in length, 33.5 feet in beam, and 13.4 feet in depth of hold. COFFINBERRY was constructed with one large freight hold accessible through four hatches, each 7.5 feet by 15.66 feet and spaced on 24 foot centers (Bureau of Navigation List of Merchant Vessels of the United States [MV] 1885:333; 1894; Runge Collection n.d.). She originally measured 649.84 gross tons. She was later readmeasured at Cleveland in 1879 as 858.35 gross/706.78 net tons, and again at Cleveland in 1899 as 778 gross/509 net tons (IGLR n.d.).

Her original engine was a low-pressure, double steeple compound, built by the Globe Iron Works of Cleveland in 1874 with a maximum horsepower of 625. This engine had two cylinders of 16 in. diameter, two of 32 in. diameter, and a stroke of 36 inches (IGLR, n.d.). In 1893 she had a steeple compound engine with a 16-inch and 23-inch cylinder, a stroke of 36 inches, and 766 nominal horsepower (Bureau of Navigation [MV] 1894:306; Runge Collection n.d.). The 1895 Inland Lloyds Vessel Register (1895:12) indicates she also had a steam-pump well: it is not known if this was original equipment. In 1913 she is listed as having a 625 h.p. double steeple compound engine with two 16-inch and two 32-two inch cylinders, a stroke of 36 inches, and a speed of 95 revolutions per minute (Runge Collection n.d.).

No known data exists on the original boiler specifications. However, the second boiler was a firebox-type and measured 10 feet in diameter, 16 feet in length, with a working pressure of 125 pounds per square inch. It was manufactured by the Phoenix Iron Works of Port Huron, Michigan in 1892 (IGLR n.d.; Runge Collection n.d.).

The COFFINBERRY had a history of groundings and accidents throughout its career. On August 25, 1892 she was run hard aground near Port Huron during a fierce northwest gale. She was bound down from Escanaba for Ashtabula with a load of soft iron ore when her boiler shifted in the gale off Port Hope. As her steam let down, the crew attempted to make sail while the vessel wallowed in the troughs of the seas. The steamer UGANDA attempted to take her in tow, but the seas were to heavy for her to render assistance. COFFINBERRY's sails gave her enough headway to make for the beach near Port Hope, where she was put

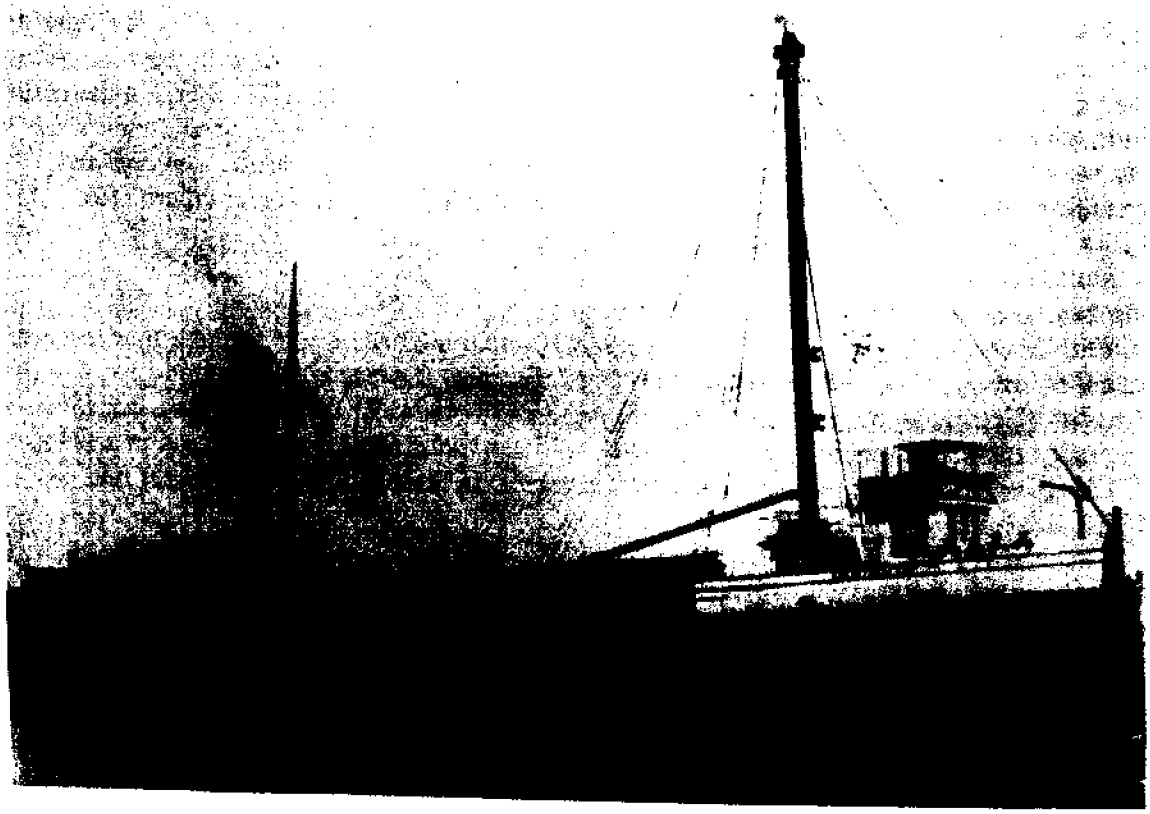


Figure 7.1 *Steamer H.D. COFFINBERRY. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

aground on the rocky bottom and a flag of distress hoisted (Detroit Free Press 8/26/1892, Duluth Daily News 8/26/1892).

The seas were sweeping clean over the hapless steamer when the Sand Beach Life Saving Station crew arrived with their lifeboat in tow of the tug ONAPING. The lifeboat was cast off from the tug as it came abreast of the COFFINBERRY, and with some difficulty, the steamer's crew was rescued and taken to Sand Beach. The Cleveland owners of the COFFINBERRY were notified, and the wrecking tug FAVORITE of the Parker and Millen firm was dispatched to the scene from Cheboygan that afternoon (Detroit Free Press 8/26/1892).

The FAVORITE found a badly hogged and battered steamer awaiting her attentions, and commenced to put two steam pumps aboard to pump her out. It was feared that the COFFINBERRY's bottom had been pounded out from the lashing she had taken on the rocks. However, by the 28th a "big gang of men" was being rounded up in the Sand Beach vicinity to begin the arduous task of shoveling out the cargo and dumping it overboard. By that night, she was released and towed to Sand Beach, with one pump aboard to keep her leaking hull afloat. A diver was called in to make emergency repairs (Detroit Free Press 8/29/1892; 8/30/1892). By 8:00 the next morning, she arrived at Port Huron, where it was reported, "she is not leaking much and will be unloaded before [dry] docking her there" (Detroit Free Press 8/31/1892).

The COFFINBERRY had just been rebuilt the previous winter at Port Huron at a cost of $40,000. An A2 rating and an insurable value of $35,000 was assigned to the vessel at the time of the August 1892 grounding, though her hull was only insured for $25,000 (Detroit Free Press 8/26/1892; Duluth Daily News 8/26/1892). Either prior to (or possibly as a result of) this grounding, she had her bottom recaulked in 1892 (Inland Lloyds 1895:12).

On May 28, 1900, en route for Portage, Michigan (probably Portage Lake at the base of Lake Superior's Keweenaw Peninsula), with a load of coal, COFFINBERRY again ran aground along with her consort CHETOCAH, this time on Thunder Bay Island, Alpena, Michigan. The stranding was attributed to a dense fog, which caused both vessels to run afoul of the southeast end of the island. Surfmen from the Thunder Bay Island Life Saving Service Station boarded COFFINBERRY, and immediately sent for a tug and yet another gang of men with shovels. After jettisoning about sixty tons of coal and a day's effort COFFINBERRY was released by the tug RALPH and steamer HALL. She was towed in leaking condition to Alpena, where she was found to have taken on water up to the level of her boilers. She soon after settled onto the harbor bottom (Duluth Evening Herald 5/28/1900; Poole Collection, n.d.; U.S. Life Saving Service 1900:154).

She was apparently quickly refloated, repaired, and soon set loose to more misadventures. On October 15, 1900, in the crowded St. Mary's River near Nine-Mile Point the H. D. COFFINBERRY collided with the steamer SPINNER. The SPINNER had crossed the COFFINBERRY's path while trying to avoid a passing maneuver by the steamer CASTLE

RHODES. The damaged SPINNER, leaking from her port bow, proceeded into shallow water where she sank in seventeen feet of water. COFFINBERRY continued on course, apparently uninjured (Duluth Evening Herald 10/16/1900).

Evidently, some financial crisis overtook the COFFINBERRY's owners around 1912, as the Bayfield County Press of August 10, 1917, reports:

> The lumber carrier Coffinberry, abandoned at Ashland five years ago when the entire crew including the captain struck, libelled the vessel, assigned their claims to Ashland attorneys who sold it at sheriff's sale to satisfy the claims, after which it gradually sunk to the deck, was raised at Ashland this week by a party of Duluth wreckers, and will be towed to Duluth by the tug Valerie, as soon as weather conditions warrant the attempt. It has a big marine boiler and a big engine, and its five years repose under water may have left a still serviceable hull (Holden 1985:15-16).

Shortly after the salvage operation, the remaining hull seems to have been towed to Red Cliff Bay and abandoned. Though the exact sequence of salvage and removal from Ashland has not yet been documented, both Keller (1984:147) and Holden (1985:15-16) are in agreement that the derelict steamer was somehow removed to Red Cliff Bay. Holden also refutes earlier reports by Engman (1984:32-33, 36) and Wolff (1979:90) identifying the large hull on the beach at the north side of Red Cliff Bay as that of the steamer CORMORANT.

The CORMORANT, it seems, was burned and beached on the north side of Basswood Island in October, 1907. Salvor J. B Wanless of Duluth immediately purchased the hull, and on November 17, 1907, floated the hull to Bayfield to begin removal of her machinery. The hull was thereafter towed to Duluth on December 6, 1907, by the tug E. G. CROSBY (Bayfield County Press 11/1/1907; 11/2/1907; Duluth Evening Herald 10/31/1907; Duluth News Tribune 10/31/1907; 11/22/1907; 12/7/1907; Holden 1985:24-25). The CORMORANT wreck does not appear to have ever resided at Red Cliff Bay.

COFFINBERRY's final enrollment was surrendered at Toledo, Ohio, December 31, 1917, "abandoned" (IGLR n.d.). Today, what are believed to be the remains of the COFFINBERRY lie partially on shore on the north side of Red Cliff Bay near the tug R.W. CURRIE and wrecking tug OTTAWA (Keller 1984:120, 147).

Site Investigations

Examination of the H. D. COFFINBERRY confirmed that almost all the vessel structure has broken up, leaving only the very lower hull. The surviving wreck structure consists of the keel, keelson, floors, lower starboard futtocks, stringers, and exterior planking. Unlike the other wrecks examined during the survey, only the bottom of the H. D. COFFINBERRY lies below the water. The wreck is located in three to six feet of water parallel with the shoreline,

at the base of a steep clay slope on the north side of Red Cliff Bay. The lakebed in the vicinity of the site consists of sand, silt, cobble, and a few boulders.

Documentation of the wreck was greatly simplified by being able to conduct mapping work without use of diving equipment. A baseline tape was laid down the length of the surviving keelson to control recording, using the forward (west) end of the wreck as a baseline datum. Elements of the structure were plotted in relationship to distance along the keelson and distance port or starboard. Major features of the hull were sketched and measured (Figure 7.2). Additional field documentation was completed in 1992, including photography, video, measured sketches, and a more complete assessment of the site.

Relatively little of the wooden freighter COFFINBERRY remains intact. The surviving structural elements consist of the badly damaged lower hull of the ship 170 feet in length and 31 ft. 8 in. at its maximum width. Neither the bow nor the stern survive: however, the remains of the vessel's boilers at the east end of the wreck confirm the orientation of the hull. The bow bears 285 degrees off magnetic north.

The bow, or west, end of the vessel has been extensively damaged and the stem and other features of the bow are missing. Below the keelson, little more than the floors and hull planking remain intact. Frames are composed of paired floors and futtocks (double-timbered framing). That pattern extends aft approximately 40 feet, to where four frame sets are composed of floors with futtocks attached both fore and aft (triple-timbered framing). Forty-five feet aft of the bow, the floor and single futtock (double-timbered framing) pattern resumes and extends aft to a point 67 feet from the datum, where the pattern of futtocks fore and aft of the floor resumes and continues for approximately twenty feet aft. From that point the floors appeared to be composed of paired floors and futtocks as far as the wreck structure survived intact.

COFFINBERRY's double frames were 5½ inch sided and 9½ inch molded above the turn of the bilge. Molding at the floors measured 11 inches, and 10½ inches at the turn of the bilge. Room measured approximately 11 inches, with a space of 10½ in. Triple frames measured 4 inch sided and 9½ molded. Triple-framed areas had a frame room of 12½ to 13½ inches, and a space of 9 inches. Futtocks at the turn of the bilge were not compass timber, but were sawn to shape.

The floors of the COFFINBERRY were sandwiched below by the keel and above by a keelson assembly consisting of a centerline keelson, two sisters, and two riders. The sister keelsons were placed on either side of the centerline keelson, are vertically fastened to the floors by 1-inch diameter drift pins, and the whole keelson assembly is cross-fastened by ⅞ in. iron drifts peened over 2⅛ in. diameter clinch rings. The sister keelsons extend aft from the forward datum more than 135 feet. The sides of the sister keelsons were strengthened by iron plates beginning approximately 81 feet aft of the datum. The plates measured 7/16 in. thick by 14⅞ in. wide, and were through-fastened to the keelsons with ⅞ in. peened drift pins. A heavy athwartships beam is situated ten feet aft of the terminus of the sister keelsons,

probably as some type of lateral hull reinforcement. The starboard sister keelson measured 10½ in. sided and 9½ in. molded. Rider keelsons were placed above both of the sisters, and measured 12½ in. molded and 7 in. sided, forming a 8½ in. wide slot between the riders over the centerline keelson. The centerline keelson, situated between and below the sisters, measured 12 in. sided and approximately 11 in. molded. All keelson sections were constructed of several shorter timbers joined using flat scarphs.

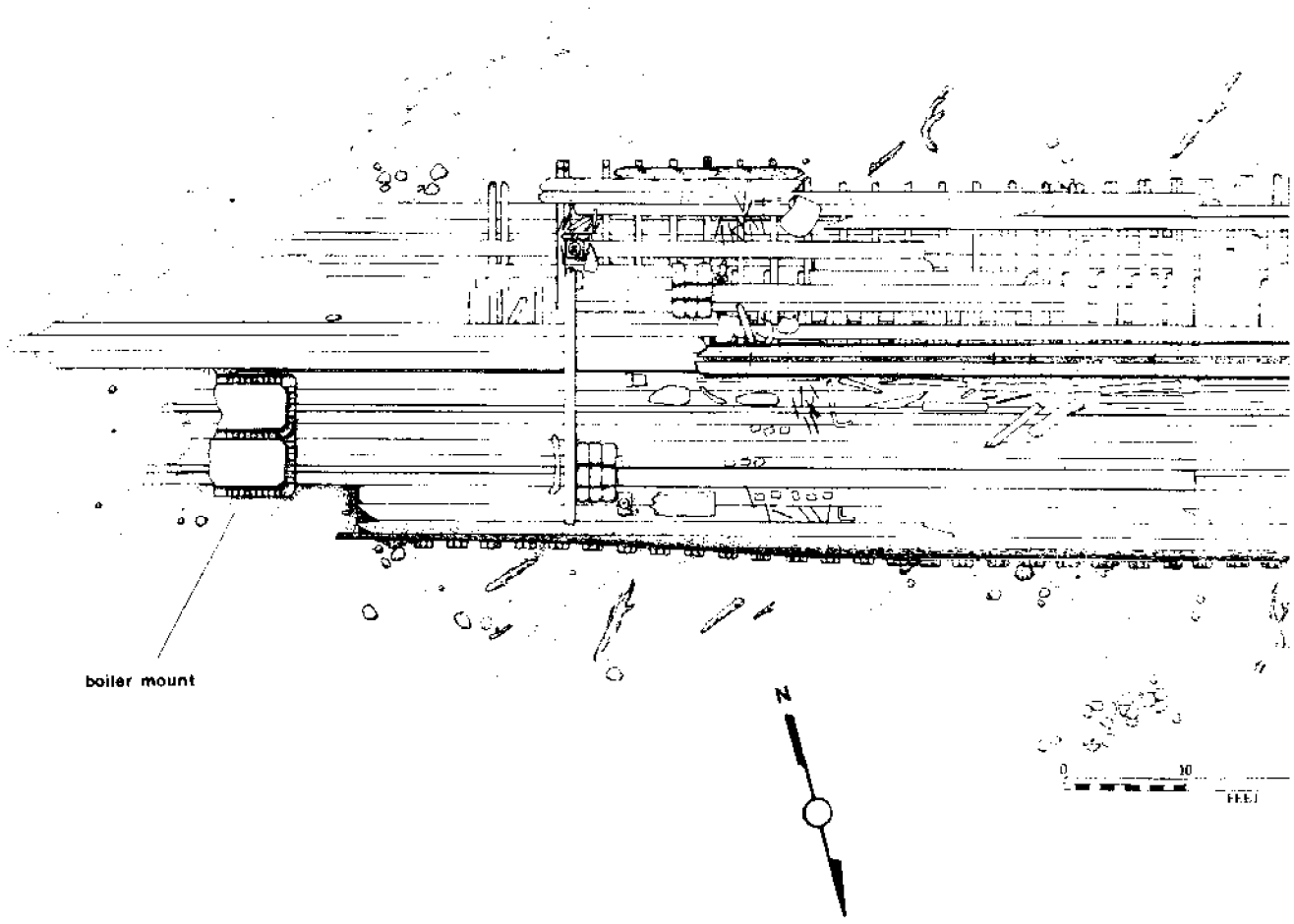
Remains of hold stanchions could be found in the slot between the riders and sister keelsons. The stumps of the stanchions measured 7 in. (fore to aft) by 6 in. (athwartships). There is evidence of additional riders above the extant rider keelsons: surviving 5/16 inch square iron spike fastenings indicate that light rider keelsons measuring approximately 4½ in. molded were positioned at several places. These may have helped support hold stanchions, and, considering their small dimensions, probably did not assist with longitudinal reinforcement.

On the port side of the hull the bilge ceiling was found to extend aft along the keelson and along the turn of the bilge from a point seventy-five feet aft of the forward datum. At 105 feet aft, the amount of ceiling increased again and continued aft until the remains of the COFFINBERRY disappeared into the bottom sediment. On the starboard side of the wreck the bilge ceiling covered most of the lower hull from a point approximately 40 feet aft of the datum. Bilge ceiling measured 4¾ to 5 inches in thickness by 10 to 11 inches in width, and was edge-joined above the turn of the bilge with ¾ in. drift pins. Bilge ceiling was fastened to the frames and floors using ⅝ in. drifts peened over ¾ in. diameter clinch rings alternating in a zig-zag pattern with 5/16 in. square shank, rosette-head spikes. The individual ceiling planks were connected using flat scarphs of 3 ft. 10 in. length.

Four bilge stringers are extant on the starboard side, fastened over the bilge ceiling. The inboardmost stringer is centered 1 ft. 7 in. outboard from the keelsons, the second is centered 3 ft. ½ inches outboard, the third 5 ft. 3 in., and the fourth 7 ft. 6 inches. The stringers range from approximately 5 to 5½ in. sided, and 5 to 7½ in. molded, and are fastened to the ceiling and floors with ¾ inch peened drift pins. Where observable, the individual timbers of the stringers are butt-scarphed. Outboard of the starboard stringers, a floor keelson appears approximately 94 ft. 6 in. aft of the datum. This keelson is sided 15 in. and molded approximately 12 inches. The floor keelson has a rider 13 in. sided and 13 in. molded, fastened to the lower keelson with ⅞ in. peened iron drifts. The remains of a floor keelson were also encountered on the port side, 16 inches sided and molded. The placement of these stringers and the floor keelsons *over* the ceiling suggest that they are later additions for reinforcement, possibly in the vessel's declining years.

Unlike the port side, the starboard side of the COFFINBERRY (which is on the leeward side of the wreck) has survived above the turn of the bilge, where it is extant to a height of approximately four feet. Surviving elements of exterior planking in this area are 3 in. thick, 9 to 9½ inches wide, and are fastened to the frames with ⅝ in. square shank, rosette-head spikes, with occasional ¾ in. drifts. Below the turn of the bilge, exterior planking measures 12 to 14 inches in width.

St.s. H.D. COFFINBEI
Red Cliff Bay
7/1990



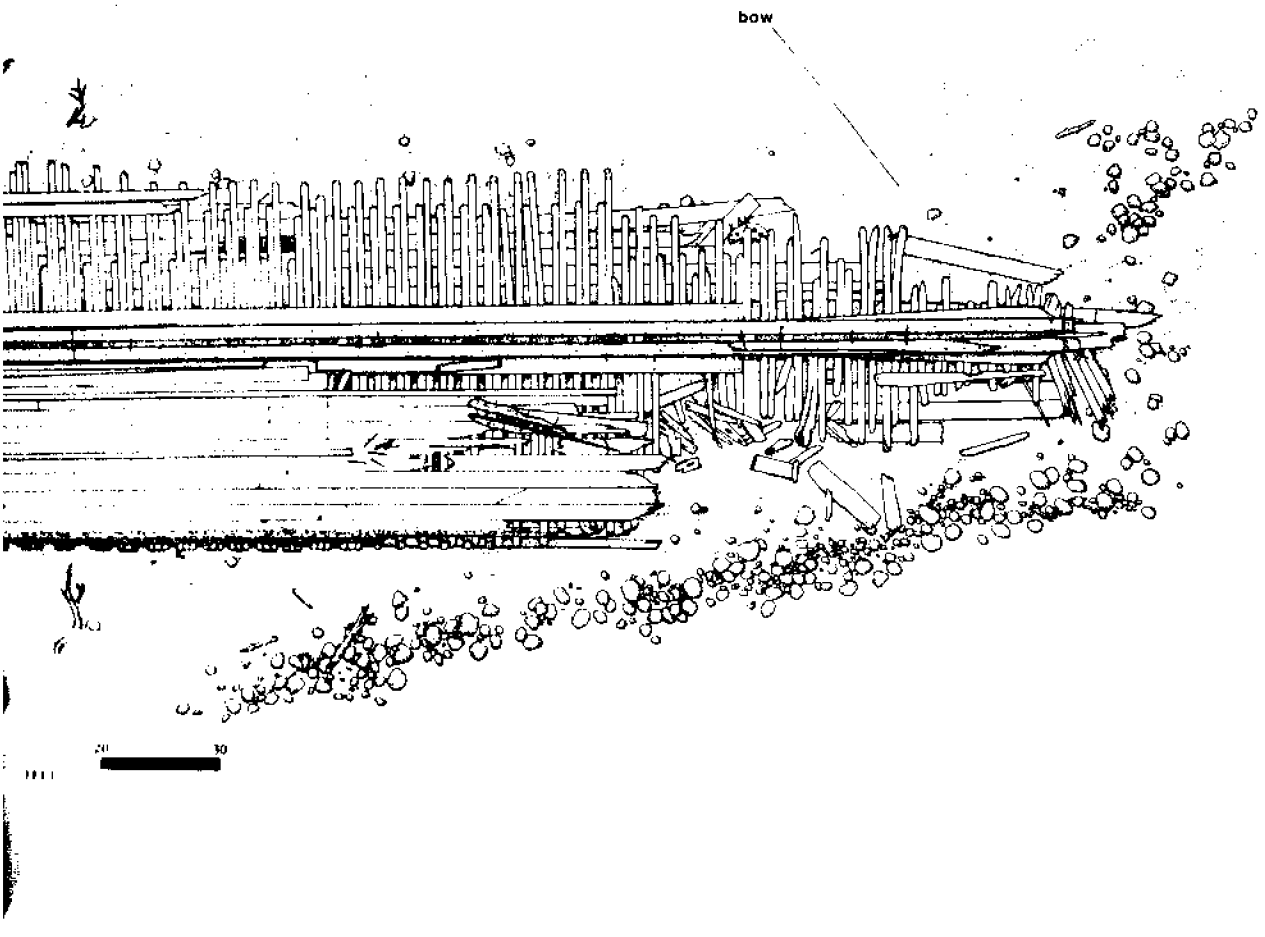


Figure 7.2

Aft of the athwartships reinforcing beam at baseline point 145, virtually all of the bilge was ceiled, and the ceiling is extant. The major feature in the after area proved to be the remains of the ship's boiler bed, located on the starboard side of the hull 170 feet aft of the forward datum. The boiler bed measured 6 ft. 8 inches in length by 10 ft. 6 inches in width. The remains indicate that the COFFINBERRY's boiler was equipped with two 4 ft. 2 in. wide by 6 ft. long ash pits. The off-center location of the boiler bed suggests that it has been dislocated within the wreck structure.

A short distance to the west of the site, what appears to have been the forefoot from the COFFINBERRY's stempost lies partially submerged along the shoreline. The forefoot consists of a curved timber sided 24 inches and molded 12 inches, with portions of a stemson or apron and keel attached. The keel fragment measures 10 inches molded by approximately 10 inches sided; the fragment of stemson or apron measures 22 inches molded by 11 inches sided. A mortise in the sides of the keel and the forefoot indicate that a metal plate approximately 22 inches long by 4 inches in width, and approximately ½ inch in thickness, was used to reinforce this critical joint.

Conclusions and Management Recommendations

Like the FEDORA, the COFFINBERRY is an accessible source of construction data on Great Lakes wooden bulk carriers. Her research potential includes a more detailed analysis of architectural elements, joinery, fastenings, and scantlings. Test excavations could be also be undertaken around the hull to assess potential for undisturbed material culture. Though her deteriorated condition makes her a marginal candidate, COFFINBERRY may qualify for listing on the National Register of Historic Places under Criteria D, as her extant architecture has potential archeological significance.

The site also possesses some recreational value, as it is visible from the surface, and is easily visited by divers, snorkelers, and kayakers. The COFFINBERRY is also a regular feature of the island tour boats who, erroneously, point it out to visitors as the wreck of the CORMORANT. Ice damage, salvage, and artifact scavenging have done a great deal of damage to the wreck, leaving only the sturdy bottom elements. Ice will continue to degrade the site, but the site does not appear to be threatened by recreational usage. Though outside of the National Lakeshore boundaries, the COFFINBERRY should be considered for inclusion in any future designation of state bottomland preserve areas or National Marine Sanctuaries in the Apostle Islands area. In the interim, the site should receive periodic monitoring for any artifacts exposed by shifting sands, or any illegal efforts at excavation. Observed materials should be reported to the State Archeologist. Artifacts should be documented in place and left undisturbed to be seen by other visitors. As the site is in shallow water, monitoring for zebra mussel encrustation should also be periodically undertaken.

8.0 Tug OTTAWA Site Survey, Red Cliff Bay

Vessel History

The tug BOSCOBEL (U.S. 3152), later renamed OTTAWA (Canadian 116391), was originally built by the Miller Brothers of Chicago (Figures 8.1, 8.2). She was the largest towing tug ever constructed in Chicago at the time of her May 5th, 1881, launching, and she remained the largest and most powerful tug on the Great Lakes to her time of loss in 1909 (Keller 1984:117; Milwaukee Sentinel 5/7/1881).

The BOSCOBEL's unusual name may be a reference to the town and lumber raft stopover point by that name on the Wisconsin River. It may also be a literary reference to the novel of Emma Mersereau Newton published in 1881 related to the English Civil War Battle of Worcester (1651), the escape of Charles II to Boscobel, and his hiding in the Royal Oak. As seen with other vessel names of the period, (e.g. LUCERNE, FEDORA) nineteenth century American industrialists seem to have appreciated surrounding themselves with aristocratic, literary, and Old World references, perhaps in an effort to acquire an "old money" mantle of sophistication. Possibly to further the allegory, the Boscobel Royal Oak assisted Charles (in making his escape); a tug also "assists" (Holzhueter 3/27/1991, personal communication).

BOSCOBEL measured 610.81 gross tons, and 450.95 net tons. Her dimensions were 151 feet in length, 28.4 foot in beam, and 13.7 feet in depth of hold. Her first captain, William Nicholson, was the former captain of the ill-fated tug LIVINGSTON, which dropped its propeller shaft and foundered in October of 1880 off Door County (Bureau of Navigation 1881; Door County Advocate 10/7/1880; Milwaukee Sentinel 5/7/1881).

BOSCOBEL's powerful 600 horsepower engine was built in 1881 by S.F. Hodge & Company of Detroit, Michigan. Its high-pressure steeple compound engine, (no. 105) had 22 and 40 inch diameter cylinders and a 32 inch stroke. Her two boilers were of the firebox-type and measured 7.6 feet by 17 feet each. These boilers were built by the American Boiler Works of Chicago, Illinois in 1881 (IGLR n.d.).

The BOSCOBEL, after a trial run on June 17, 1881, entered service in a tug and towing capacity for the Peshtigo Lumber Company in Peshtigo, Wisconsin (Milwaukee Sentinel 6/20/1881). Her first enrollment was on June 18, 1881, at the Port of Milwaukee, with William A. Ellis, Peshtigo Lumber Company secretary, as managing owner (Bureau of Navigation 1881). On July 24, 1881, while passing down through Sturgeon Bay with barges in tow, the BOSCOBEL ran aground on a shoal in front of the Washington Ice Company's houses. Even her 600 horsepower engine could not get her off the rocks. It reportedly took five tugs a total of four hours to pull her off (Milwaukee Sentinel 7/26/1881).

Either due to rapid deterioration or unsatisfactory service, the BOSCOBEL's original steeple engine was replaced with a new compound engine in 1882, increasing the tug's value from $45,000 to $50,000 (Runge Collection n.d.). Inland Lloyds indicates that she kept her A1

rating through 1887, at which time she was downgraded to A1½, value $45,000. She is also listed as having an iron boiler house at this time (Runge Collection n.d.). By 1891, she was downgraded to A2, value $40,000.

BOSCOBEL's documents of enrollment state that she was sold to the Stephenson Transportation Company of Marinette, Wisconsin, in March of 1893, with William A. Ellis as company secretary (Bureau of Navigation 1893). Coincidentally, the Peshtigo Lumber Company had also owned the schooner-barge NOQUEBAY (one of the BOSCOBEL's lumber consorts during this period), which was also sold to the Stephenson Transportation Company in March of 1893. The NOQUEBAY was later sold to lumber shippers in Bay City, Michigan, and burned at Stockton Island in 1905, not far from where BOSCOBEL herself was lost (Carrell 1985:19-20).

In 1895, with a value of $35,000 and still carrying a respectable "A2" rating, BOSCOBEL was sold to Benjamin Boutell and P.G. Smith of Bay City, Michigan. BOSCOBEL was re-enrolled at Port Huron, Michigan, and operated out of Bay City (Bureau of Navigation 1895b; Inland Lloyds 1895). Interestingly, the Stephenson Transportation Company also sold off NOQUEBAY at this time, to Thomas, James, and John Madden, also of Bay City (Carrell 1985:20). BOSCOBEL was then resold in October, 1896, to Lorenzo S. Boutelle and the Saginaw Bay Towing Company of Bay City, Michigan (Bureau of Navigation 1896b). She was refastened sometime in 1897, at which time she was listed as a "wrecker" (Runge Collection n.d.).

In March of 1902 BOSCOBEL was bought by Liberty Dean Holden of Cleveland, and was captained by James Thomas Reid, the famous salvor (Bureau of Navigation 1902b). In February of 1903, Reid purchased the ship, acting as secretary of Reid Wrecking Company of Port Huron, Michigan. Lauchlen P. Morrison, as a boy, recalls the BOSCOBEL and her colorful skipper around this time:

> The Boscobel, one of Reid's earlier tugs, was a long, rakish, piratical-looking boat, with low-lying, open decks fore and aft. As boys, we used to talk with awe of her hawsers. With complete entrancement, we would say, "Twelve inch hawser!" Captain Jim Reid, her owner, was an amiable pirate who would blarney you while robbing you blind on a wrecking job. He was by far the most successful wrecker the lakes ever produced (Morrison 1951:122-123).

James Thomas Reid was originally from Ontario. He moved to Alpena to take work as a carpenter, and his son Tom was born there in 1870. Building and selling a large house gave Reid the initial capital to move into the logging and rafting business. He reinvested his profits, and rapidly acquired logging camps, vessels, and other equipment. By the 1880s he was involved with rafting log booms out of Michigan's Upper Peninsula, as well as the North Channel and Georgian Bay on Lake Huron. While BOSCOBEL is known to have been involved with log rafting under command of Reid's son Tom, as well as working as a

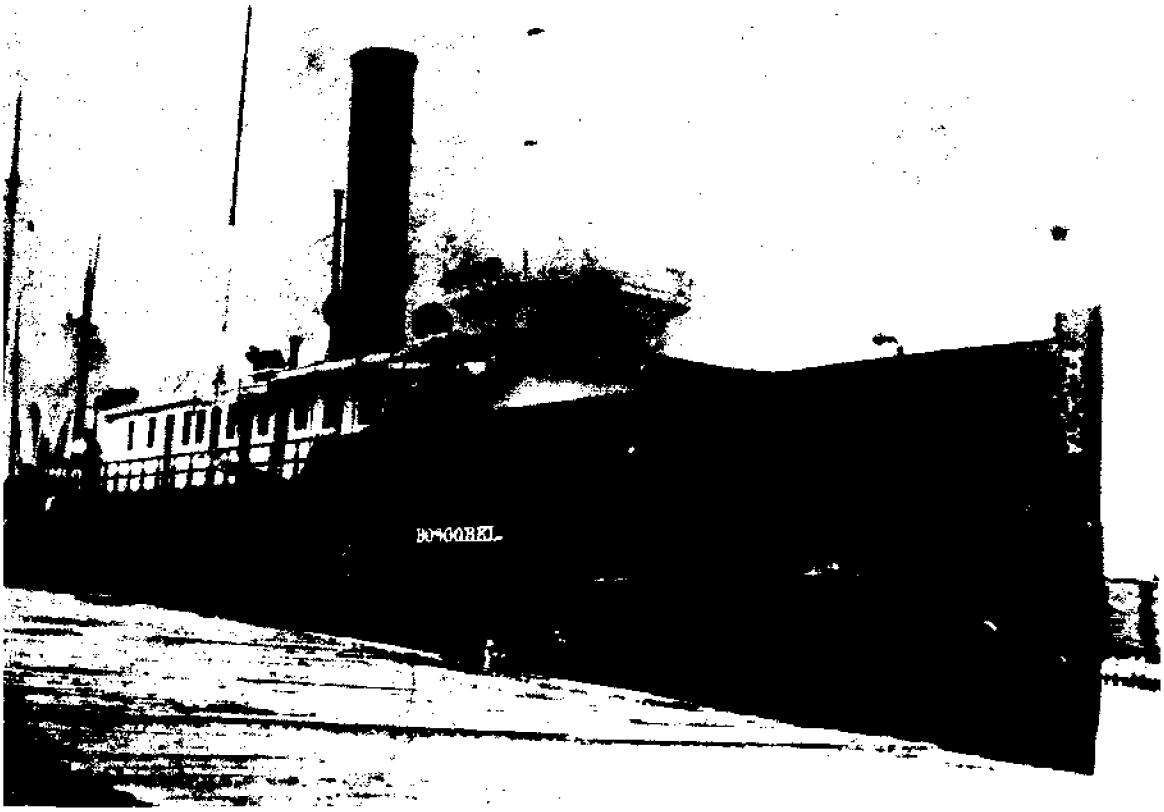


Figure 8.1 *Tug BOSCOBEL. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

Figure 8.2 *Tug BOSCOBEL crew and mascot on foredeck. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

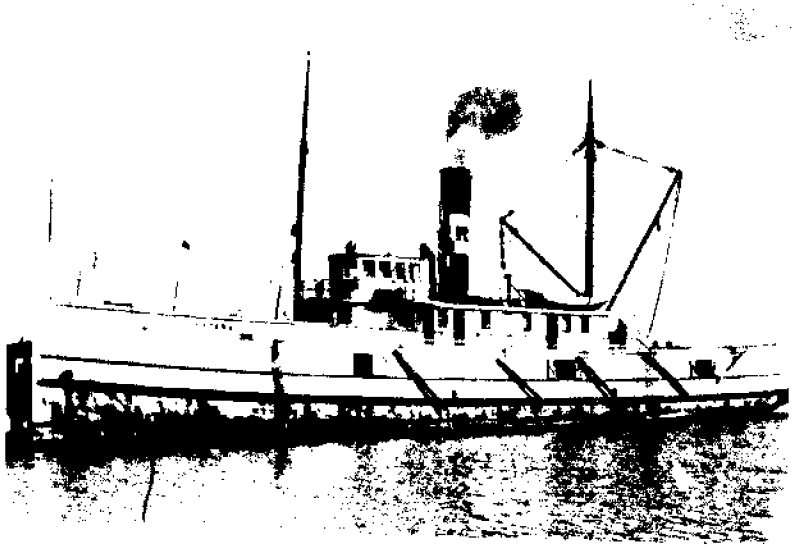


Figure 8.3 *Wrecking tug OTTAWA. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

wrecker, it is unclear if this was prior to or subsequent to Reid ownership (Doner 1958:11-12, 29, 65).

As Great Lakes vessels increased in both size and value towards the end of the nineteenth century, the need for larger and more sophisticated salvage and wrecking equipment became apparent. Reid was already familiar with the heavier tugs used in the rafting and barge towing business, and was one of the first operators on the lakes to branch out into professional wrecking and salvage operations. Early wrecking tugs (like BOSCOBEL) seem to have been converted from large tow tugs, or were like the famous old wrecker FAVORITE (pronounced with a long "I" by those in the marine salvage business; the same tug which rescued the H. D. COFFINBERRY in 1892), which was a former passenger steamer. Reid, faced with a need for heavier wrecking vessels, began purchasing the heaviest Great Lakes tugs available, smaller steam vessels for lightering off cargoes, and even raised and rebuilt several wrecks for salvage use (Meakin 1968:5-7).

Regarding the demand for powerful wrecking tugs to assist large freighters, the Cheboygan Democrat in 1898 asserted:

> One of these huge monsters with a cargo of flour or grain may represent a value of half a million dollars, and when she gets into trouble by stranding, collision, breakage of machinery, or any other cause, she wants help and she wants it pretty quick, at any cost (Meakin 1968:6).

The wrecking tug FAVORITE, owned by Parker and Millen of Detroit was said to be one of the best-equipped wrecking tugs on the lake at the time (though her hull was old and worn out) and was a chief rival of the BOSCOBEL (Doner 1958:72-73, 101; Meakin 1968:6-7). As enthusiastically described in 1898, FAVORITE's salvage gear gives us an idea of how a wrecking tug like BOSCOBEL may have been equipped:

> [Her outfit] consists of three 12" rotary pumps of a capacity of 2,200 gallons per minute. One 14" Worthington, 3,200 gallons per minute. One 16" centrifugal, 1,200 gallons per minute, which pumps coal, grain, iron ore or anything that will enter a suction pipe.
>
> She carries 10,000 ton hydraulic jacks which are used to lift a boat bodily. She also has two 60 foot steel derricks for lifting the loads out of vessels, 20 ore and coal buckets, 200 shovels and picks, and two 12" manila hawsers, one 14" hawser 1,500 feet long, ship's carpenters tools of all descriptions. A blacksmith shop, small machine shop, complete outfit of taps and dies from 3/32" to 1½". Lumber, hay, oakum, nails, rod iron, strap iron and miscellaneous material of all description is carried in abundance, for it is necessary for her to be ready at all times to handle the most difficult job. She also has a complete electric plant, including search light and cable lights. She also has a submarine drill for use on steel boats to enable divers to secure a patch (Meakin 1968:6-7).

Needless to say, as lake vessels continued to increase in size, wrecking tug designs grew even larger, more heavy-duty, and better-equipped. The second FAVORITE (built by the Buffalo Dry Dock Company in 1907) was 195 feet in length, 1,200 horsepower, slept and fed a crew of ninety, had fully-equipped carpentry and machine shops, her own foundry, the most powerful towing winch in existence, and great quantities of pumps, tackle, cables, and other salvage materials (Meakin 1968:10).

On June 1, 1903 the BOSCOBEL was sold to James Reid & Son of Sarnia, Ontario, directly across the St. Clair River from her old home at Port Huron (Bureau of Navigation 1903). Apparently, the change was made by James Reid's son Tom, both to get away from increasingly burdensome U.S. regulations and generally to relocate to a place with a "more favorable business climate" (Meakin 1968:5). Additionally, it seems that Canada passed a law at this time forbidding rafting of logs to the U.S. for processing, and Reid greatly wished to continue with his Canadian timber rafting operations (Doner 1958:59). Evidently, Reid intended to permanently transfer his towing and salvage operations to Canada, because under U.S. navigation laws, once sold foreign the vessel could never return to U.S. service.

Upon transferring to Canada, the BOSCOBEL was renamed OTTAWA and re-registered (Canadian registry #116391). While under Canadian ownership she was captained by Tom Reid, who made quite a name for the large tug in salvage operations on Lake Superior (Figure 8.3). Working variously with such partner tugs as the REID, SALVOR, MANISTIQUE, and GEORGE H. PARKER, some of her many salvages include the famous steamers MATAAFA (refloated, Duluth, 1906), MONARCH (salvaged, Isle Royale, 1908), and SEVONA (salvaged, Sand Island, 1906-1908) (Doner 1958:124-126, 256-257 [plate]; Holden 1985:96; Murphy and Holden 1987:114-115; Keller 1984:117-119; Wolff 1990:107-108, 117-118, 122).

The OTTAWA's last mission came in November, 1909, when the engines of the steamer JAMES H. HOYT became disabled and the big freighter drifted onto a previously uncharted shoal two miles northeast of Outer Island. After futile attempts by local tugs to get her off, she was turned over to the underwriters, who in turn contacted the Reid Wrecking Company. Reid dispatched the OTTAWA and her partner the MANISTIQUE to the scene. After one week and assisted by yet a third tug, the JAMES H. HOYT was freed from the reef at a cost of $65,000 (Keller 1984:117-119). Sources are somewhat in disagreement as to where the HOYT was taken following her rescue. Holden (1985:77) indicates that the HOYT was taken to Frog Bay, near Oak Island. Keller (1984:117-119) dismisses this, and indicates that the HOYT was actually taken to Red Cliff Bay. Engman's account (1984:34-36) seems to confirm this.

In any case, on the night of November 29, 1909, fire broke out aboard the OTTAWA while she lay tied alongside the rescued HOYT. Around 7:00 p.m. the exhausted nine men of the OTTAWA's crew had eaten and turned in early to their bunks. However, by 7:30 they were awakened from their well-earned sleep by a huge blaze aboard, already burning beyond

control. They managed to leap from OTTAWA's deck to the adjoining HOYT, and cut the lines connecting the vessels. Smaller tugs succeeded in pushing the OTTAWA away from the HOYT. By the time Reid Wrecking had dispatched another of their tugs, the REID from Bayfield, it was too late to save the blazing OTTAWA. She burned to her waterline and sank (Keller 1984:117-120).

To this day, the cause of the fire remains a mystery, though it was speculated that the OTTAWA's coal bunkers (containing 130 tons of fuel) had spontaneously combusted. The vessel, containing specialized wrecking equipment, was worth approximately $60,000 but was only insured for $40,000 (Keller 1984:120). The engine and some machinery were eventually salvaged by Whitney Brothers of Superior in May, 1910, using the tug MAXWELL and a scow. The James Reid wrecking tug MANISTIQUE arrived in September, 1911, to complete the job, removing the propeller and other remaining items. The wreck is now located on the north side of Red Cliff Bay lying parallel to the abandoned H. D. COFFINBERRY in approximately twelve feet of water (Holden 1985:77).

Site Investigations

A two-day investigation of the remains of the OTTAWA confirmed that while the steam machinery had been salvaged, most of the vessel's hull structure survived at the site. The OTTAWA's hull remains consist of several major sections, the largest being the lower hull of the tug, including the keel, keelson, and floors. Most of the bilge ceiling remains intact, along with the boiler and engine beds, as well as the propeller shaft tube. In the stern, the deadwood, rudder head, and horn timber survive, along with most of the port fantail. Although the sides of the hull have been burned, much survives up to six feet above the turn of the bilge from the fantail in the stern to the bow (Figure 8.4).

Preliminary mapping of the wreck was carried out without use of a baseline because of the three-dimensional nature of the wreck, as well as time constraints. Each section of the hull was drawn individually, using the chief longitudinal feature as a reference. The location of each section was tied to the main hull by additional measurements of longitudinal members. Photographs and drawings of each section recorded details of construction. Additional field documentation completed in 1991 allowed for the production of a to-scale site plan of the wreck, and included photography, additional measured sketches, and a more complete site assessment.

The surviving remains of the OTTAWA consist of several large sections of the hull and a scatter of structural debris. The site is located on a sandy bottom, with some mixed patches of cobble near shore, and with a light covering of a reddish silt over the whole. The most prominent feature of the wreck proved to be OTTAWA's entire 158-foot long port side and lower hull, running from the position of the stem to the sternpost and fantail. This has survived nearly intact and lies parallel to the north shore of Red Cliff Bay in 12 to 16 feet of water. A 58-foot section of the starboard bow that included the stem assembly lay forward and inshore of the major hull section. Both port and starboard bow sections contain cant

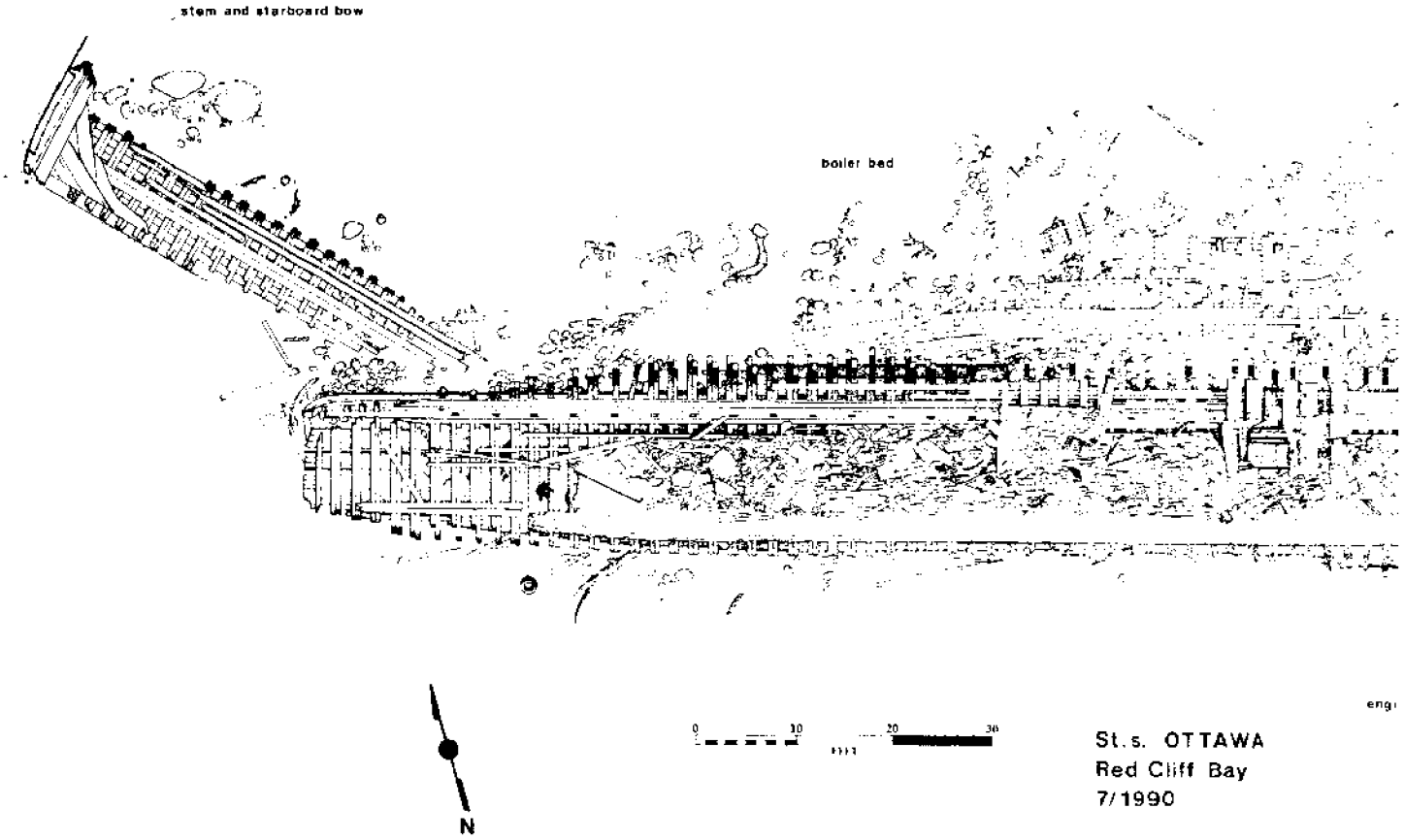
frames, exterior planking, bilge ceiling, and portions of the deadwood used to reinforce the stem. An additional 65-foot section of the starboard side of the vessel lay parallel and adjacent to the major hull section amidships. A 30-foot long section of the starboard quarter lay inshore of the port fantail and stern.

North of these fragments, the lake bed was littered with smaller elements of disarticulated hull structure. Aft and east of the wreck a final 85-foot long section of wreckage was identified. That section appeared to have been part of the starboard lower hull, possibly from the area associated with the OTTAWA's machinery. Other small fragments of wreckage (mostly loose planks) were noted to the west and south of the site.

Although the stempost assembly was actually attached to the fallen section of starboard bow, the rabbet ends of the port hull planks and forward keel scarph clearly identified the port bow. The plank ends confirmed the plumb design of the stem and short radius of the forefoot indicated by historical photographs of the OTTAWA. From the stem scarph, the keel, molded 24 in. and sided 12 in., extended aft to the stern post. At the bow, a section of deadwood extended 17 ft. 4 in. aft from the stem scarph; this scarph was reinforced by 4 in. wide iron straps mortised into the keel and stem. The deadwood was mortised for OTTAWA's cant frames and served as a base for the bow assembly that consisted of the stem, stemson, apron, and additional deadwood.

The entire stem assembly was preserved in association with the section of starboard bow that lay north of the western end of the major hull section. The surviving stem measured 15 ft. 2 inches in height, and had an iron shoe fastened to its leading edge, as well as a length of iron sheathing. The stem was 22 in. molded and 14 in. sided along its after edge, with a rabbet carved into its after edge for the bow planking. The stem was backed by a stemson measuring 12 in. sided and 16 in. molded, which was in turn backed by four deadwood timbers and two apron pieces. Components of the stem assembly were fastened together using 1-inch diameter drifts.

From the bow deadwood, the keel and keelson continued aft and into the stern deadwood below the propeller shaft log. Both appeared to terminate at the sternpost. The keelson was sided approximately 12½ inches and molded 13 inches, while the 24-inch molded keel tapered from approximately 9 inches sided at the stem and stern post to 12½ inches amidships. Aft of the last floor, the space between the keel and keelson appeared to have been filled with deadwood, beginning immediately aft of the bed for the thrust bearings. Above the OTTAWA's shaft tube an 18-inch sided, 19-inch molded horn timber extended diagonally across the top of the sternpost to support the fantail. The plumb stempost extended from the keel to the horn timber and was reinforced at that joint by a knee mortised into both the horn timber and the sternpost. Iron straps reinforced the sternpost and the deadwood forward of the stempost. Like the bow, the stern deadwood was mortised for the cant frames that began aft of the thrust bearing bed.



St.s. OTTAWA
Red Cliff Bay
7/1990

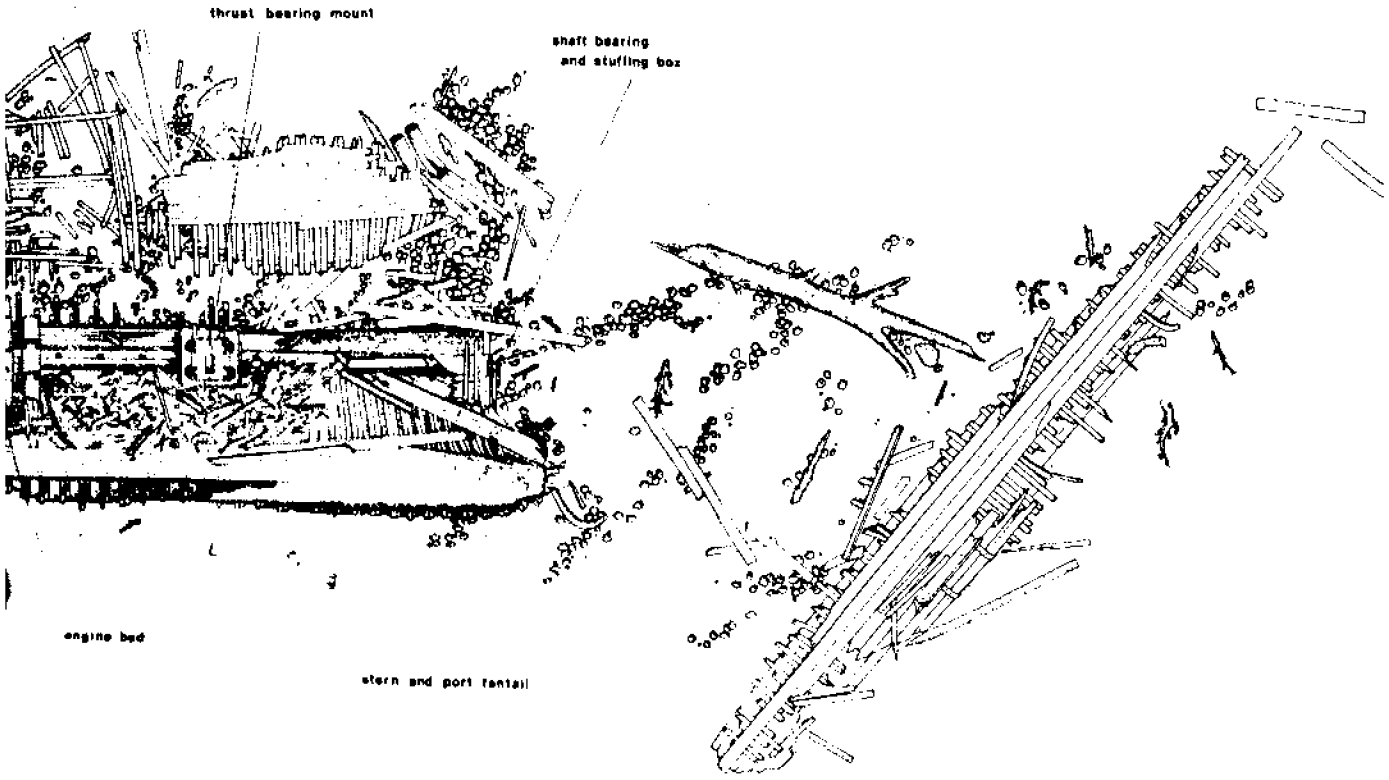

thrust bearing mount
shaft bearing
and stuffing box
engine bed
stern and port tantail

Figure 8.4

long the length of the keelson, the upper face was mortised 4¼ in. by 11 inches pproximately every five feet for centerline hold stanchions that extended aft to the ngineering space. From a point approximately ten feet aft of the stempost, the OTTAWA's eelson was reinforced by sister keelsons that conformed to the contour of the bow cant rames to a sided dimension of 12½ inches along the midships floors before narrowing with ie stern frames to disappear aft of the thrust bearing bed. The molded dimension of the ister keelsons varied with the angle of the floors, ranging between 6½ inches to 7½ inches.

he OTTAWA's double-timbered frames were composed of a series of futtocks, or floors aired with futtocks. The forward nine cant frames were composed of staggered butt-carphed futtocks. In each frame the forward futtocks were separated from the aft futtocks by space of approximately one-half inch to provide ventilation. The futtocks were through-astened to their partners by a series of ¾ inch diameter peened iron pins. Aft of the forward ant frames, each frame was composed of a floor and futtocks. Floors were secured to the eel and keelson by ½ inch diameter iron drift pins. Each floor was located aft of the first uttocks, which were butted beneath the keelson. Floors and futtocks were sided pproximately 4½ to 5½ inches, and were set to produce approximately 10 to 11 inches of oom and 11 inches of space. Measurements confirmed that the frames were molded pproximately 11½ to 12½ inches at the garboards and 9 inches near the deck clamp.

Aft of the thrust bearing bed, the base of the frames were mortised into the deadwood. Aft of he stuffing-box gland the line of mortises followed the rise of the horn timber to the top of he sternpost. There, the framing pattern evolved into a radial pattern that produced the antail. The only observable deviation from the double-timbered framing pattern was found at he engine and thrust bearing beds. There, several sets of frames were found to have been einforced by an additional set of futtocks to provide support for the machinery and resistance o the forces absorbed by the thrust bearings. That pattern of triple futtocks also appeared in he section of hull structure that was identified aft of the major section of hull remains.

The hull of the OTTAWA was planked with 3-inch thick exterior planking ranging from 6 to 11 inches in width, 3 inches in thickness. Planking was attached by a combination of ⅝ in. square shank spikes, drift pins peened over roves, and occasional trunnels. The ceiling planking was roughly 2½ inches in thickness and varied from 8 to 12 inches in width. Most of the observed ceiling fasteners were ¾-inch diameter drift pins peened over 2¼ in. diameter clinch rings.

On the port side of the hull amidships, at least one stringer was observed approximately eight feet outboard of the keelson. The bases of several stanchions were found in association with the stringer -- these may have been the supports for a coal bunker, or some other type of bulkhead. The remains of a deck clamp 13 inches wide and 9 inches thick were observed aft of the bed for the thrust bearings on the port side, as well as on a section of the disarticulated starboard quarter located near the stern of the wreck. The remains of an additional clamp and the ends of deck beams were found on the port quarter outboard of the horn timber and stern post.

Although the interior of the major hull section was filled with debris from the fire and subsequent salvage, the tug's machinery beds were readily apparent. The boiler beds were identified approximately 70 feet aft of the stem, and consisted of a series of 10-inch molded by 7- to 10-inch sided beams placed transversely across the keelson. These supported a bed of 3-inch thick, 10-inch wide planks that were oriented longitudinally, creating a bed area 6 ft. 8 in. long and 7 ft. wide. Upon this structure, a base of brick and concrete was fashioned within an athwartships framework of iron I-beams.

A second bed for the steam plant was located approximately 12 feet aft of the boiler bed. It consisted of a series of five athwartships timbers varying from approximately 15 to 20 inches in width and molded to conform to the contour of the hull, up to 15 inches. Three of the lower sleepers were surmounted by wooden upper members of similar dimensions. These sleepers varied in length and contained a variety of fasteners as well as iron plates that had been employed in mounting the vertical cylinder steam plant. The sleepers were fastened vertically to the hull and to the three upper members with large 2 in. diameter drift pins. The ten-foot length of the bed suggests a multi-cylinder compound engine, which confirms historical records of OTTAWA's engine.

Nine inches aft of the engine bed, another athwartships timber formed the bed for a propeller shaft block bearing. It is possible that the space between the engine bed and the shaft block bed was designed to accommodate the engine's flywheel. Fragments of the shaft block bearing remain attached to the bed timber by 1⅞-inch diameter bolts with 3½ in. nuts.

Fifteen feet aft of the shaft block bearing, the bed for the thrust bearing was found. The bed was composed of a four heavy athwartships sleepers fitted into the vee of the stem. The lower timbers were sided 12 to 17 inches and molded to fit the shape of the hull. The upper timbers were roughly 8 inches in thickness, with similar sided dimensions. The ends of these timbers were also cut diagonally to conform to the contours of the hull. An iron bearing base was attached to the bed by four 2-inch diameter bolts. Additional smaller bolts would have secured the bearings and thrust washer collars.

At the sternpost, a final adjustable bearing supported the propeller shaft. That support consisted of an iron casting bolted to the sternpost above the shaft hole. The casting contained the upper bearing for the propeller shaft and supported the base of a yoke that contained the lower shaft bearing. A rod with an eye in the lower end connected to the upper end of the lower shaft bearing yoke. That rod extended through the horn timber and terminated with a nut that compressed a series of ersatz washers. By tightening the nut, the rod was drawn up increasing pressure on the lower propeller shaft bearing, and thus compensating for wear.

The OTTAWA's rudder was located approximately seventy-five feet west of the disarticulated stem assembly. The rudder lies flat on the sandy bottom, and was probably pushed to this opposite end of the wreck by ice action. The rudder is 7 ft. 8 in. long, 5 ft. 6 in. wide, and 7 in. thick, with a 8½ inch outer diameter iron or steel rudderpost, 13 ft. 3 in. long. The

rectangular rudder blade is constructed of a series of individual vertical wooden planks, reinforced with four horizontal 6-inch wide iron straps. An iron collar is fitted around the rudderpost where it fits into the top of the rudder blade, and the base of the rudderpost terminates in a reinforcing plate and a pintle to fit into the rudder shoe. A 11 in. long iron shackle is fitted to the top of the trailing edge of the rudder blade, where it was probably fastened to the ship with chains for emergency steering, or so as not to lose the rudder if it became unshipped.

Within the hull, a variety of debris associated with the fire that destroyed the OTTAWA and subsequent salvage operations has accumulated to cover most of the bilge ceiling. Debris includes iron fasteners, plate, pipe, and valves associated with the machinery. Brick and concrete from the boiler bed and fragments of wood structure are mixed throughout the length of the OTTAWA's hull. A radiator from the living space or pilot house lies forward between the frames, approximately twenty-five feet aft of the bow. Although little personal material associated with the crew was observed in the debris, small glass and ceramic fragments were present, probably related to galleyware and food storage.

Conclusions and Management Recommendations

Though broken up by fire, ice, salvage, and later scavenging by sport divers, the OTTAWA site still possesses a good deal of architectural integrity. Her lower hull is mostly articulated, and even disarticulated components offer significant information on her construction. The stem assembly, stern/fantail construction, shaft bearing hardware, and rudder are of particular interest. OTTAWA is one of only a few large tow tugs wrecked in Wisconsin waters, and virtually the only example of wrecking tug. It is unfortunate that her wrecking outfit was salvaged along with her machinery, as this could have offered much interesting data on nineteenth century marine salvage. Nonetheless, her sharp hull design and adaptation to towing and wrecking make her a unique source of marine architectural data.
OTTAWA should be considered eligible for the National Register of Historic Places, at least under Criteria C (architecture and engineering), and D (yields information on history). Her surviving architecture is representative of early large tug construction on the Great Lakes, and has the potential to provide archeological insights into these designs. Also, the presence of material cultural remains in the hull suggest potential to provide archeological data on engineering and shipboard life. OTTAWA's association with the development of Great Lakes wrecking, and her many famous salvage operations should also make her significant under Criteria A (broad patterns of history), and her association with James Reid may make her significant under Criteria B (association with famous individuals).

The site also possesses some recreational value, as it is frequently visited by sport divers, due to its convenient depth and great deal of visible remains. The site does not appear to be threatened by recreational usage, other than random artifact collecting, or potential theft of smaller hull elements, such as the rudder. Though outside of the National Lakeshore boundaries, the OTTAWA should be strongly considered for inclusion in any designation of state bottomland preserve areas or National Marine Sanctuaries in the Apostle Islands area.

In the meantime, the site should receive periodic monitoring for artifact theft and illegal efforts at excavation. Any significant artifacts that are observed by monitoring teams or sport divers should be reported to the State Archeologist, documented in place, and left undisturbed to be seen by other visitors. As the site is in relatively shallow water, it is potentially threatened by zebra mussels, and periodic monitoring for these invaders should also be undertaken.

9.0 Steamer SEVONA Site Survey, Sand Island Shoal

Vessel History

The steamer SEVONA (U.S. #136129), originally launched as EMILY P. WEED, was a product of the industrious shipbuilding company of F. W. Wheeler & Company of Bay City, Michigan. The EMILY P. WEED (Wheeler Hull No. 69) was only the second steel craft to be constructed by that firm (CITY OF CHICAGO, launched in March, 1890, was the first) and was one of the largest lake carriers at the time of her 1890 launch (Detroit Free Press 6/8/1890; F. W. Wheeler & Co. n.d.; IGLR n.d.; Runge Collection n.d.).

Her original dimensions were 300 feet in length, a beam of 41 feet, depth of hold of 21.2 feet, and height under her spar deck of 8.2 feet. Her tonnage was listed as 2,362.51 gross and 1,899.65 net tons. She had a plain head, round stern, two decks, and four masts (Bureau of Navigation 1890a). Her triple expansion, 1,560 horsepower steam engine was built by the S.F. Hodge & Company of Detroit in 1890, with cylinders of 23, 37, and 62 inches and stroke of 42 inches, driving a 14 foot diameter, four-bladed propeller. The engine was powered by three 150 p.s.i. Scotch boilers, each 11.5 in diameter and 12 feet in length, built in 1890 by Wickes Brothers of Saginaw (Detroit Free Press 6/8/1890; F. W. Wheeler & Co. n.d.; Runge Collection n.d.).

She was launched on June 7, 1890, at the F. W. Wheeler yard at Bay City, Michigan. The E. P. WEED was constructed at a cost of $220,000 for the Hollister Transportation Company of Gratwick, New York, and was used in both bulk and package freight carrying capacity, being chartered by the Western Transit Company of Buffalo for package freight service between 1890 and 1896 (Detroit Free Press 6/8/1890; IGLR n.d.; Runge Collection n.d.).

EMILY P. WEED was temporarily enrolled at Port Huron on July 5, with C. H. Woodruff as company secretary and Capt. F. D. Welcome as her first master (Bureau of Navigation 1890a). On July 31 she was permanently enrolled at Port Huron with F. L. Gilbert, Secretary of the F. W. Wheeler Company of Bay City as managing owner, and C. H. Woodruff as master (Bureau of Navigation 1890b). She was then sold to C. H. Woodruff in August, 1890, Secretary of the Hollister Transportation Company, managing owner, general manager, and master (Bureau of Navigation 1890c). It is not known why EMILY P. WEED was temporarily sold back to her builder in July.

EMILY P. WEED also achieved a perhaps esoteric distinction in Great Lakes maritime history in 1890: she closed a contract in June for an Edison 200 light plant of sixteen candlepower to be placed aboard as a searchlight, the first to be ordered for a lake steamer. However, it seems that the lake steamer MARYLAND may actually have had her searchlight installed before SEVONA's (Detroit Free Press 6/26/1890, 7/16/1890; Poole Collection n.d.).

H. C. Durand replaced C. H. Woodruff in April, 1894, as secretary of the Hollister Transportation Company, as well as managing owner, general manager, and master of EMILY

P. WEED (Bureau of Navigation 1894c). The vessel was thereafter sold to Granger A. Hollister (owner and master) of Rochester, New York in April, 1895, and was re-enrolled at Rochester (Bureau of Navigation 1895c). She was valued at $175,000 and classed A1 that year by Inland Lloyds, who reported the vessel to have a steel double-bottom, iron boiler house, and steam pump well (Inland Lloyds 1895:78).

James McBrier and company of Erie, Pennsylvania, bought the vessel in April, 1896, probably almost exclusively for use in the Lake Superior iron ore trade. McBrier owned 4/16 interest in the ship, John Thompson of Allegheny City, Pennsylvania and W. J. Sands of Erie each owned 4/16, E. D. Carter of Erie owned 2/16, and Fred C. and Alex Jarecki of Erie each owned 1/16. These gentlemen renamed her SEVONA in February of the following year (Figure 9.1). Captain Donald S. McDonald was her master, and came in as 1/16 owner in March, 1900, McBrier selling or transferring part of his share to McDonald. McBrier and Carter also owned the Wheeler-built steamer FEDORA during this period, finally selling it in April, 1900. Carter sold out his shares in SEVONA to McBrier and Sands at the same time (Bureau of Navigation 1896c, 1897, 1900a, 1900c, 1900d).

In February 1905, SEVONA was purchased by John Mitchell, vice president of the Pennsylvania Steamship Company, and the ship was enrolled at Cleveland with Fairport as her port of hail (Bureau of Navigation 1905a). That winter, SEVONA entered dry-dock facilities at Buffalo and was cut in half. An addition of 72.5 feet was made to her midsection to allow for greater carrying capacity. This addition increased her tonnage up from 2,362.51 to 3,166 gross tons, 1,899.65 to 2,258 net tons, and increased the length of the vessel from 300 to 372.5 feet. During this construction her hold depth was increased to 24.6 feet (Bureau of Navigation 1905a). Evidently, the modifications had been in the planning for several years, as F. W. Wheeler & Company plans for the lengthening have been found dating back to October 20, 1898 (IGLR 1898, 1905).

Emerging newly fitted out from the Buffalo yards in June, SEVONA was temporarily enrolled at Buffalo on June 5 (Figure 9.2). Three days later she was permanently enrolled back at Cleveland and placed back into the Lake Superior iron ore trade, with Captain Donald S. McDonald remaining as master (Bureau of Navigation 1905b, 1905c).

In the evening hours of September 1, 1905, the SEVONA left the Allouez docks of West Superior, Wisconsin, downbound for Erie, Pennsylvania. The steamer was loaded with 6,000 tons of iron ore and a carried a crew of twenty-four, including four women; two were guests of the owners. Though heavy ground swells were running out on the lake, there was no indication either in the weather or the forecast of an impending blow (Keller 1984:95-96). In the span of a few hours, the swells built into a storm, gathering more force by the hour. By midnight, it was blowing a full gale. At 2:00 a.m. SEVONA was about seventy miles from Superior, with heavy seas breaking over her bow and running over the deck. Captain McDonald, estimating his position to be about an hour northeast of Sand Island, opted to come about and make for the shelter of the Apostle Islands (Keller 1984:96-97). Navigating through blinding rain, fog, mist, and rough seas, SEVONA ran hard aground on Sand Island

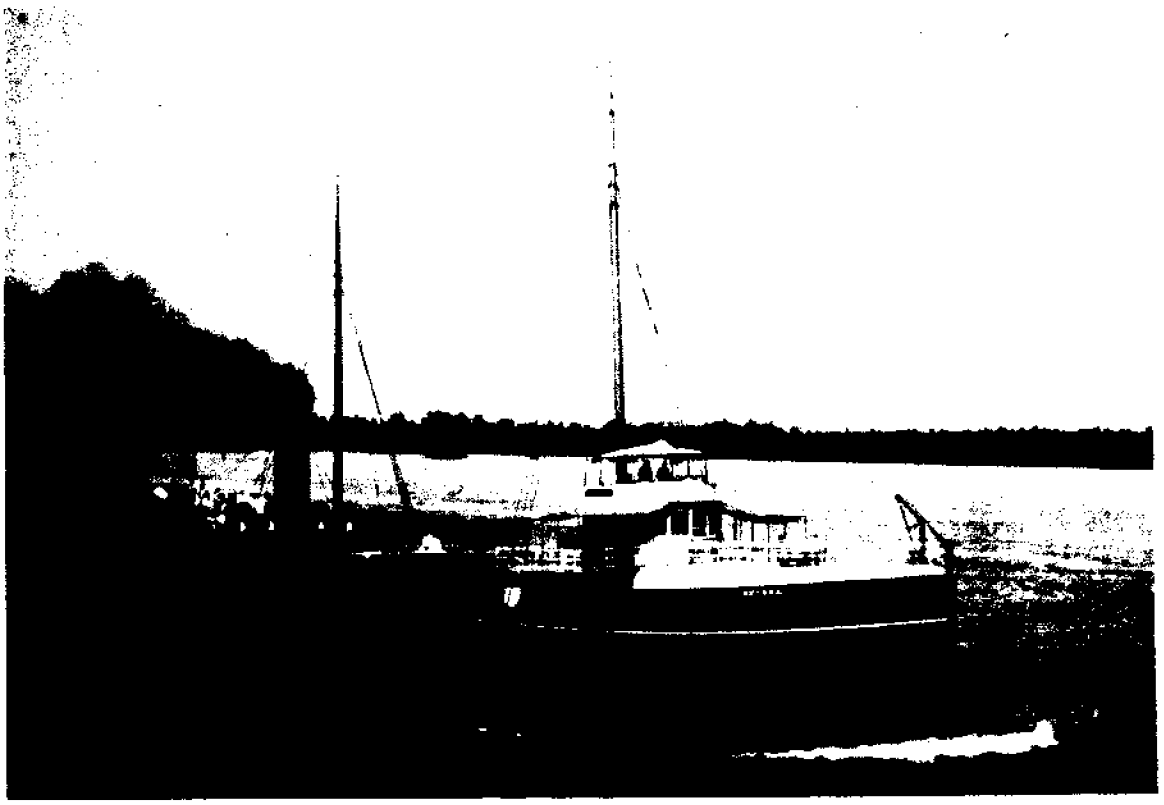


Figure 9.1 *Steamer SEVONA prior to 1905 lengthening. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

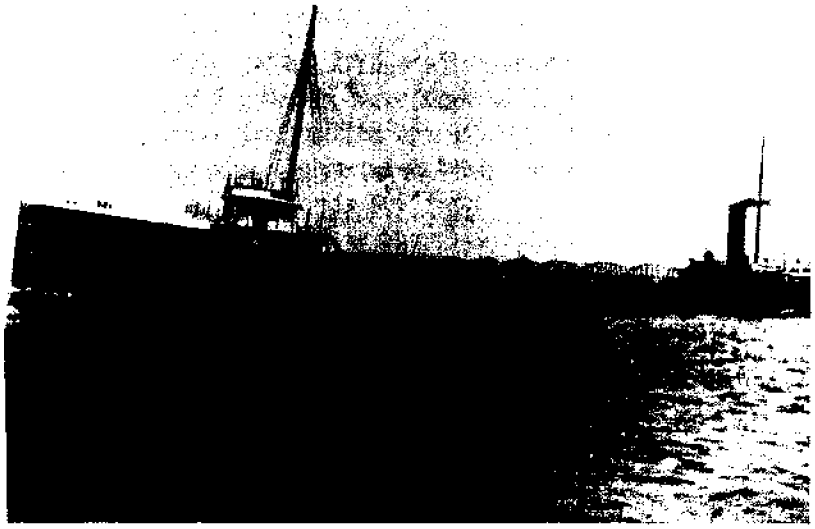


Figure 9.2 *Steamer SEVONA after 1905 lengthening. Photo courtesy of the Institute for Great Lakes Research, Bowling Green University.*

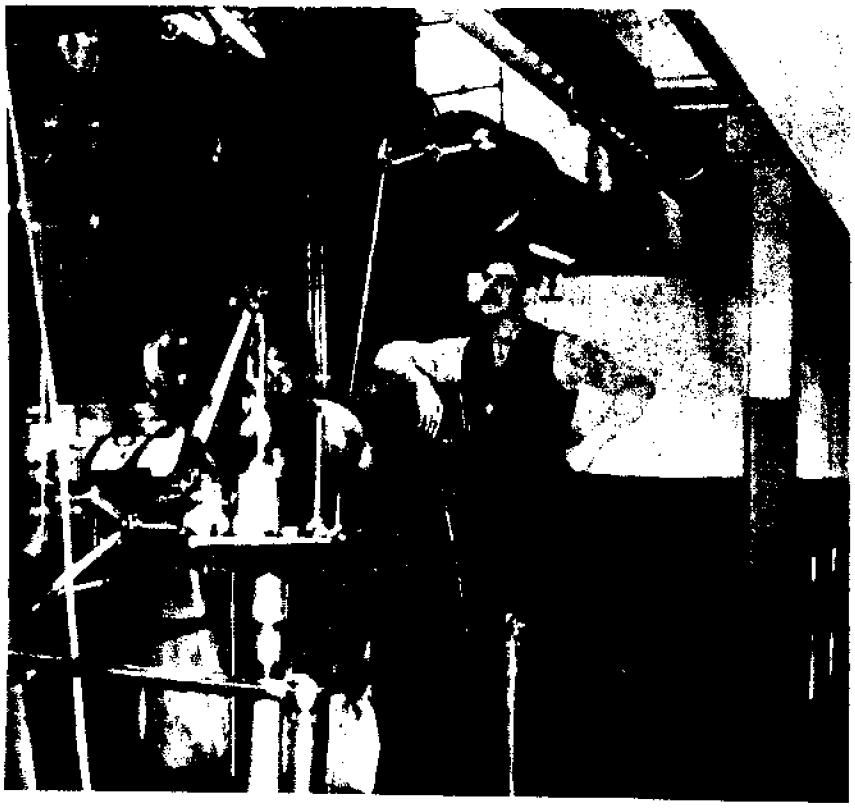


Figure 9.3 *Engineroom crew, steamer SEVONA. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

reef shortly after 5:45 a.m. on September 2. The Sand Island Light Station Journal of Keeper Emanuel Luick gives a portrait of the events:

> Saturday September 2, 1905
> NE, terrible gale and heavy rain and fog. At 5:45 AM a Steamer whistled a distress signal but for fog and heavy rains we was unable to see or tell where the steamer was only know she was NE of station. At 10:00 AM it cleared up some so we could see a steamer drifting in on the east side of Station where she soon struck bodom [sic]. We could see no life on board or see any distress signal. We patroled the beach from 10 to 12 but found nothing. At 12:00 the pilot house started to break away and at 2:00 the forward mast went overboard. From 2:00 to 5:45 PM we [illegible] the beach and found one trunk and all the cablon [sic] work and mast. Lift [sic] along the shore and found or see one man which was covered back and forth in the sea but life was extinguished. We tried to get him but was unable to do anything. As the sea did not carry him in close enough. At 2:00 PM one life boat with 6 of the crew came ashore at East Bay and found shelter with F.A. Hanson. The others boat made for York Island. With 11 of the crew. Four women was along (U.S. Light House Service 9/2/1905a).

Also corroborating the wreck was Keeper Charles Hendrickson of the Raspberry Island Light Station:

> 9/2/05 A steam boat wrecked on the north side of York Island [sic]. First visible from this Station at 10 A.M., when the whole boat was seen. At about 3 P.M. the front part of the boat disappeared, and at sun set, only the smokestack was visible. No sign of life was seen. Wind NE. Gale and Mist . . . (U.S. Light House Service 9/2/1905b).

Though McDonald was keeping a sharp eye out for the lights, and had even slowed engines to half speed just prior to the stranding, the gale weather allowed only dead reckoning for navigation. As the lightkeeper's report suggests, SEVONA began to break up almost immediately after it struck the shoal. The captain and six of the crew stationed forward on the vessel were cut off from the other seventeen located aft, due to hatches opening and the vessel being broken in two amidships. One of the female passengers, Kate Spencer, recounts:

> I cannot think or talk of the wreck without shudder following shudder. At about 6:00 came the terrible crash which broke the vessel in two. We got into the lifeboats at that time, but the captain and the other men could not come aft owing to the break. He hailed us through the megaphone 'Hang on as long as you can.' We did so but the sea was pounding us so hard that Chief Engineer Phillipi finally directed us out of the small boat and into the large vessel again, all congregating into the dining room which was still intact. The big boat was pounding and tossing. Now a piece of the deck would go and then a portion of the dining

> room. During all this time the men forward could not get to us (Ashland Daily Press 9/5/1905 in Keller 1984:98-99).

The ship's whistle was blown and signal rockets were launched to no avail: there was neither life-saving station nor nearby vessel to render assistance. By 11:00 a.m. the aft section was breaking up. Kate Spencer reports:

> Everything seemed to be breaking at once, and by order of the Chief Engineer we took to the small boat again. One by one we piled into the boat leaving six men behind us. I never heard such a heart rending cry as came from those six. 'For God's sake, don't leave us!' they cried. So two of our men got out and helped the six pull the port boat over to the starboard side and launch it. Then we both set out. It was a terrible fight to keep the small boat afloat! (Ashland Daily Press 9/5/1905 in Keller 1984:100)

Two aft lifeboats were launched; one carried eleven crew, and the other six. Both reached the safety of land. The captain, two mates, two wheelsmen, and two watchmen were not so lucky. Somehow, during the course of SEVONA's rebuild, the forward lifeboat had been removed, and was not even replaced with a liferaft (MacDonald 1963:78). The men forward perished while trying to make Sand Island on a raft made of SEVONA's hatch covers after the pilot house collapsed (Keller 1984:102-103).

The two lifeboats had a rough ride in, especially the smaller boat with the six men aboard. As all the experienced crewmen were forward, the after boats were manned by the ship's black gang, galley staff, and passengers, who were largely unfamiliar with boathandling. Even the most experienced of seamen would have had difficulties managing the boats as they plunged and corkscrewed through the wild seas. Harry Van Vlack, SEVONA's one-armed oiler, furiously attempted to bail the smaller lifeboat with his cap, keeping it afloat long enough to blow ashore at East Bay, Sand Island. Engineer Phillipi's boat, after a brave attempt to rescue the forward crew, finally made land at Little Sand Bay, where they were assisted by a farmer out looking for cattle spooked by the storm (Ashland Daily Press 9/5/1905 in Keller 1984:100-101).

With local logger Napoleon Rabideaux and his wagon and team, Phillipi set out to Bayfield for assistance, leaving the rest of the crew and passengers at Rabideaux's cabin. Over eleven miles of horrendous roads, and clearing numerous windfalls, they made Bayfield after nearly a day. Phillipi enlisted the aid of the tug HARROW and fifteen men to go out to SEVONA and rescue the remaining crew. He could not know that the bow had collapsed soon after they had departed the wreck, and that the forward crew were already dead. Arriving at the wreck, the HARROW found only the abandoned remnants of the stern; the bow and forward 200 feet of the ship had been consumed by Lake Superior (Keller 1984:101-102).

The Sand Island lighthousemen undertook the grim task of body recovery.

> Sunday, September 3, 1905
> NNE Gale and heavy rain, fog. At 10 AM Keeper E. Luick and Assistant F.A. Hudson went around the beach when about 1 mile from light we found a dead man among the wreckage. Keeper got help from East Bay to help get him up in the woods. Two of the wreck steamer crew. At 6:45 PM the tug Harrow came out from Bayfield to view the wreck but there was only the stern left.
>
> Monday, September 4, 1905
> NE fresh and cloudy, cold. Keeper got ready to take crew to town with sailboat when the tug R.W. Currie came out to pick them up at 9:00 AM. Mr. Frank Shaw, Ambrose Gorden and Edward Stufel went out to help look for the bodies. They found three, one in Justus Bay and two in east Bay. Keeper learned through the Captain of Tug Currie that the other life boat landed in Sand Bay mainland with 11 of the crew. They left the wreck at 2:00 PM with the 7 men on the bow of the steamer no way to get off. Keeper left for town with the tug to get the Statement of the Wreck from the Engineer. The tug took the four bodies to town at 6 PM. Keeper returned with the tug on her second trip (U.S. Light House Service 9/3/1905a, 9/4/1905a).

The Ashland Daily Press reported the condition of the bodies; "The bodies recovered were horribly pounded up on the logs and driftwood on the beach but their faces are all sufficiently clear to allow for easy identification" (Ashland Daily Press 9/6/1905 in Keller 1984:103). These bodies included that of the captain. Donald Sutherland McDonald, a Scots-Canadian mariner from Ontario with extensive salt-water service, had cheated death years earlier when he and another man were the sole survivors of the wreck of the Norwegian brig HILDING off the Irish coast (Milwaukee Journal 9/9/1973).

Not all the locals appear to have been as helpful as Rabideaux and the lighthousemen. When McDonald's body was found, $1,500 of company money was missing from his pockets, though all his other personal effects were present. It was later reported that several "undesirables" were frequenting Bayfield bars and stores, spending vast quantities of battered, watersoaked bills. The three men were brought to trial, but the prosecuting attorney inexplicably failed to appear, and the charges were dismissed (Keller 1984:105)

The newly rebuilt SEVONA was valued at $220,000 and was declared a total loss. Insurance paid but $160,000. The payments to the families, if any, were the expressed public outcry for better navigational aids, life-saving stations, and telephones through the Apostle Islands in the wake of the 1905 gale. Claims were also made that the ship had broken directly at the junction of her new midships section, suggesting that the vessel lengthening had been a dangerous folly (Keller 1984:105) SEVONA's documents of enrollment were surrendered at Cleveland in December of 1905 by her newly acquired owners, the Pennsylvania Steamship Company (Bureau of Navigation 1905c).

Figure 9.4 *Wreck of the SEVONA; stern view. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

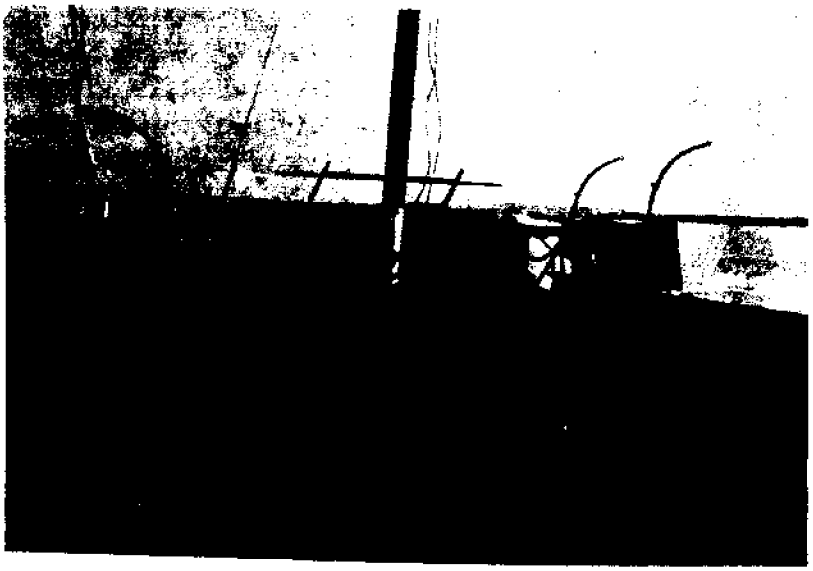


Figure 9.5 *Wreck of the SEVONA; afterdeck section. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

The first "salvage" of the wreck occurred only days later. The tug SKATER took weekend excursionists out to the site, serving coffee and sandwiches, and securing "portions of the wreck as mementoes of the disaster" (Holden 1985:95; Keller 1984:100). The Reid Wrecking Company of Sarnia, Ontario, purchased the wreck from the underwriters in October, 1905, for $5,000, thinking the vessel could actually be refloated. However, the hull was ground down by winter ice, and in the fall of 1906 Reid returned to remove light machinery and to re-think salvage options (Holden 1985:96).

One account indicates that Reid did actually attempt to refloat the hull, bringing equipment and diver Louis Meyer up from Port Huron, and building a 426-foot-long by sixteen-foot-high floating cofferdam on the mainland that was towed out to the wreck (Doner 1958:124). That may have been the plan; the account is not confirmed by any of the secondary or primary literature, and it is difficult to imagine that such an extravagant effort would have escaped remark by local newspapers, had it really taken place.

In any case, by the fall of 1907 Reid had still not performed the planned salvage, and the U.S. Army Corps of Engineers was beginning to get impatient about the wreck being a hazard to navigation (Holden 1985:96). Reid had the hull (which rose up to within six feet of the water's surface) marked with spar buoys pending his salvage work. He announced that he intended to remove the boiler and machinery first, then the ore, and finally the hull would be raised or dynamited for scrap (Marine Review 10/10/1907:25 in Runge n.d.).

Good to his word, in June of 1908 Reid arrived with a large salvage rig, including the tug OTTAWA. During this time he recovered the engine, SEVONA's three boilers valued at $10,000 apiece, and hundreds of tons of hull plating scrap valued at $9.00 per ton (Holden 1985:96; Wolff 1990:107-108). Despite Reid's work, the SEVONA still protruded to within eleven feet of the surface. In July, 1909 the U.S. Army Corps of Engineers had her blown up with a quarter ton of dynamite by the government steamer VIDETTE, producing a water depth of fourteen feet over the site for safe navigation by smaller vessels. Even after this abuse, enough steel remained that J. B. Wanless of Duluth conducted extensive salvage on the wreck during the 1917 scrap drive for World War I, removing 180 tons by that August, and hoping to have another 800 out before winter (Holden 1985:96).

Site Investigations

A three-day archeological examination of the remains of the SEVONA confirmed the efficiency of the salvors. Today, the remains of the SEVONA consist of little more than the lower section of the hull below the tank top and turn of the bilge. Virtually everything above the tank top was broken up with explosives and recovered (Figure 9.6).

The surviving wreck structure consists of two sections of the hull. The two sections lie almost perpendicular to one another with the larger aft section oriented almost east to west and the 118-foot forward section oriented northwest to southeast. The stern lies at the western extremity of the wreck and the bow lies at the southern extremity. Both surviving

sections of the SEVONA consist of the lower hull, including the ship's lower hull plate, keel, keelson, stringers, floors, and portions of the steel tank top plate. Outside the intact sections of the lower hull is an extensive debris field consisting of plates, frames, beams, and other structural material dislodged from the hull during salvage. The wreck lies in approximately eighteen to twenty feet of water, on a flat sandstone bottom.

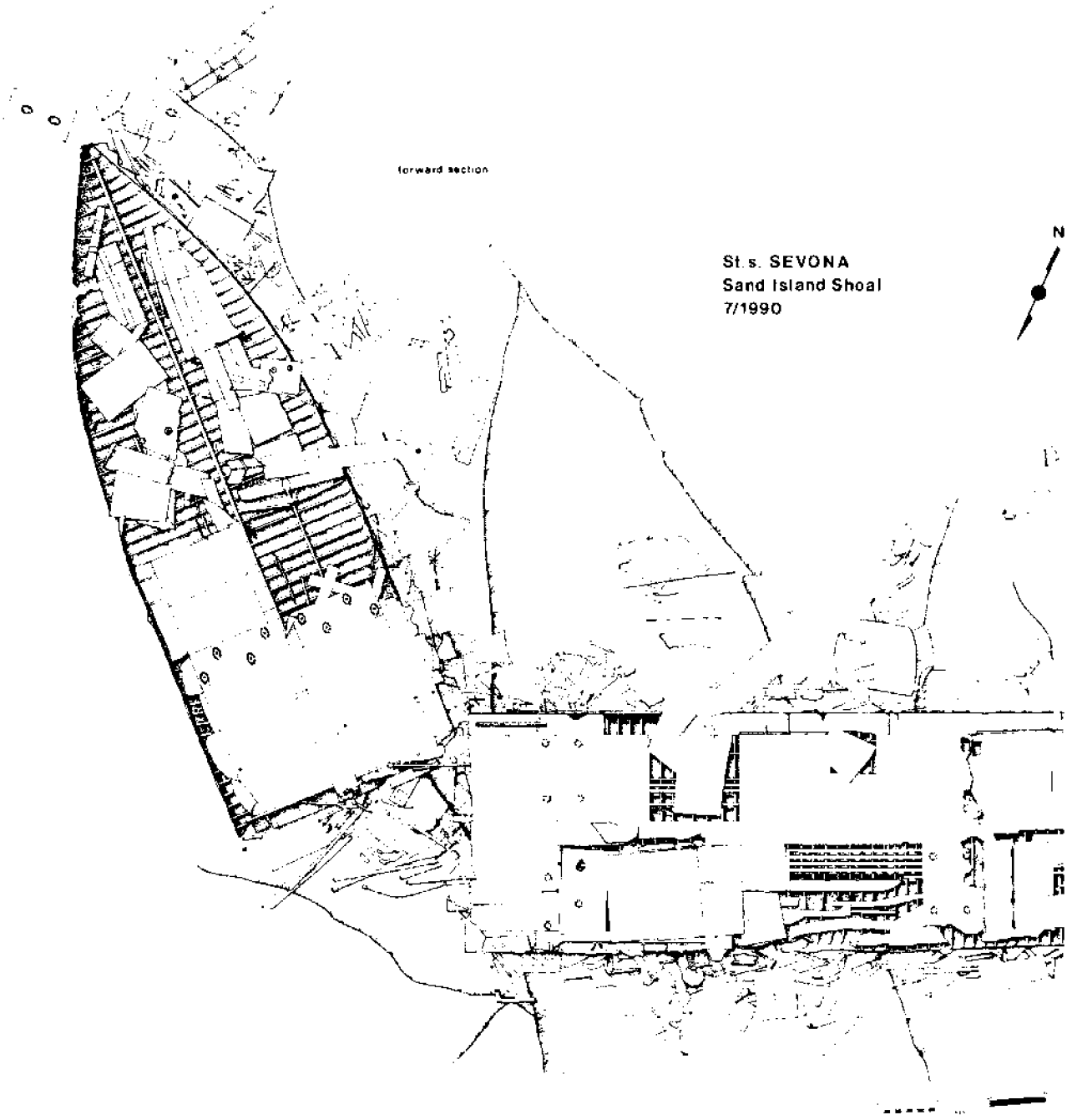
To facilitate mapping the SEVONA, baselines were stretched along the keel over both sections of the hull. To establish the relationship of the bow to the stern, the baselines were connected using two short baseline segments. By measuring the lengths of the short segments and determining the angles of intersection, it was possible to tie the two sections of wreckage together for mapping purposes.

In order to document both sections of the SEVONA's hull in the amount of time available, the wreck was divided into sections. Each section was mapped in relation to the baseline. Overall dimensions were recorded as a factor of baseline distance and hull width. Throughout most of the wreck, measurements of beam were recorded every twenty feet. Where bow and stern configuration was more complex, athwartships measurements were taken every ten feet. Within this general framework, details of the wreck were recorded in relation to distance along baseline and distance port and starboard of the baseline. As the framing pattern was highly standardized and plates were of uniform dimensions, the structure itself could be used as a reference grid for recording construction details and features. Material outside the hull was sketched in relationship to features or details along the extremity of the surviving hull structure. Major elements of debris were measured to improve sketch map accuracy. In August, 1991, SHSW archeologists and a local volunteer diver returned to the SEVONA site to confirm portions of the 1990 documentation, gather additional data, and take video and still photographs of the site.

Site Description

The larger aft section of the SEVONA measured 226 feet and four inches in length over the keel plate. The extant after section consists of lower hull plate, keel plate, floors, stringers, and tank top plates. The ⅝ in. steel plate that formed the SEVONA's keel measured 3 ft. 6 in. molded amidships and extended uninterrupted from the stern to the break in the hull. The keel plate was attached to the exterior plating by 4½ in. by 4½ in. angle bar riveted along the port side of the plate. The top of the keel plate was reinforced and attached to the tank top with 3½ in. by 3½ in. angle bar riveted to both sides of the keel plate and 24 in. wide longitudinal plates that comprised the center of the tank top. The keel measured 28 in. molded at the bow, with a sided measurement of 7½ inches.

Every 25 in. the keel plate was reinforced by 3½ by 3½ inch angle bar riveted vertically. Those plates also served to attach the 1 ft. 7 in. sided, ½ in. thick steel floors that extended from the keel plate to the turn of the bilge. Each floor was riveted to the vertical angle at the keel plate and attached to the exterior plating by 4½ in. by 4½ in. angle bar that extended from immediately outside the keel plate angle out to around the turn of the bilge. Frames


forward section
St.s. SEVONA
Sand Island Shoal
7/1990
N

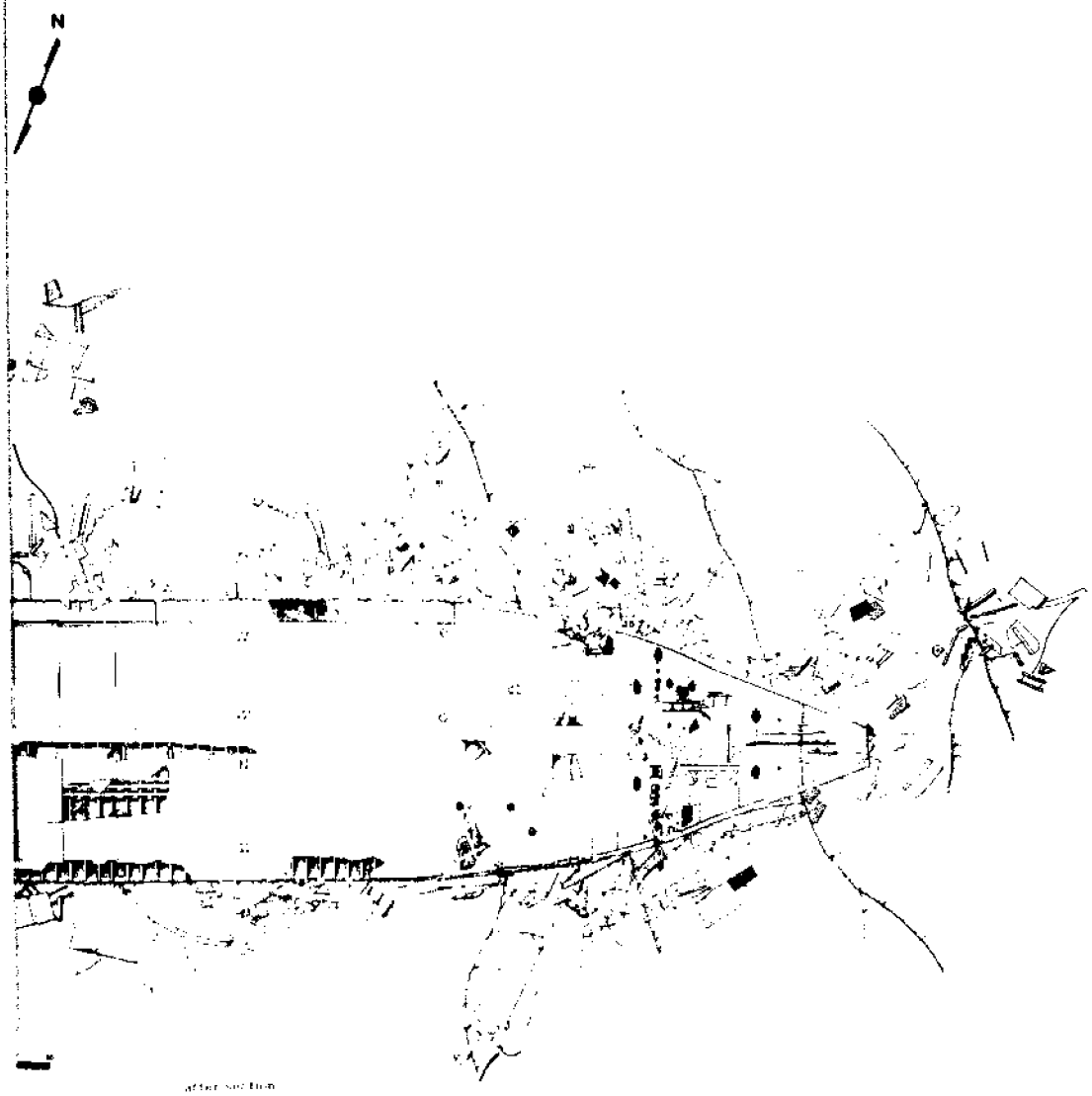


Figure 9.6

were sided 3¼ in., molded 15 inches at the floors and 4¾ inches at the turn of the bilge, and were spaced 2 ft. 4 in. A 10½ in. wide diagonal brace reinforced along the top by 3 in. by 3 in. angles extended from the top of the angle reinforcing the keel plate to a point on the floor 26 in. from the keel plate. The diagonal brace was riveted to the forward face of the floor. The top of the floor was also reinforced by a 3½ in. by 3½ in. angle that extended from the keel plate to around the turn of the bilge. The inboard end of each of the floors was also found to have been pierced on 6 in. centers 9 in. above the exterior plating to provide three 3-in. diameter limber holes.

The exception to this method of construction was the section of the SEVONA that had been added in 1905. That 73 ft. section was located in the after section of the hull and was identified by different construction of the keel plate brace and floors. The addition is located 25 ft. aft of the break in the hull and extends to a point 97 ft. 2 in. aft of the break. There, the keel plate was reinforced by a plate cut to butt to the keel plate, from above the angle that was used to attach the keel plate to the hull plate, to a point 3 ft. 2½ in. above the bottom of the hull. The base of the gusset extended 2 ft. 6 in. outboard of the keel plate and was cut diagonally to clear the angle at the base of the keel plate. The top of the gusset was also cut to form a 3½ in. horizontal face which was designed to clear a 3½ in. angle that attached the keel plate to the tank top.

Unlike the braces in the original sections of the SEVONA's hull, the gussets in the addition were stiffened by bending approximately 3 in. along the diagonal edge of the plate at an angle of ninety degrees. These gussets were riveted to the after side of the 1 ft. 4 in. molded floors. Two limber holes 3 inches in diameter had been punched through the floor within the area reinforced by the gusset. The floors were attached to the bottom plating with 4 in. angle and stiffened along the top with 4 in. angle that extended, as did the floor, from a point immediately outboard of the angle used to attach the keel plate to the hull plate. The upper stiffener extended outboard to a point in the center of a triangular gusset attached to the aft side of the floor at the turn of the bilge.

Also differing from the original sections of the SEVONA, the floor at the turn of the bilge of the new section was formed by bending the outside radius of the turn ninety degrees to provide a place of attachment to the hull plating and act as a stiffener. Angle bar attaching the stringers to the floors was attached to the aft face of the floors. To reinforce the turn of the bilge, a triangular gusset had been attached to the extremity of the floor. Although none of the frames survived above the tank top, the triangular gusset must have also served to reinforce the joint between floors and frames.

Outboard of the keel plate each side of the SEVONA was found to have three steel reinforcing stringers. The inboard stringer was located 4 ft. 9 in. outboard of the keel plate, the second stringer was positioned 9 ft. 11 in. outboard of the keel plate, and the outboard stringer was attached 14 ft. 7 in. outboard of the keel plate. Each stringer rested on top of the floors and was riveted to the floors by 3 in. angles that extended vertically up the forward

face of the floor and the sides of the stringer. The top of each stringer was stiffened and attached to the tank top plates with 3 in. angle.

Over the system of floors, stringers, and keel plate that formed the framework of the lower hull, the SEVONA was plated with ½ in. steel, comprising the tank top. In the center of the hull over the keel plate a series of 4 ft. wide plates, each approximately 25 ft. in length, extended from forward of the engine room to a point approximately 65 ft. aft of the bow. Additional plates no doubt extended to the bow but damage to the tank top in the vicinity of the bow precluded confirmation. Outboard of those plates the tank top consisted of 8 ft. wide plates that extended out approximately 14 ft. 4 in. to the turn of the bilge. Along the turn of the bilge, longitudinal plates approximately 2 ft. in width and 16 ft. in length covered the ends of the floors. With the exception of the forward portion of the bow section and a few small areas in the stern section, most of the tank top plate was found intact.

Rivets used in SEVONA's construction included 1 in. diameter rivets countersunk into the tank top plate, ⅞ in. diameter rivets used in the frames and floors, and ⅞ in. diameter rivets used to fasten the exterior plating.

Conclusions and Management Recommendations

One interesting result of the survey is the fact that the 1905 midships section added to the SEVONA is readily identifiable, even in the heavily salvaged state of the wreckage. This section is still articulated, refuting the historical claim that the ship had broken at the joint between the old and the new hull sections. The break seems to have been the result of the sudden stranding of the bow, with the momentum force of the midships and stern snapping the hull in two.

Though badly broken up by salvage, and subsequently heavily scavenged by sport divers, the SEVONA site still possesses good architectural integrity from the level of her tank top to her bottom. In addition, a good deal of smaller material and debris from her machinery and upper structure can be found in the immediate vicinity. SEVONA is one of only a few (less than ten) large iron or steel ships wrecked in Wisconsin waters, and is the only known surviving example of a metal-constructed bulk carrier wrecked in Wisconsin waters (the steamer M.J. BARTELME, wrecked at Cana Island in 1928, and the steamer WILLIAM A. REISS, stranded at Sheboygan in 1934, were both scrapped, leaving behind virtually no articulated hull remains) (Wisconsin Submerged Sites Inventory, n.d.). Additionally, SEVONA is only the second steel hull to have been built by the Wheeler firm, and may offer significant comparative data on the development of Wheeler's steel hull construction techniques.

It seems that SEVONA should be eligible for the National Register of Historic Places, at least under Criteria D, as her surviving architecture has the potential to provide archeological insights into early steel-shipbuilding on the Great Lakes. While the existence of extensive builder's documentation for the ship may seem to argue against the archeological significance

of its remains, the presence of both the historical and the archeological record allows archeologists to test the reliability of the historical record, not simply supplant the historical for the archeological. Therefore, the existence of historical documentation does not preempt the archeological significance of the site; rather, it merely defines a different set of research questions.

Additionally, the SEVONA seems to have acquired some de facto historical significance as a noted tragic event in local history. Samuel Fifield, an Ashland businessman and former state legislator, senator, and lieutenant governor, built a cottage on Sand Island soon after the wreck, using the ship's wooden hatch covers that washed ashore. The cabin is decorated inside with framed articles and letters dealing with the event, and the cottage seems to have had some memorial function. The SEVONA Cabin was listed on the National Register in 1976 (Parnes 1976). For this reason, and for its inclusion in many popular accounts of Apostle Island's history (Boyer 1971:138-157; Keller 1984:95-105; Superior Evening Telegram 9/10/1973), the SEVONA wreck is popularly perceived as a historically-significant wreck site, despite the wreck's lack of full structural integrity, or real uniqueness about its history or loss.

The site also possesses some recreational value, as it is frequently visited by sport divers, due to its convenient depth and great deal of visible remains. Though outside of the National Lakeshore boundaries, the SEVONA should be strongly considered for inclusion in any future designation of state bottomland preserve areas, or National Marine Sanctuaries. In the interim, the site does not appear to be threatened by recreational usage, other than random artifact collecting. The site should receive periodic monitoring for obvious artifact theft; however, the flat sandstone bedrock around the wreck has not hidden many artifacts from collectors, nor can looters dig around the site, other than in debris. Nonetheless, any especially significant artifacts that are observed by monitoring teams or sport divers should be reported to the State Archeologist, documented in place, and left undisturbed to be seen by other visitors. As the site is in relatively shallow water, and comprises a potentially large, solid habitat for zebra mussels, periodic monitoring for encrustation by these invaders should also be undertaken.

10.0 Schooner-Barge PRETORIA Reconnaissance, Outer Island

Vessel History

One of the most colossal vessels to ever have sailed the Great Lakes was the wooden schooner PRETORIA (U.S. 150872), built in 1900 in West Bay City, Michigan, by James Davidson. Davidson, a marvel in his day with the science of building and maintaining wooden ships, had the confidence of many of the big Great Lakes freight shippers in his ability to construct wooden vessels of the highest quality, able to carry heavy cargoes at competitive rates. His ships were built and maintained at his own yards, and Davidson was self-insured. He also undertook his own fleet wrecking operations, and the stranding of one of Davidson's ships was attended by a much smaller wrecking bill than was the usual case. Davidson claims to have saved over $1,000,000 in insurance premiums through these methods (Keller 1984:107). None the less, some contemporary observers doubted the future of wooden ships (they were reportedly almost unsalable even at half their insurance value), and Davidson was seen as something of a final holdout in wooden ship construction (Detroit Free Press 11/9/1898).

PRETORIA was one of three vessels built by Davidson with the same dimensions of 338.4 feet in length, a 44 foot beam, and a depth of 23 feet (MV 1900). Her sisters included CHIEFTAIN (1902) and MONTEZUMA (1903), and together were the largest wooden vessels of any type ever built on the lakes, as well as some of the last. PRETORIA's keel was reportedly laid as early as November of 1898, but was not launched until July 26, 1900 (Figure 10.1) (Detroit Free Press 11/9/1898; Duluth Evening Herald 7/27/1900; Runge Collection n.d.).

PRETORIA was classified as a schooner-barge, was owned by Davidson, and was towed by Davidson-built steamers. PRETORIA participated in the iron ore, coal, and grain trades. She had a gross tonnage of 2,790.53 tons, a net tonnage of 2,715, and a capacity for up to 5,000 tons of iron ore or 175,000 bushels of wheat. She had a single deck and three masts. Reportedly, she had eleven hatches in her deck, each 7 by 26 feet. Her sister ship CHIEFTAIN's hatches were spaced on twenty-four-foot centers; it can be assumed PRETORIA was similarly configured. PRETORIA's aftercabins were built entirely on her upper deck, and she is reported to have had a round stern; there are few other specifics on her construction (Bureau of Navigation 1900b; Lewis 1948:207; Runge Collection n.d.).

PRETORIA was initially enrolled at Port Huron, Michigan on July 27, 1900, with James Davidson owner and master (Bureau of Navigation 1900b). In March, 1902, she was sold to G. A. Tomlinson, Davidson's son-in-law and vice-president of the Davidson Steamship Company of Duluth. The enrollment also lists Tomlinson as master (Bureau of Navigation 1902a; Labadie, personal communication 1/28/1991).

On the morning of September 1, 1905, PRETORIA was taking on iron ore at the Allouez docks in Superior, Wisconsin, and late that morning she cleared for South Chicago heavily

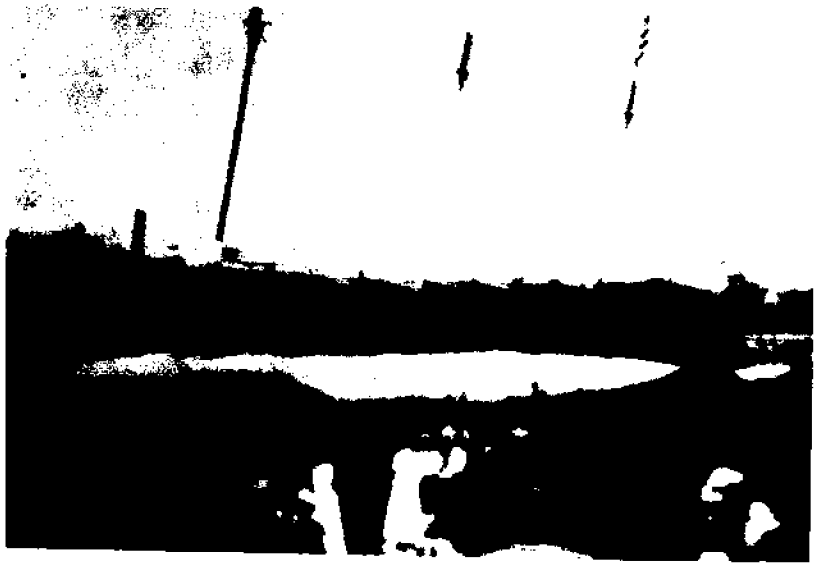


Figure 10.1 *Schooner-barge PRETORIA at launching. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

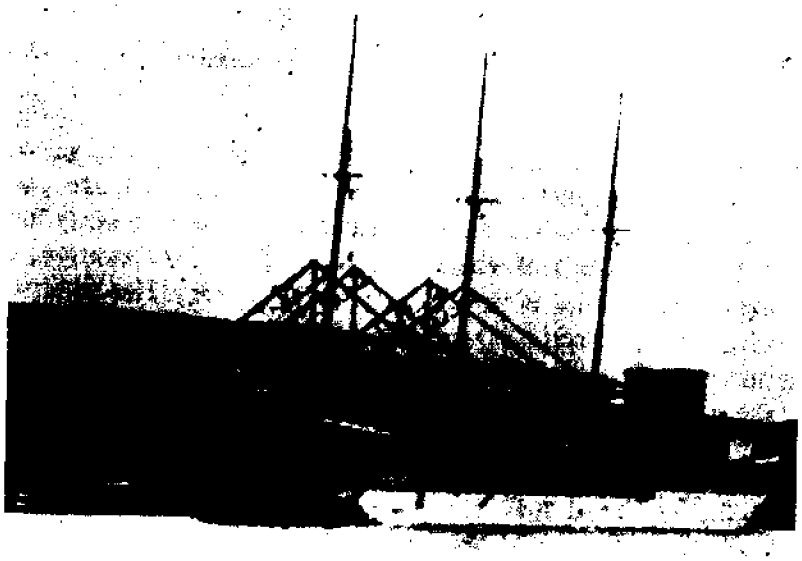


Figure 10.2 *Schooner-barge PRETORIA. Photo courtesy of the Institute for Great Lakes Research, Bowling Green State University.*

laden, in tow of the 263-foot wooden steamer VENEZUELA. PRETORIA, under the command of Captain Charles Smart with nine crewmen aboard, was unsuspectingly heading out into another of Lake Superior's fierce autumn storms. Nearby lay another ill-destined vessel; the SEVONA was also loading ore at the Allouez docks that day (Keller 1984:107; U.S. Light House Service 9/2/1905c; 9/4/1905c).

On the morning of September 2 the PRETORIA and VENEZUELA were caught in a building gale about thirty miles northeast of Outer Island. About 7:30 a.m. the steering gear on the PRETORIA failed in rough seas. Smart signaled the VENEZUELA, which immediately headed back for the shelter of one of the islands. About 8:00 a.m. the steamer's tow line snapped, leaving the PRETORIA helpless and wallowing in the heavy seas. The captain of the VENEZUELA searched vainly for her consort in the deteriorating visibility, then gave up and made for the protection of Ashland Harbor to report the barge as missing (Keller 1984:108-110).

The PRETORIA, now alone, was forced to raise sails, which were quickly ripped apart by the gale winds. The captain ordered anchors dropped, but they dragged. The seas pounded the big barge, forcing some of the hatch covers off, and she quickly began to take on water. The crew manned the pumps, but to no avail. As the day wore on the PRETORIA lay battered and drifting. Her anchors finally found holding ground about a mile and a half off Outer Island, but the stout hull had about all it could take. A deck house was removed by a big roller, the covering board began to give way, and the deck commenced to float off. At that point, the captain and nine crew abandoned ship and made for shore in the PRETORIA's lifeboat. While nearing the shore the lifeboat capsized in the surf, throwing men ten feet into the air, and drowning five of the ten aboard (Keller 1984:108-111; Wolff 1990:108).

Outer Island lighthouse keeper John Irvine reports:

> September 2, 1905
>
> Cleaning, trimming lamps and lens. Tending signal. A terrible gale blowing from the NE. The biggest sea I have seen since I have been at the station, which is eight years. About 2:30 p.m. sighted a schooner about 2 miles NE of station. About 4 p.m. seen small boat leaving schooner. I the keeper hurried down with a white flag in my hand and a piece of rope to render what assistance I could. I helped to pull five men ashore, pretty well exhausted. Five were drowned. The crew consisted of Captain Charles Smart & nine of a crew. The Capt., mate and three seaman were saved. Four seaman and a cook, who was colored, drowned (U.S. Light House Service 9/2/1905c).

Irvine's modest account trivializes his own involvement in the rescue. The Duluth News Tribune reports, "Captain Irvine, who, though sixty years old, is still hale and strong, started to their rescue. By almost superhuman effort, while his life was endangered every minute, he

brought the five who still clung to the lifeboat safely to shore" (Duluth News Tribune 9/5/1905).

The barge, meanwhile, foundered and settled on the bottom in fifty-two feet of water, her long masts protruding above the surface. The crew were taken to the lighthouse, where the lighthousemen did what they could to make the survivors comfortable. The weather moderated the next day, and Keeper Irvine reported that the crew seemed "much improved today after a good nights rest and sleep" (U.S. Light House Service 9/3/1905c).

By the following day, PRETORIA's crew was up and about. Keeper Irvine continues:

> They were able to go along the beach looking for the bodies of those who perished. None were found. They all got back to the station by noon. While at dinner the steamer Venezuela came in sight looking for her consort which was the Pretoria. Which she could plainly see, as it looks like two thirds of her spars is above water. We signaled the steamer. She sent a boat ashore at 2 p.m. and took the men off . . . I expect she [PRETORIA] will be a total wreck as her decks is all coming ashore (U.S. Light House Service 9/4/1905c).

The vessel's worth was estimated at $60,000 in 1900 and its cargo at $27,000 in 1900. She was reputed to be the first vessel Davidson had ever lost (Wolff 1990:108). The Duluth Herald (9/5/1905) details the human cost of the wreck:

> The names of the survivors are as follows:
> Charles Smart, master, West Bay City
> Charles Fierman, mate, West Bay City
> William Smart, seaman, West Bay City
> Oscar Orling, seaman, Milwaukee
> Ned Blank, seaman, Buffalo
> The dead:
> Henry Schwartz, donkey engineman, West Bay City
> Axel Lindloff, seaman, Marinette
> Isaac Myers, seaman, Milwaukee
> Alfred Pebsal, Seaman, Sweden
> Steward, colored, unknown, shipped at Duluth

These bodies later washed ashore at Outer Island and were recovered (Keller 1984:111).

PRETORIA's certificate of enrollment was surrendered on January 12, 1906. It was listed as a loss due to foundering (Bureau of Navigation 1902a). A salvage effort under Capt. John Pasque in May, 1906, recovered a 1,200-pound steam pump from the ship and one of PRETORIA's masts (Holden 1985:89; Bayfield County Press 5/18/1905). Sometime thereafter the wreck appears to have been salvaged, the iron ore clammed from her hold and the hull broken up. Coast Guardsmen fishing in shallow water near the lighthouse in 1948

discovered the bell and pulled it from the water with a boathook (Lewis 1948:207). The bell's location was reportedly three or four miles southwest of the wreck location, confirming the report that portions of the deck floated clear of the wreck. The bell now resides at the Great Lakes Historical Society Museum in Vermillion, Ohio (Beall 1965:24). In recent years, divers have located and recovered her donkey boiler and anchors. The latter are located at the historical museum on Madeline Island (Wolff 1990:108).

Site Investigations

As part of the 1990 underwater archeological survey work, a brief reconnaissance of the schooner-barge PRETORIA was made, to help plan further survey work by the State Historical Society of Wisconsin. Using several sets of LORAN coordinates supplied by local divers, archeologists inspected the main wreck and portions of the PRETORIA debris field.

Several reconnaissance dives produced a basic assessment of the site and wreckage field. The archeologists were particularly impressed by the great size of the timbers used in PRETORIA's construction as well as by the vessel itself. Because the PRETORIA was one of the largest wooden vessels to sail the Great Lakes, she presents some real challenges regarding archeological documentation. The main portion of the site consists of the ship's heavy bilge, as well as the port and starboard sides. The sides of the hull are broken at the turn of the bilge, and lay outboard of the bilge section. The port side lies inboard up; the starboard side lies outboard up, and partially overlaps the starboard turn of the bilge. An inverted portion of the PRETORIA's bow (including her windlass) lies to port of the forward end of the wreck. Some iron ore is littered in the vicinity of the site, along with other debris. The sheer size of the main hull and debris field (reportedly, debris from the wreck and subsequent salvage lies ¼ to ½ mile around the main hull) pose a serious problem of scale to underwater archeologists using manual mapping methods. Moreover, the wreck depth of fifty-five feet somewhat limits bottom time for divers, and the remoteness of Outer Island (over thirty miles from the base at Bayfield) presents logistical problems for extended field operations.

The broken-up nature of the hull is attributed to later salvage of the wreck, some of it occurring rather recently. One reported incident of modern salvage included the removal of the PRETORIA's anchor chain using clam dredge equipment: the anchor chain is now to be seen draped around Bayfield as ornamental fencing.

Additional field work on PRETORIA was conducted in 1991, including photography, video, development of a base site plan, measured sketches, and visual reconnaissance away from the main hull. The notes, sketches, and photographs generated in 1990-1991 will be used for planning final survey work on the site in 1992. It is probable that remote sensing equipment (such as side-scan sonar or a magnetometer) will be needed to locate scattered elements of debris, as visual survey by divers would not be time or cost-effective. At a minimum, documentation of the site may be confined to the main hull, with debris field documentation to be completed at a future date.

11.0 Tug CHARLOTTE Site Survey, Pikes Bay

Vessel History

The tug CHARLOTTE (U.S. 209920) was built in Erie, Pennsylvania, in 1912 with a 62.0 foot length, 17.6 foot beam, and 6.6 foot depth of hold. Her gross tonnage was 41 tons, and net tonnage 28 tons. She was built as a steam propeller-driven craft with 110 horsepower (MV 1912). As one of many of the smaller working boats on the Lakes, scant information exists regarding her use or abandonment, though her records of ownership provide some clues.

Little is known of her operational history between 1912 to 1924. However, in 1924 CHARLOTTE was sold to the Valley Sand Company in Bay City, Michigan, with her new home port in Huron, Michigan. While with the sand company, she was used in towing and in tug capacities. The 1926 U.S. List of Merchant Vessels lists the CHARLOTTE under new ownership of Ora Endress and the vessel's home port (customs house where her permanent documents resided) as Marquette, Michigan. The boat actually operated out of Grand Marais, Michigan (MV 1924).

The Bayfield Fish Company of Bayfield, Wisconsin, bought the vessel in 1928. The vessel was used for fishing and was manned by a crew of four. Its new home port was Duluth, Minnesota. The CHARLOTTE remained with the Bayfield Fish Company until 1939 in fishing and towing capacities. CHARLOTTE was sold to George Fulton of the Fulton Construction Company of Superior, Wisconsin in 1939, and was used as a tow tug (MV 1928, 1939). Like many boats at the time, she had her steam engine replaced with a gasoline engine in 1941. This conversion increased her horsepower to 150. Also during this conversion the depth of the hold decreased from 6.6 to 5.6 feet, but the tonnage was increased to 43 gross tons and 29 net tons (MV 1941). From the dimension and tonnage alterations, it can be presumed that her deck was lowered, while her superstructure was enlarged.

During 1943 the CHARLOTTE's engine was replaced with diesel engine. She was then sold to Northern Hardwood Veneers in Superior, Wisconsin (MV 1941, 1943). Sometime between 1943 and 1945 the CHARLOTTE was reportedly abandoned in the vicinity of the marine railroad in Pikes Bay south of Port Superior (Engman 1984:41-42; Holden 1985:13-14; Keller 1984:145).

Site Investigations

A half-day was spent in documenting the remains of the small wreck in Pikes Bay believed to be the CHARLOTTE. The site lies in three to six feet of water, with portions of the frames, keel assembly, and stem protruding from the water's surface. Much of the hull is flattened, with the sides disarticulated from the keel, and lying broken up around the site. Sand overburden obscures much of the wreck. No machinery is evident on site. Of chief interest in this vessel's construction is the use of angle-iron to strengthen the hull framing. The

presence of wire nails in her keel and garboards is consistent with an early-twentieth-century construction date, but nothing other than her reported identity could confirm this as the tug CHARLOTTE.

The site was documented through measured sketches, and diagnostic features such as framing, scantlings, and fastenings were noted. While the site does contain some interesting information regarding early-twentieth-century boat construction, it is probable that much of this information could be gotten more easily through examination of the many derelict fish tugs that lie in Great Lakes boatyards. Apart from the angle iron composite construction (which was probably a later addition), the wreck exhibits very few unique characteristics, and has relatively little integrity. Though the site has been placed on the Wisconsin Submerged Sites Inventory, it is not believed (from surficial evidence) to be eligible for listing on the State or National Registers of Historic Places. Therefore, it is not recommended that the site receive further archeological investigation at this time.

12.0 Unknown Barge Site Survey, Pikes Bay

The remains of an unknown scow or barge were examined in the north part of Pikes Bay. The wreckage is attributed to a scow which was abandoned here in the 1930s and subsequently gutted by fire. The scow apparently was often towed by the tug ASHLAND for cargo transport, and was equipped with a deck boom for cargo handling (Engman 1984:41-42; Keller 1984:145-146).

One-half day was spent surveying this wreck and documenting diagnostic construction elements. The barge is single-framed with slab sides, conforming with her identity as a scow-type hull. Her bottom is reinforced with multiple bilge stringers, and her deck planks (now missing) appear to have been 1 in. to 2 inches in thickness based on the height of extant fastenings. Her bottom planking runs athwartships, and she is flat-bottomed.

The hull lies roughly north-south, with what appears to be her bow at the south end. Two sleepers for machinery or a superstructure are fastened over the stringers on the west side of the hull. The presence of wire nails and threaded bolts with square nuts for fastenings, alongside more traditional drift pins and clinch rings indicate a transitional construction period, probably early twentieth century. No machinery was found associated with the wreck, except for a broken pump assembly at the south end of the site.

The hull does contain some valuable information on scow construction, and may be slated for further documentation if such data is needed. However, the principal objectives of confirming site location and documenting basic construction features have been accomplished through a brief inspection. The site is not believed to be highly significant or archeologically sensitive.

13.0 Quarry Bay, Site Reconnaissance, Stockton Island

A brief reconnaissance was undertaken of submerged material associated with 1870-1890 era quarry sites on Stockton Island. NPS staff assisted in locating several shore locations where late-nineteenth-century quarrying hardware and artifacts were present. Divers then made a visual reconnaissance of the offshore area of these dump sites, to ascertain the potential locations and types of submerged cultural materials. Some miscellaneous fastenings and hardware were visible near shore at a depth of about five feet, and a piece of nineteenth-century dock cribbing was found at a depth of approximately forty feet. In locating significant cultural submerged cultural remains, the results of the initial reconnaissance were negative. However, previous NPS and volunteer survey work around other brownstone quarry docks and quarry areas has brought to light a great deal of artifactual material (Submerged Cultural Resources File, n.d.), and it is recommended that these sites receive more extensive survey work in the future.

14.0 Schooner-Barge NOQUEBAY Reconnaissance, Stockton Island

A brief inspection was made of the site of the schooner-barge NOQUEBAY, as follow-up to National Park Service archeological survey work conducted in 1984 (Carrell 1985). The NOQUEBAY was built in 1872 in Trenton, Michigan as a towbarge for the lumber trade. She had a 205.0 foot length, 34.0 foot beam, 12.0 foot depth of hold, measured 684.39 gross tons, 652.05 net tons, and was jackass schooner-rigged with two masts. She burned at Stockton Island in 1905 while in tow of the steambarge LIZZIE MADDEN (Carrell 1985:27-29; Holden 1985:71).

The site was inspected in 1990 to monitor impacts to the wreck subsequent to its opening for visitation, as well as to investigate new portions of the wreck recently exposed by shifting sand (Johnson, personal communication 7/21/1990). Archeologists and NPS rangers made an extensive swim over the entire site, noting the presence of the vessel's large rudder (not visible in 1984), the absence of artifacts that had been present and reported in 1984 (jib hanks, wrenches, and pots in the bow area), and noting a severe crack to the iron rim of the ship's wheel, also intact in 1984.

It was ascertained from visual inspection and discussions with NPS staff that the rim had most likely been cracked by ice action on the site, and has worsened over the winters of 1989-1990 (Johnson, personal communication 7/21/1990). Close inspection of the rim could find no evidence of either vandalism or fouling with a sailboat anchor (sailors frequently anchor in the protected Julian Bay in the vicinity of the site). The rudder, wheel, and the bow artifacts were recorded with underwater still photographs. Close-ups of the wheel rim were also taken for damage assessment purposes.

Subsequent NPS site monitoring following a violent northeast gale relocated the missing wrenches and pots (they evidently had been buried in sand), but the jib hanks are believed to have been removed by unscrupulous park visitors. It is thought that other material may have been removed as well (Johnson, personal communication 10/30/1990).

Aside from the loss of the jib hanks, the park visitors have generally shown themselves to be both responsible and trustworthy in adhering to park prohibitions on artifact removal, and to "take only pictures, leave only bubbles." However, the ice damage to the wheel is probably to some degree the inadvertent result of human visitation and curiosity. Divers seem to enjoy fanning sand away from the wheel to make it more visible and photogenic. This has had the unfortunate effect of leaving the rim exposed to winter ice scraping. Prior to its excavation in 1984, the wheel survived seventy-nine years of ice shoves and scraping with only a few bent spokes (see Carrell 1985:40-43). Though NPS archeologists reburied the wheel at the time, it is unlikely that it could be kept buried from inquisitive visitors for long. It seems that a strategy of autumn reburial of the wheel to protect it from winter ice would be the best passive measure available to management, short of complete burial (preservation in situ) or recovery. As far as controlling future artifact removal, diver education and site monitoring should be stepped up to ensure that the site is not subject to gradual attrition from collectors.

As the site is shallow and relatively warm, zebra mussel monitoring should also be periodically undertaken, as has been recommended earlier.

Although the 1985 survey determined the site to be eligible for listing on the National Register of Historic Places because of its significant architectural and artifactual data (Carrell 1985:77), to date the site has not been nominated. It is recommended that either the SHSW or NPS nominate the site to the National Register, possibly including the site within the submerged maritime archeological resources multi-property nomination being prepared by the SHSW Division of Historic Preservation. Also, as per 1985 NPS management recommendations, some type of formal management agreement between the NPS and State of Wisconsin is still required (Carrell 1985:32, 77-79).

15.0 CONCLUSIONS

Though specific recommendations for future research have been placed in the discussion of individual sites, plainly, the underwater archeological resources of this area require a great amount of additional research. Based on a current inventory of historic shipwrecks in the Lakeshore vicinity, at least twelve vessels dating from 1873 to 1929 remain unaccounted for, and many others remain to be found in the larger Chequamegon area (Carrell 1985:9-10; Holden 1985). SHSW inventory efforts into 1992 are directed towards surveying known sites; however, improved management and protection for newly discovered sites would enable survey and exploration for many sites yet undiscovered. Potentially well-preserved deepwater sites await discovery at a number of locations, and would be of great interest, both scientifically and recreationally. In addition to shipwrecks, the Apostle Islands offer great potential for inundated prehistoric site studies (due to the inundation of the Lake Superior southwest shore), as well as the study of historic materials associated with logging, quarrying, fishing, and lighthouses.

The 1990 survey of submerged cultural resources in the Apostles Islands has merely highlighted the underwater archeological potential of the Apostle Islands area. The Apostles and Chequamegon region combine a rich and colorful history, superb archeological site preservation, and (due to the presence of the National Lakeshore) excellent opportunities for underwater site management, interpretation, and preservation. These sites have a variety of cultural values, not only scientific but also recreational and educational. As the area already sees significant multiple-use recreation including sailboaters, kayakers, hikers, and scuba divers, the natural landscapes also provide a beautiful backdrop for the appreciation of the Apostles' history, from its prehistoric fisherfolk to the fur trade to the high-water mark of the American industrial revolution.

Relating the Apostles' natural environment and such cultural features as lighthouses, quarries, fishing camps, logging camps, and shipwrecks can provide for visitors not only an enhanced recreational experience, but also a closer understanding of man's own history and ecology. With proper interpretation, well-managed recreational development, and cautious exploration for new sites, the underwater archeological resources of the Apostle Islands could provide a fascinating and unique means of presenting man's past use of the Chequamegon area to divers and nondivers alike. Such an integrative approach to public history and environmental education would be of great importance to building a broader-based appreciation for the future protection of our Great Lakes resources.

Significant outlets already exist for these educational efforts, including the National Park Service headquarters at Bayfield, the State Historical Society of Wisconsin museum on Madeline Island, Big Bay State Park headquarters at Bayfield, the Bayfield Heritage Association, and smaller National Park Service interpretive facilities at Little Sand Bay and Stockton Island. Local, state, and federal entities would also provide an important springboard for joint management of a state or federal marine sanctuary.

The management recommendations presented herein will only be accomplished by the formation of a strong partnership of local, state, and federal interests in the management and preservation of these resources. Past experience at Apostle Islands and elsewhere has shown such a partnership to be not only possible, but a growing means of developing broad-based stewardship for a wide range of natural and cultural resources. Projects such as the NOQUEBAY and the 1990 joint submerged cultural resources survey are building the foundations for a strong federal, state, university, and local partnership to deal with the various issues surrounding submerged cultural resources management in the Apostle Islands. Greater involvement of local interests (sport diving, chartering, local businesses) will be important to solidifying the local role. Suggested means of participation include development of a local shipwreck preservation council (similar to the Michigan Bottomlands Preserve Council and its local chapters), involvement with state and federal archeological resource surveys, involvement with avocational archeological research efforts (such as the newly formed Wisconsin Underwater Archeological Association), and participation in the development of future state and federal management policies through public hearings and similar public forums.

Related management recommendations covering submerged cultural resources interpretation, recreational diving, and law enforcement in the Pictured Rocks National Lakeshore are discussed in Labadie (1989:176-181). While Pictured Rocks National Lakeshore overlaps with a Michigan State Bottomland Preserve (with its own separate regulations), Pictured Rocks and Apostle Islands do have some factors in common, including concurrent state/federal jurisdiction, similar management and enforcement issues, similar site types, and similar environmental factors. Labadie's recommendations for Pictured Rocks National Lakeshore, therefore, have more general applicability to other National Lakeshore areas, particularly in regards to recreational management and law enforcement (Labadie 1989:177-179), site interpretation (Labadie 1989:179-181), and the importance of cooperatively sharing joint management with state and local entities (Labadie 1989:2, 176-177).

At present, the non-federal waters of the Apostle Islands are an important candidate for designation and management as a state marine preserve (based on the Michigan model; see Cooper 1989:66-68; Halsey 1990:33-37), and await completion of legislation and funding for such a program. This area is also a candidate for designation and management as a National Marine Sanctuary through the National Oceanic and Atmospheric Administration. Before either of these could happen, there are a great number of issues related to resource preservation, future development, and the different roles of local, state, and federal agencies which need to be dealt with. However, without a doubt the quality and fragility of the Apostle Island's natural and cultural resources warrant the wisest and best efforts which can be made for their protection, management, and future use.

Though the federally owned National Lakeshore area has been saved from destructive tourism development, privately owned Madeline Island has not fared quite as well, with a marina, golf course, and other new construction obliterating many of the archeological remains of the

land's rich history (Holzhueter 1986:56-59). In examining the impacts of this latest industry relation to the many previous enterprises, one author has asked:

> What would early entrepreneurs like Crooks, Prentice, Austrian, and Dalrymple have thought of it? They loved Chequamegon and Madeline Island, and they respected the region's possibilities. Chequamegon responded by yielding some profit, but its facade was not changed significantly because of their efforts. Even the trees that had been removed by the lumbermen grew back, restoring the fairyland appearance of the 1820s. Will Chequamegon continue to resist and restore itself, or will tourism finally conquer the wilderness that enticed so many generations of investors? (Holzhueter 1986:59)

uch a question is quite relevant to this study, and to any decisions affecting the future of the agile cultural and natural resources which make up the Apostle Islands.

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Lucerne Collection inventory, LaMonte Florentz

FOLLOWING WERE FOUND INSIDE PORT SIDE BOW SAILER'S BUNK

1. woolen overcoat, black print, 20 pcs, buttons missing, approx size 38-40
2. Felt hat, black with dress band and bow (hat had been used informally as was folded neatly and tucked into a pocket of number one above) approx si
3. Pkg, horsehair- remains of mattress
4. Trouser leg, woolen, striped multicolor
5. Dress vest, dark color, twill
6. Vest, black, wool
7. Coat lining, black print, wool
8. Lining, black, wool, for unidentified
9. Knife sheath, black rubber, handmade, 19X4X2 cm
10. Unidentified garments, 26 pcs
11. Bottle, Coffin Flask, corked, one-half full of foul smelling CLEAR substance (b 18 cm tall
12. Socks, 1 pr, unwashed wool, black with gray tops, approx size 9
13. Suspender set, 7 pcs, black leather
14. Oil lamp chimney, clear glass, top edge decorated, 21 cm tall, bottom ID
15. Smoking pipe, clay, white, tip of stem broken. Markings on stem "78, W. White, Glasgow, " bowl has initials "TD" stamped on it. Style of pipe w manufactured 1820-1880
16. Trouser belt, leather, black, simple one-tongue buckle, outer rim of buck missing. 108cmX5mmX17mm
17. Hat, felt, black, (for informal use- extremely poor condition) approx siz
18. Shoe, leather, black, right foot, side buckle dress shoe- buckle missing, of rear portion of heel badly worn, 27 cm long X 10cm at widest point of
19. Shoe, leather, black, RIGHT FOOT dress shoe, even wear on heel, 25cm long X 8cm at w point of sole
20. Shoe, leather, black, right foot, lace-up work shoe, outside edge of heel and well worn all around. 27cm long X 10 cm at widest point of sole
21. Shoe, leather, black, left foot, upper part missing, even wear all around 28cm long X 9cm at widest point of sole

22. Shoe, leather, black, right foot, 5 pcs, dress shoe, outside edge of heel down, sole badly worn. Black elastic sidebands provided tension that hel shoe onto foot. 25cm long X 9cm at widest point of sole

23. Slicker, two-tone black rubber, for dress purposes, bottom evenly worn. long X 10cm at widest point of sole

24. Shoe, leather, black, brass eyelets and hooks, 2pcs, uppers only

25. Hat, felt, black, extremely poor condition, torn and fragmented

26. Cap, wool, black. This cap was apparently the inside liner of unidentifi headgear but was used on its own merits- very stout, looks warm

27. Fisherman's boots, rubber, black, one pr, metal black enameled boot strap on top edges, outside edge of heels worn. 40cm from heel to top X 27cm l 10cm at widest point of sole

28. Tray, sheet metal, ends riveted to sides, metal ring handles riveted to e Only one corner survived removal. Original size 20X20X6 cm

29.A.Buttons, garment, bone, plastic, wood, steel, porcelain and brass, 37 ea.

B.Pipe stem, rubber, black, curved, bottom end threaded, 8cm long

C.Pocket knife, wooden handle-riveted, black, nickel plated emblem plate er on one side of handle, main blade open- secondary blade broken and closed 15cm long

D.Syringe, blown clear glass, black enameled wooden plunger with white stor string wrapped around it as gasket, overall length 12cm

E.Suspender clasps, metal, black enameled, 2ea

F.Handle, wooden, lathe-turned, unpainted (clothes brush ?)

G.Comb, plastic, black, fine and course teeth-half and half, overall lengt

H.Comb, plastic, black, fragment course teeth, overall length 6cm

I.Wool remnant, maroon color, three sewing needles & brass safety pin embe in remnant. 14X5cm overall

J.Thimble, brass, sewing, open end for tip of thumb, 2cm widest end X 15mm narrowest end X 15mm tall

30. Smoking pipe, clay, white, fragment of stem and bowl

31. Bottle, Pumpkinseed flask, corked, half full of lake water, 17cm tall

32. Can, tin, ragged open top, empty and smells mildly of paint

33. Block, wooden, single wheel- wheel absent, traces of white paint on bloc 18cm tall X 13cm wide X 75mm thick

34. Blocks, wooden, single wheel, lignumvitae wheels, 2 ea A and B, Both paint white. 30cm tall X 23cm wide X 11cm thick

35. Block, wooden, single wheel, steel wheel, unpainted, utility hook 4cm dia. 23cm tall fastened to top. Block only is 38cm tall X 29cm wide X 135mm th

36. Block, wooden, single wheel, lignumvitae wheel, unpainted, utility hook 4c dia. X 23cm tall fastened to top. Block only is 38cm X 29cm X 135mm

37. Rat trap, wire grids, factory made, spring loaded doors, wooden pine base, 33cm X 18cm X 11cm

38. Wedge, wood splitting, wrought iron. 14cm X 6cm X 15mm at top tapering dc to sharp edge

39. Wedge, wood splitting, wrought iron. 25cm X 8cm X 5cm at top tapering dowr to sharp edge

.....Note: The items 37, 38 and 39 were on the below deck next to the outsic of the inside wall of the port sailer's bunk

.....Note: The items 40 through 47 were clustered together in the stern fill

40. Binoculars, brass, leather bound black, (tiny screw between small lenses i not original equipment). Small lenses 2cm dia., large lenses 6cm dia., o\ length 21cm

41. Inkwell, green glass, cone shape, "CARTERS #4" embossed on base, 6cm tall

42. Calipers, wrought iron, brass pivot, navigational, 15cm tall, max spread approx 20cm

43. Shoe, leather, black, right foot, outside edge of heel slightly worn. 26cm long X 9cm wide at widest point of sole

44. Lamp, oil, brass, weighted butt, on a round gimbal base. Finger ring on t the lamp can be either hung on a vertical wall or used on a table. Style a copy of a pre-civil war whale oil lamp in Kranz's American Nautical Art antiques. 20cm tall, base 12cm dia., reservoir holds approx one pint

45. Spitoon, ceramic, brown two-tone, cylindrical with inverted cone shaped t business hole 3cm dia., Drain hole on side 3cm dia., overal dia. 20cm, 85r tall

46. Bottle, amber glass, rectangular, indented side panels read "BUHRERS GENT BITTERS, S. BUHRER PROPRIETOR" This bottle once held a substance that wa approx 60 percent alcohol and was used both as a medicinal and a liquor. side shattered, 24cm tall X 7cm square

47. Medal, brass, civil war, 2 pcs, ribbon absent. Top part is artillery ins eagle holding sword over crossed cannons on cannon balls; bottom part is pointed star upon which is a circle containing union army logo. Wording around circle "Grand Army of the Republic, 1861- veteran- 1866. Eagle wingspan 4cm, 25mm tall. Star is 45mm dia.

.....Note: The items 48 through 110 were found in the stern fill

48. Dinner plate shard, Ironstone China, "J.W. PANKHURST & CO., HANLEY, ENGLAN

49. Sauce dish shard, Ironstone China, eagle emblem "...NE CHINA"

50. Dinner plate shard, Ironstone China, "ROYAL PATENT, IRONSTONE ...S & GODDAR

51. Dinner plate shard, eagle clutching lion emblem "Premium Stone China, HOMER LAUGHLIN"

52. Gravy bowl, Ironstone China, British coat-of-arms "Ironstone China, J&G MEAKIN," oval 28cm X 20cm X 6cm

53. Dinner plate, "Ironstone China" above British coat-of-arms, "J&G MEAKIN, HANLEY ENGLAND" round 25cm dia. X 25mm deep

54. Sauce dish, Ironstone China, beige color, trademark undiscernable, round 17cm dia. X 25mm deep

55. Tea cup saucer, Ironstone China, "J&GM" round 125mm dia. X 2cm deep

56. Sauce dish, Ironstone China, crossed American flags in circle "Geo. S. Harker & Co., E LIVERPOOL, Ironstone China" on ribbon, round 14cm dia. X 3cm deep

57. Sauce dish, Ironstone China, American eagle emblem "Ironstone China, Trade Mark, William Flentke" round 17cm dia. X 25mm deep

58. Sauce dish, Ironstone China, emblem undiscernable, round 165mm dia. X 25mm

59. Saucer, Ironstone China, British coat-of-arms, "J&G MEAKIN, HANLEY ENGLAND round 15cm dia. X 25mm deep

60. Sauce dish, Ironstone China, British coat-of-arms, "J&G MEAKIN, HANLEY ENG round 165mm dia. X 2cm deep

61. Saucer, Ironstone China, plummed crown emblem "Warranted Ironstone China, John Edwards, W84, round, 45mm X 25mm deep

62. Soup plate, Ironstone China, British coat-of-arms, "Royal Patent, Ironston Richard Alcock, Burslem, England," round 23cm dia. X 3cm deep

63. Lard bowl, Ironstone china, lip for lid on top, still full of lard, plumme crown emblem, "Warranted Ironstone China, John Edwards, B82, round 16mm di X 6cm deep

64. Coffee cup, Ironstone china, no trademark, round with one-finger handle, 9 dia. X 85mm high

65. Same as item #64

66. Tea cup, porcelain, handle missing, hand-painted Japanese scene on side, 3 girl holding musical instrument beside seated man staring at book, cylindr 75mm dia. X 8cm tall

67. Same as item #64

68. Soup bowl, Ironstone China, no emblem, round 14cm dia. X 85mm deep

69. Pot shard, brown, no markings

70. Pot shard, beige, no markings

71. Jug shard, brown top, beige sides, no markings, cylindrical lip

72. Bottle, wine, green glass with rubber and wire "snap" type closure, 30cm t X 75mm wide at base, no markings

73. Bottle, demijohn, amber glass in reed basket with handle, no markings 31cm 14cm dia. at base

74. Jam jar, clear glass, fluted sides, no markings, 85mm tall X 75mm wide at

75. Glass shard, green glass, "EDRIC" embossed

76. Glass shard, clear glass, probably base to pressed glass bowl

77. Bottle, neck only, peppersauce, light green glass, no markings

78. Bottle, base only, light green glass, "MILW WIS GLASS CO." embossed, 55cm

79. Bowl, clear glass, pressed and cut designs- diamond pattern, four legs, rectangular, 8cm X 6cm X 4cm

80. Bowl, clear glass, pressed and cut designs- fluted on base, rectangular wi no legs, 9cm X 6cm X 4cm

81. ~~Dinner bell, brass with wooden handle (school marm type), brass clapper wi bits of white store string still tied around it. Handle is lathe turned a has horizontal designs cut into it. No markings anywhere.~~ Overall height 20cm, bell heighth 9cm, 12cm dia. at bell mouth STOLEN

82. Cruit, cut glass, ground lip, 16cm tall X 4cm at base

83. Cruit, cut glass, 2pcs, lip on neck fragment is similar to an inverted sa

84. Cruit holder plate, 4 holer, nickel plated pewter, insignia in circle of balanced gold scales "Cambridge Company" stamped under scales, round 165mm X 25mm tall

85. Key, brass, cabinet, ornate, 75mm long, no markings

86. Pot handle, sheet metal, 12cm X 4cm tall, no markings

87. Lid, tin, round, 8cm dia. X 2cm tall, no markings

88. Can, tin, 75mm X 5cm tall, no markings

89. Spoon, no handle, broken glass fragment cemented to spoon, no markings

90. Soup spoon handle, stamped sheet metal, tinned, ornate, no markings

91. Same as item #90

92. Dinner fork, 3 tines, wooden handle with pewter clasps, 185mm long, no mar

93. Butter knife, wooden handle with ornate pewter clasps, 24cm long, no marki

94. Same as item #93

95. Same as item #93

96. Same as item #93

97. Pancake turner, sheet metal, wrought iron handle, 215mm long, no markings

98. Can opener, black enameled steel handle, pewter fitting on cutting edge, "SPRAGUE" on handle, "Pat. July 21, 71" on pewter fitting, 16cm long

99. Cook's spoon, steel and wrought iron, well used, upper tip of handle bent to serve as hanger, 39cm long, no markings

100. Cook's spoon, steel plated, ornate handle, 345mm long, no markings

101. Baking powder can lid, tinned, "Full Weight 1 lb, Royal Baking Powder, Absolutely pure" embossed, round, 85mm dia. X 2cm tall

102. Baking powder can lid, tinned, "Full Weight 2½ lbs, Royal Baking Powder, Absolutely pure" embossed, round, 115 dia.

103. Tin can, sealed, contents probably tomatoes per similar cans that were beyond salvage that were in association with this one. 85mm dia. X 115mm

104. Skillet, cast iron, handle broken off, 28cm dia. X 5cm tall, no markings

105. Skillet handle, cast iron, "D.R. SPERRY, 9-10" stamped, 14cm long

106. Ladle pot, cast iron, porcelain lined, baked on food on base, wrought iron handle, "T5" visible on bottom, 235mm dia. X 13cm deep

107. Lard bucket, tin, half full of lard, "Armour & Co., pure refined family la Chicago," on side, 21 cm tall X 125mm deep

108. Fire brick, (for galley stove??) beige, "B" in diamond and the number "9" stamped on side. 25cm X 8cm X2cm

109. Fire brick, fragment, beige, "C" in diamond and the number "9" stamped on side. Also, "1885" stamped on side. The stampings have been traced in wi white water color for photographical purposes.

110. Modern-day coffee can full of misc fragments that are duplicates to other already mentioned items listed. Their purpose is suggested as specimens f experimentation with possible preservatives

.....The items 111 through 142 were found outside aft end of bow port sailer' bunk on below deck.

111. Thimble, wrought iron, teardrop shape, 15cm long X 85mm at widest point X 35mm across saddle

112. Ring, wrought iron, 25mm thick, OD 18cm with 2ea wrought iron teardrop sha thimbles. One is 125mm long X 8cm wide at widest point, 45mm wide across saddle; other is 75mm X 5cm X 25mm

113. Ring, wrought iron, 2cm thick, OD 13cm with 2ea wrought iron teardrop shap thimbles. One is 85mm long X 6cm wide at widest point, 35mm wide across saddle; other is 75mm X 5cm X 25mm

114. Pine board, teardrop shape, 21cm long X 140mm wide at widest point X 2cm t Beveled edges, hole in top, metal countersunk screw 4cm long inserted in h Traces of white paint on face

115. Pine board, teardrop shape, 25cm long X 135mm wide at widest point X 2cm t Beveled edges, countersunk hole in top 6mm wide, traces of white paint on

116. Button hook, steel, flat shank, 8cm long, finger hole has stamped onto its outer edge, "N.O. STONE, 212 SUPER..." Probably a free advertising item f 212 Superior Street.

117. Thimble from a sailmaker's palm, lead, black leather bound, no markings. dia. 2cm

118. Grommets, brass, crimped, 11 ea, OD 4cm X ID 2cm

119. Jib hank , wrought iron, oval 115mm X 8cm

120. Jib hank, wrought iron, oval 10cm X 9cm

121. Weight, cast iron, bull ring on top, tapered smaller from top to bottom. from top view, rectangular from side view, weight proper is 13cm X 7cm X 6 at top. Bull ring is wrought iron, 65mm OD X 45mm ID. Approx 2° taper

122. Weight, cast iron, bull ring on top, tapered smaller from top to bottom. from top view, rectangular from side view, weight proper is 15 X 4 X 4cm Bull ring is wrought iron, 55mm OD X 35mm ID. Approx 1° taper

123. Belaying pin, wrought iron, 50cm long X 35mm at widest point

124. Sister hook, wrought iron, 13cm long from top to bottom edge of curve

125. Same as item #124

126. Cargo hook, wrought iron, 16cm long, eye 75mm OD X 45mm ID

127. Cargo hook, wrought iron, 17cm long, eye 65mm OD X 4cm ID. Round thimble attached to eye 6cm OD X 3cm across saddle

128. Staple, wrought iron, 10cm long X 6cm X 7mm

129. Flat hook, 15cm long X 6cm at tip of hook, eye is 6cm OD X 4cm ID

130. Sister hook, wrought iron, 165mm long, eye 75mm OD X 5cm ID

131. Sister hook, wrought iron, 13cm long. Eye 6cm X 4cm

132. Grommets, brass, crimped, 4ea, 2cm OD X 1cm ID

133. Ring, wrought iron, one side flat, 45mm OD X 25mm ID

134. Stove poker handle, wrought iron

135. MACHINE Bolt with nut, wrought iron, 18cm long X 2cm thick

136. MACHINE Bolt with nut, wrought iron, 11cm long X 25mm thick

137. Round thimble, wrought iron, 75mm OD, 5cm ID X 25mm across saddle

138. Same as item #124

139. Round thimble, wrought iron, 95mm OD, 7cm ID X 3cm across saddle

140. Nut, wrought iron, square, 65mm X 3cm thick X 3cm ID

141. Bottle, whiskey, broken but restored, coffin flask, 185mm tall, no marking

142. Coin, shield nickel, 1882

.....Note: The items 143 through 146 were found on below deck next to suppor stanchions under bow anchor machinery

143. Stove, pot belly, wrought iron and steel, 66cm tall, very ornate. Pedesta on front bottom is akin to Franklin style, decorative letter style on pede "CHARM, MARTINSFERRY STOVE CO., MARTINSFERRY O." Base is 44cm X 44cm. 3 le

144. Hat, felt, brown, one-half missing, brim resembles bowler, approx size 7

145. Sock, wool, black, unwashed, approx size 9 (found right underneath stove)

146. Coal chunks, 5 ea, black

147. Rock, iron ore, vessel's cargo 

.....The items 148 through 350 were found in the stern fill

148. Boot, leather, black, right foot, work boot, outside edge of heel worn, h bottom. 37cm tall X 27cm long X 10cm at widest point of sole

149. Boot, rubber, black, fisherman's, black enameled boot straps on top edges even wear on heel. 40cm tall X 27cm long X 10cm at widest point of sole

150. Legging, rubber, black, originally must have been leg part of hip boot as foot part has been purposely cut off, wool lined. 76cm X 21cm

151. Trouser leg, one panel, with pocket cuff, wool, navy blue. 1m long X 28c to crotch

152. Section of linoleum floor, burlap backed, brightly colored multi-design, 10 X 10cm square

153. Section of linoleum floor, burlap backed, brightly colored multi-design, black ink splotches, entombed in clear polymer block. 60 X 40 X 2cm

154. Green glass fragments, 4 ea and red glass fragment 1 ea

155. Square nail embedded in clump of pitch

156. Glass stopper for liquor bottle, ground shank, 3cm long

157. Bottle, coffin flask, empty, no cork, clear glass, no markings, 185mm tall (found right next to ship's bible)

158. Bible cover, leather, black, ornately tooled. When fully opened 405mm X 1 "HOLY BIBLE" in gold leaf on end, "SCHOONER LUCERNE" in gold leaf on face

159. Ship's lantern, white light, oil, clear glass globe optically beveled and pressed glass in wrought iron carrying cage. Embossed on globe "Pat'd Mar 13, 1860, EXTD March 13, 1874." 60cm tall X 23 cm dia.

160. Trunk lid, moulded sheet metal bolstered by riveted steel straps, Auburn colored outside. Nickel plated brass hasp, British coat-of-arms, "A.W. PATENT LEVER" stamped on hasp. 60cm X 40cm X 9cm deep

161. Sink basin shard, ceramic, British coat-of-arms, "T.C. BROWN-WESTHEAD-MOOR & CO., By Royal appointment, Potters to her Majesty, imported by Miller an Coates, New York." "T.C. Brown Westhead Moore and Co." stamped on base

162. Smoking pipe, clay, stem broken, beige, no markings

163. Button, brass, no markings, 2cm dia.

164. Duck call, brass barrel, wooden bit (still works if blown hard enough) 10 X 25mm

165. Innerworkings of a whistle

166. Salt shaker lid, pewter, threaded, 25mm tall

167. Soap dish, Ironstone China, ornate designs, British coat-of-arms on base, "Royal Ironstone China, J.H.N." 125mm X 9cm X 25mm

168. Flatiron, cast and wrought iron. "6" in star on iron proper, "GENEVA" stam in handle. 13cm tall X 95mm wide at widest point

169. Paint bucket, wooden strapped staves, heavily covered by different colors c paint. 17cm tall X 19cm dia.

170. Pour spout can with handle, tin, heavily coated with different colors of paint. 17cm tall, 105mm dia. at base

171. Paint can, tin, one-fourth full of red lead paint, open top, lid missing, part of paper label intact. 125mm tall X 11cm dia.

172. Turpentine can, tin with pour spout and handle, one gallon.capacity. Paper label one-half approx intact. "The King Varnish Company" printed on the label as well as embossed on the side of the can with "Akron, Ohio" 25cm X 155mm X 95mm

173. Paint brush handle, wood, "1½" stamped on side plus "Lumbard & Co., Chicag EX- EX" 11cm long X 1cm thick

174. Paint brush, animal hairs reddish in color, brass banding, wood handle. Bristles are 9cm X 9cm X 3cm thick. Overall length 25cm. No markings

175. Paint brush, animal hairs, black, brass banding, wood handle. Bristles ar 9cm X 6cm X 3cm thick, overal length 250mm. "EXT 5A" stamped on handle, also "Pure Bristles" and other undiscernable letters

176. Paint brush, animal hairs, black, brass banding, wood handle. Bristles ar 85mm X 35mm X 35mm thick, overall length 205mm. "NY" stamped on handle. Brush was probably a cleaning brush because of the stubby bristles that ar devoid of any hint of paint

177. Paint brush, animal hairs, reddish colored bristles, brass banding, wood handle. Bristles are 7cm X 55mm X 2cm thick. "3 IN" stamped on handle al with several undiscernable letters

178. Funnel, tinware, was used for paint because of multi-coatings inside. Rem of hanger ring on top lip. Top Dia. 25cm, Bottom hole 3cm dia., barrel 5c long. overall length 24cm

179. Piece of used lead sheeting. Rectangular 50cm X 8cm X 1mm thick. Nail ho on edges

180. Piece of used lead sheeting. trapozoidal. Approx 13cm X 15cm X 1mm. Nai holes on edges all arcund

181. Lead pipe, 35cm long, 25mm OD. Lead wall bracket has been melted onto one

182. Lead pipe, curved with wall bracket and brass hull fitting, pipe OD 25mm

183. Funneled lead pipe from sink base, 40cm long, pipe proper 15mm OD. Funnel on one end is 105mm long, mouth approx 4cm

184. Roll of unused lead sheeting, length unknown, 5cm wide, 1mm thick

185. Faucet, brass, utility type, "T" valve handle, spigot faces downward. "C. ARRTSON & CO., Pat'd Dec 4, 1877." stamped on side

186. Faucet, nickel-plated brass, spigot acts as valve handle also. Small gate valve inside stem. Ornate design. ID approx 5mm. (This faucet was removed from wooden top of small ceramic sink because we could not budge the sink from wreckage without damaging it. On a subsequent trip the sink was found half gone, half destroyed) See item #161 and item #183

187. Shovel, formed sheet metal, black enameled, for removing clinkers and ashes from stove. Shovel is 17cm X 12cm. Handle is 17cm X 3cm

188. Deadeye, 3 eyes, lignumvitae caged by wrought iron rings. Bolt and nut are intact (machine bolt). 32cm tall X 22cm wide X 11cm thick

189. Wedge, lignumvitae, black, polished face and end. 19cm X 45mm wide at thickest point

190. Wedge, lignumvitae, black, original condition as found. Same measurements as item #189

191. Pulley wheel, lignumvitae, black, brass center with brass roller bearings, "WILSON MFG CO.," stamped on brass core. OD 225mm X ID 25mm, saddle 4cm

192. Pulley wheel, lignumvitae, black, cast iron center, no bearings, no markin OD 16cm, ID 2cm, saddle 3cm

193. Pulley wheel, lignumvitae, black, cast iron center, no bearings, no markin OD 14cm, ID 18mm, saddle 3cm

194. Broken round thimble, lignumvitae, cream and black color. OD 7cm, ID 3cm, Saddle 15mm

195. Pulley wheel, fragment, lignumvitae, brown color, polished end

196. Block, wood, lignumvitae wheel, black, portion of whipping remains on ring at top. 18cm tall X 13cm X 75mm thick

197. Barrel hoop, wooden, nailed with square nails 3cm long, width 35mm

198. Barrel end, 3pcs, pine, "380 LBS" and "...ES" visible on center piece. OD 47cm X 12mm thick

199. Tool, hardwood, handmade, black, 135mm long. This tool was used for managing barrel hoops off and on a barrel

200. Alarm clock, 4 pcs, brass and beveled glass. Face round, OD 95mm X 6cm th

201. Oil lamp wall bracket, 3pcs, very ornate, cast metal, gold painted

202. Oil lamp wall bracket, 2pcs, very ornate, cast metal, black enameled

203. Mantle, oil lamp, brass, with wick, "VENUS PATENTED DEC 10, 1867" embossed on wick handle, 75mm OD X 45cm tall

204. Same as item 203, no wick

205. Mantle, oil lamp, brass, no wick, "M.B.CO., NY, PAT APL 30, 83" embossed or wick handle, 55mm OD X 4cm tall

206. Mantle cover, brass, no markings, 42mm OD X 3cm tall

207. Mantle cover, brass, no markings, 5cm OD X 3cm tall

208. Can, oil lamp filler, tin conical with slender tapered spout and curved han 12cm OD X 17cm tall

209. Coat hooks, cast iron, 4 ea, fragments, black enameled

210. Unidentified slotted wrought iron strap fitting, 15cm X 25mm X 3mm

211. Wooden plug, possibly from barrel, trace of white paint, 5cm dia. X 2cm thi

212. Rubber hose, beige, 4 ply inner of black rubber, 28cm long, ID 1 cm

213. Fire hose fitting, quick release type per lugs on each side, brass, with portion of 3 ply black rubber hose still attached. Inside threads, OD 5cm X ID 45mm

214. Door hinge, 3 pcs, cast, 3 screw holes each side, traces of white paint. I opened is 9cm X 9cm. Either side would fit door 4cm thick. Drift pin 95mm long overall.

215. Door hinge fragment and two drift pins, same as item #214 for measurements

216. Door hinge and drift pin, one lugged side, cast metal, ornate, black enamel covered by traces of white paint. Drift pin has ornate brass top and is 11 overall. Hinge plate is 9cm X 4cm for 4cm thick door. This may have been from an ice box door

217. Door knob, porcelain, with black enameled shaft receptacle, OD 55mm

218. Same as item #217 only with portion of shaft from opposite knob still intac shaft is 5cm long

219. Same as item #217

220. Same as item #217 only with shaft receptacle broken

221. Same as item #217 only whole shaft is intact- 8cm long. Fragment of cast i stove door is cemented to knob assembly

222. Shaft receptacle from porcelain door knob minus the porcelain, lead and cas metal 4cm long

223. Brick, porous, beige, "BRIDGWATER BATH BRICK COMP" stamped on top. Also "Y" inside of rectangle. 16 X 8 X 5cm. May have been used as handwarmer

224. Whetstone, gray color, very well used, medium grit, rectangular, oval shape from end view. 10cm X 3cm X 15mm

225. Sharpening stone, fine grit, gray color, rectangular. 13cm X 55mm X 3cm

226. Devil's foot or claw, iron bar for manipulating anchor chain, 124cm long, shaft 3cm dia.

227. Shovel handle, soft wood grip riveted, 35mm dia. X 10cm wide

228. Tool, wrought iron and cast iron, unkown purpose. Beveled weight slides d shaft and strikes another beveled piece that is permanently affixed to sha Top of shaft has ring 32mm OD X 2cm ID. Bottom is filed as screwdriver- t 12mm wide. Shaft is 6mm dia., sliding weight is 6cm X 3cm, fixed piece is 3cm X 2cm. Overall length is 34cm

229. Screwdriver, wooden handle, bulbous top with flat sides on handle 15mm wid with indentations for fingers. Blade is 12cm long X 15mm wide with indent for fingers also. Business end is 7mm wide, brass clasp between blade and handle. "STANLEY RULE & LEVEL CO., Patented JUNE 6, 71" stamped into blad which is 3mm thick

230. Screwdriver blade with brass clasp. Same style blade as Stanley, but different style clasp. Overall length 21cm. Business end 1cm. Undiscern writing on blade

231. Wire shaft, 325mm long with screwdriver point 5mm wide

232. Wood chisel, wrought iron with tempered steel plate welded to business end wooden handle 12cm long X 3cm dia round. Blade is 225mm long X 48mm wide 14mm thick at thickest point. Overall length 44cm

233. Punch, wrought iron, 145 mm long X 13mm dia. at top X 6mm dia. at bottom

234. Drill bit, twist type for wood, steel, 12cm long, will drill approx 5cm hc

235. Drill bit, twist type for wood, steel, 10cm long, will drill approx 4cm hc

236. Drill bit, twist type for wood, steel, 20cm long will drill approx 9mm hol

237. Clump of tools, fittings, nails, screws and brass door key (65mm long) cer together. Overall length 32cm long

238. Tool, wrought iron rod 57 cm long, 6mm dia., one end is bent over- the tip being 35mm long, flattened and sharpened to a hooked tip. The other end is the same except the hook of the tip is much more pronounced. The tool was found among sailmakers gear and may have been used to stretch canvass and hold it while something or other was done to the canvass.

239. Same as item #238 except is 58cm long

240. Sail rings, 10ea, steel, traces of white paint still on rings as are the shadows of the thread that is now gone. Average OD 5cm X ID 38mm

241. Grommets, 6ea, crimped brass, OD 4cm X ID 2cm

242. Grommet, brass, unusual style, "PAT'D AUG 26, 1884, Nº 6" embossed on face OD 35mm X ID 25mm

243. Grommets, 2ea, crimped brass, OD 4cm X ID 15mm

244. Round thimble, wrought iron, OD 4cm X ID 22mm, 1cm across saddle

245. Button hook tool, black enameled, 75mm long, shank 3mm, round simple desig finger hole on top OD 23mm

246. Wooden sash fixture, pine, hourglass shape. OD 25mm X ID 13mm X 35mm long

247. Wooden sash fixture, pine, crown shape, OD 2cm X 8mm ID X 32mm long

248. Wooden sash fixture, pine, beehive shape, bottom countersunk to accomodate a knot. OD 3cm X ID 1cm X 3cm long. Cord of unusual material is strung through it and knotted

249. Sailmakers palm, supple black leather with brass covered lead thimble. Th face is 15mm, overall length 26cm. Leather thickness 4mm

250. Sailmakers needle horn, handmade of cowhorn, 2 slots carved for belt, wood plug in bottom. 12cm tall, wooden plug is 5cm dia., oblong mouth 65mm X 5 Slots approx 3cm X 8mm and begin 5mm from top. Outside of one slot to out of the other is 3cm. Decorative etchings carved on side of horn.

Eight sailmakers needles are imbedded in wax inside this horn. They of varying thicknesses from 1mm to 3mm and are triangular in shape from en view. "A. SHRIMPTON" stamped on side of largest one

251. String of round thimbles, wrought iron, 12ea, strand of rope is original a is its knot. Thimbles OD 3cm X ID 2cm X 1cm across saddle

252. Stove, pot belly, wrought iron and steel, 103cm tall, very ornate. four 3-windowed movable viewing doors around mid-section, shell type lid that w on a pivot, brass knob on cinders door, 4-legged. Base 50cm square. "187 embossed below front viewing door, "M.L. FILLEY" on right side of base lip "TROY N.Y." on left side of base lip, "CADET" embossed on front of base li

253 Anchor Chain Guide, 80 X 35 X 55 cm

255 Chain hook, anchor chain, 79 cm long, 1.5 cm diameter, hook opening 4 cm
hand opening 10X5 cm

256 Wildcat brake tool resembling devil's claw, 123 X 3 cm diameter, hook opening

257 Galley stove, main body, 77 X 22 X 44 cm, Pipe opening, oval, 21 X 10 cm,
24 cm diameter lid oper

262 Syphon bilge pump, 54 X 24 X 62 cm, was originally mounted on plank 7 cm thick

264 Pumpkinseed flask, clear glass, empty, 14 cm tall, 9cm wide

265 Pine tongue & groove boards from belowdeck floor aft, 6 ea, 82 X 10 X 2cm aver

266 Support knee, tamarack, 73 X 103 X 18 cm

267 Section of white oak, 179 X 6 X 4.5 cm

268 Section of gunwhale, white oak, 215 X 19 X 11 cm

269 White oak plank, 159 X 33 X 4.5 cm, Small section of white oak attached to
it, 56 X 7 X 6 cm

270 Block of white oak, milled, 61 X 45 X 15 cm

271 Galley stove door, 49 X 29 X 6 cm

272 Utility chain, 270 cm long, each link except end links, 8 X 5.5 cm X 1.5 cm
thickness of metal stock, end links teardrop
shaped, 11.5 X 7.5 at widest diameter, X 2cm
thickness of metal stock.

Length X width X highth or Length X width X thickness
* *

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