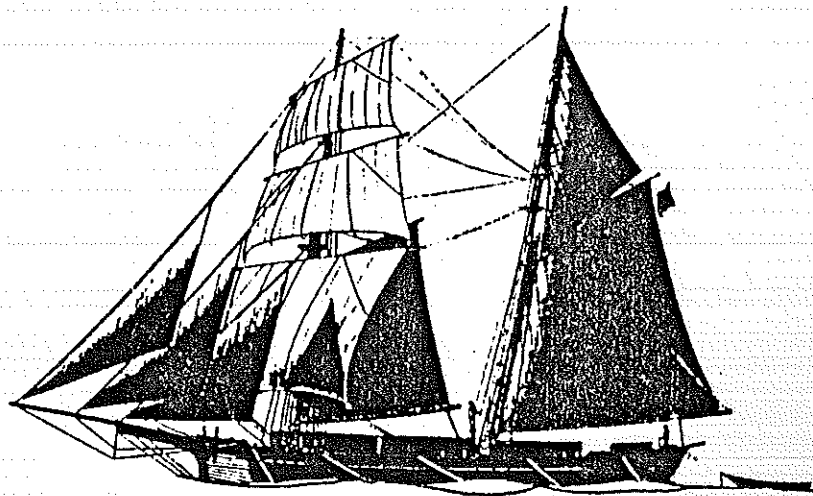

**Survey of Submerged Cultural Resources:
Selected Sites in
Lakes Michigan and Superior**

A Report on the 1991 Field Season



Submitted to University of Wisconsin

Sea Grant Institute

June 30, 1992

**David J. Cooper
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State Underwater Archeology Program
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Cover Illustration: Line Drawing of the *Alvin Clark* by Sam Manning (*Wooden Boat* 52 [May/June] 1983). The schooner *Meridian* was similar in size, age, and appearance to the *Alvin Clark*.

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Introduction

The 1991 survey of submerged cultural resources in Lakes Michigan and Superior was a joint effort between the State Historical Society of Wisconsin (SHSW) and the UW-Sea Grant Institute, who provided the major grant funding and equipment for the project. The SHSW also provided staffing and additional equipment. The SHSW 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; Cooper and Rodgers 1990; Cooper et. al. 1991). 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 charge 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.

Prior to the 1991 fieldwork, the state underwater archeology program identified a series of underwater archeological survey objectives in the Door County and Apostle Islands areas. These priority areas reflect the current areas of public interest in diving recreation, and those areas with the most immediate need for cultural resources management planning. These areas contain a variety of submerged cultural resources, including historic shipwrecks, remains of early historic fur trade posts, logging and fishing camps, and settlements, as well as evidence of prehistoric habitation.

Field surveys were undertaken to archeologically document and evaluate a series of selected underwater archeological sites for State and National Register of Historic Places listing. Surveys were preceded by archival literature research on each site to formulate individual research designs.

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 Phase I archeological field survey using remote-sensing or visual survey (Cooper 1989). Past and present State Historical Society efforts in this initial research have produced an inventory of approximately 700 shipwreck sites statewide largely based on historical sources (Cooper 1988a). Survey priorities for 1991 were chosen on the basis of management needs and feasibility of surveying the site with available equipment. As these selected site locations are all known, Phase I survey to initially locate sites was generally unnecessary.

Research designs for Phase II field research were established using the criteria for State and National Register listing, as well as site-specific research questions generated through pre-field literature survey. Generally, second phase survey consists of the actual physical inspection,

evaluation, and interpretation of the archeological site, involving survey and documentation of the remains, as well as identification of management problems (such as archeological importance and sensitivity, site environment, human and natural threats, visitor access, and safety). Extensive research was also conducted into a site's recorded history. 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 (National Park Service 1986, 1991).

General Phase II field objectives were as follows:

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 surveys and evaluations were conducted using SCUBA and manual mapping techniques, coupled with still and/or video photography. Archeologists produced measured sketches, construction schematics, and site plans for National Register-level documentation. Site analysis was conducted using comparative archeological evidence obtained from underwater archeological surveys of similar sites. Archeological evidence was augmented by historical literature relating to individual site histories and general Great Lakes maritime history and marine architecture. Detailed discussions of National Register criteria and eligibility for Great Lakes shipwrecks, as well as a detailed overview of Great Lakes maritime history, vessel types, and archeological significance may be found in Cooper and Kriesa (1992).

Field research was directed by the state underwater archeologist, who was assisted by four LTE archeologists and several sport diver volunteers. University of Wisconsin Sea Grant Institute provided the UW Marine Studies Center research vessel *Dawn Treader*, Mini-Ranger III equipment, and a vehicle to the project, in addition to grant assistance.

Applications

Sites determined eligible as a result of this survey are to be nominated to the State and National Registers of Historic Places by the SHSW Division of Historic Preservation. State and National Register listing provides a mechanism for long-term preservation, management planning, and

provides extra legal protection for archeological sites under state and federal law.

The State Historical Society of Wisconsin's submerged cultural resource surveys are part of a pilot study to plan and develop a program of marine preserves to protect state underwater archeological and historical resources and to promote diver and non-diver tourism (Cooper 1989b:1-2, 105-109). This is allied with regional and nation-wide efforts to better protect and manage submerged cultural resources, while encouraging public appreciation and responsible usage.

Federal agencies and other states such as South Carolina, North Carolina, Texas, California, Virginia, Vermont; Maryland, Michigan, Indiana, and Minnesota, (many with federal assistance) have already undertaken submerged cultural resource surveys to identify and manage these resources (Agranat, James, and Foster 1991; Arnold 1976; Carrell 1984, 1985; 1987; Crisman 1986; Labadie 1989; Lawrence 1985; Lenihan 1987; Murphy 1984; Shomette and Eshelman 1981; Warner and Holocek 1975; Watts 1991; Wilde-Ramsing and Angley 1985). Michigan, Vermont, and Florida have carried this further by developing marine preserve systems as a means of protecting sites of historical and archeological interest, as well as enhancing site usage through recreation and tourism (Crisman 1986:34; Halsey 1990; Indiana University et. al. 1988). Such preserves have succeeded in protecting important resources, have generated considerable public interest in shipwreck preservation and recreation, and have had significant positive impact on local economies (Halsey 1990; Peterson, Sundstrom, and Stewart 1987; Vrana 1989). With increasing public and governmental interest in marine preserves for Wisconsin has come a need for State and National Register-evaluated submerged cultural resources for inclusion in proposed diving recreation areas.

Submerged cultural resources surveys are of benefit to those agencies charged with the management of public lands and resources, as well those user groups who interact with submerged cultural resources. Chief state agencies in Wisconsin with cultural resource management concerns include the Wisconsin Department of Natural Resources (DNR) (the landowner for lake bottomlands), the SHSW (the agency charged with inventory and preservation planning for cultural resources), and the Board of Commissioners of Public Lands (the technical landowner for all untitled state lands). Major user groups include the sport diving community, charter diving services, and the Great Lakes tourism industry in general which promotes the unique maritime history of the Great Lakes and seeks to provide new recreational and educational opportunities for visitors.

The final report on the SHSW's 1991 submerged cultural resources survey results will serve as a compilation of site descriptions, analysis, and management recommendations for use in cultural resource management planning, recreational development, interpretation, and public education. The report will also serve as a source document for producing nominations to the State and National Registers of Historic Places, as well as listing in the State Archeological Site Inventory and Wisconsin Shipwreck Site Inventory databases.

Door County Operations

The 1991 SHSW proposal to Sea Grant identified three research objectives in the Door County area for the 1991 field season: (1) complete ground-truthing and Phase I documentation for two remote-sensing anomalies recorded during the 1989 field survey of Pilot Island; (2) survey and document the schooner *Meridian* wrecksite at Sister Islands; and (3) conduct a visual reconnaissance of the lake bottom adjacent to the seventeenth-century fur trade post at Rock Island. These primary objectives were met, along with a series of secondary objectives which included partial surveys on the steamers *Louisiana*, *R.J. Hackett*, *Kate Williams*, the schooner *Boaz*, and a visual reconnaissance of sections of Hedgehog Harbor. The most labor intensive project undertaken during the 1991 field season was a survey and documentation of the steamer *Frank O'Connor*. The *O'Connor's* recent rediscovery precluded her inclusion as a primary objective in the 1991-92 SHSW Sea Grant proposal. The site's reported archeological condition and accessibility to the diving community made it a top priority for field investigation.

Apostle Islands Operations

The 1991 SHSW Sea Grant proposal identified two objectives for the 1991 field season in the Apostle Islands: (1) the survey and documentation of the steamer (st.s.) *Sevona* wreck site at Sand Island and; (2) the survey and documentation of the wrecks at Red Cliff Bay, including the st.s. *R.W. Currie*, the st.s. *H.D. Coffinberry*, and the st.s. *Ottawa*. The extent and scope of this work was dependent upon the analysis of data collected during the 1990 field season. These objectives were met along with additional survey and documentation done on the following sites: st.s. *Fedora*, barge *Finn McCool*, schooner-barge *Pretoria*, and a recently discovered unidentified Mackinaw-type small craft. The SHSW archeologists also conducted reconnaissance dives to monitor changes and potential disturbances to the schooner-barge *Noquebay* and st.s. *R.G. Stewart* sites. The SHSW archeologists also assisted the National Park Service in a special cultural resources management training exercise at the *Noquebay* site.

Door County Site Surveys

Steamer *Frank O'Connor* Survey

The *Frank O'Connor* belongs to a remarkable class of vessels created by an equally remarkable man, James Davidson. Described by the Detroit Free Press in 1898 as "a radical of radicals," Davidson built ships that seemed to defy both common economic sense and obvious trends in naval architecture (Detroit Free Press 11/9/1898). When other shipbuilders increasingly turned to iron and steel to build lake freighters, Davidson built giant wooden ships. At least forty-one of these ships exceeded 250 feet in length, with seventeen of these breaking the three hundred foot mark. The *Frank O'Connor*, launched as the *City of Naples* in 1892 at West Bay City, Michigan, was one of the first of the three hundred foot class (Baker 1974:20-23).

Davidson was one of the best known, if controversial shipbuilders of his time. Born in Buffalo in 1841, Davidson's maritime career began early when he worked ferrying sailors out to ships laying in the Buffalo harbor. Becoming a sailor himself, Davidson visited lands and was exposed to ideas foreign to his lake port home. Davidson did two years of ocean service with the Black Ball packets that brought him to Liverpool on several occasions, to Russia, and as far east as Calcutta. In 1862 or 1863 Davidson returned to the lakes and soon after commanded his first schooner (Havighurst 1975:262-263; History of Bay County 1883:194).

Davidson began investing in ships early in his career and in 1870 built his first ship, the 138-foot schooner *Laura Belle*. The following year he built the similar sized *E.M. Davidson*. This latter vessel was the first of many he was to build at West Bay City (Arndt 1982:165; Baker 1974:19). In 1874 he launched the 1,456-ton *James Davidson*, then the largest wooden steamer on the lakes (Havighurst 1975:262). After a seven year absence, he returned to West Bay City and produced the 262-foot, 1,490-ton steamer *Oceanica*. Thereafter Davidson's ships grew steadily in size. Between 1881 and 1900, the peak of the Davidson yard's productivity, thirty-four large wooden steamers were built. In addition to the steamers, Davidson built wooden schooners and schooner-barges of gargantuan dimensions (Baker 1974:20-22).

Davidson may have built in wood, but he was no stranger to innovation. For it was innovation that made the huge wooden ships possible. In 1883, an unnamed compiler of the History of Bay County wrote: "At James Davidson's yard was found a monster steamship on the stocks, the largest craft ever constructed on the Saginaw River, and the largest craft on the Lakes so far as dimensions are concerned, the iron Steamship 'Onoko' being the only boat that will eclipse her in the way of carrying capacity," (History of Bay County 1883:225). The ship being described was the *Australasia*, and with it Davidson introduced a new system of trussing and framing:

To obtain further strength Captain Davidson will introduce a new idea in the way of trusses, one of which will be placed in the center, about one-fourth way from the stem, another amid-ships and the third about one-fourth of the way from the stern. The fourth will be placed just forward off the boilers. A heavy truss will begin on either side at the bilge and proceed to the center of the upper deck, and

and became an active player in both the Cleveland Vessel Owners Association and the Lake Carriers Association. In 1902 Gilchrist and his partners contracted for ten ships each with capacity of 6,200 tons, an order touted as the "largest order for ships ever placed on the Great Lakes." In 1903 Gilchrist consolidated his holdings into the Gilchrist Transportation Company. By 1907 the company had about seventy ships, with an annual carrying capacity of 5,000,000 tons (Watterson 1959:218-219).

Nineteen of the *City of Naples'* twenty-seven year career was spent serving the Gilchrist interests. The *Naples'* ports of registry included, at different times, Sandusky, West Bay City, and Cleveland (Bureau of Navigation 1894-1912).

In 1895 the *Naples* was valued at \$115,000 with an insurance rating of A1* (Inland Lloyds 1895). The ship seems to have been a good investment and Gilchrist kept her in good repair. The 1902 Inland Lloyds noted that the spar deck and booms had recently been replaced and listed her insurance rating at A1 with a valuation of \$80,000 (Inland Lloyds 1902). In 1904 or early 1905, the Gilchrist company modified the *Naples* by raising her deck approximately eighteen inches (Bureau of Navigation 1905). This added to her ore carrying capacity by over a third, bringing it up to between 3,300 and 3,500 tons (Great Lakes Red Book 1915; Beeson 1919).

The Gilchrist Transportation Company operated a very large fleet and rotated its captains and engineers frequently. It was said that J.C. Gilchrist preferred young men and "men of small stature" as his captains, as he believed that "the cool headed little fellow makes the best shipmaster (Marine Review 9/23/1997)." The 1904, 1905, 1907, 1909 editions of the Great Lakes Red Book each list a different master and engineer for the *Naples*. Some of her captains included Alex Clark, W.H. Landgraph, Fred Hasenflue, and John Lore -- all of undetermined stature (Great Lakes Red Book 1904; 1905; 1907; 1909).

J.C. Gilchrist's optimism and passion for expansion led to his downfall. Beginning in 1906 commercial conditions on the lakes went into a decline and the Gilchrist Transportation Company found itself overextended. Cargoes were in short supply and independent operators like Gilchrist were hit hard. Some ships, apparently, "did not turn a wheel for two years" (Watterson 1959:210). The *City of Naples* may have been among those idle. The Great Lakes Red Book lists no captains for the *Naples* and her wooden sisters in the Gilchrist fleet for shipping seasons of 1910-1912 (Great Lakes Red Book 1910; 1911; 1912).

In 1907 J.C. Gilchrist was permanently disabled by a stroke and his company began a serious decline, eventually sliding into receivership. In 1913, the Gilchrist fleet was put up for public sale by the court and the *City of Naples* sold to Norris & Co. of Chicago (Beeson 1913; Watterson 1959:210). In 1914, she was picked up by the Tonawanda Iron and Steel Company of Tonawanda, New York and commanded by P.F. Powrie (Great Lakes Red Book 1914; Green 1915:126). The vessel was not in commission in 1915. With the American economy still sluggish, there was little use for an old wooden bulk carrier, and Tonawanda Iron and Steel operated no ships at all (Great Lakes Red Book 1915).

In 1916, perhaps anticipating the coming wartime shipping boom, Tonawanda ship chandler James L. O'Connor went into the transportation business, purchasing the *Naples*, which he renamed the *Frank O'Connor* after his son (Greenwood 1986:372). This proved a sound investment as by 1917, according to Beeson:

Any old wooden hull lumber carrier that only a few years past could scarcely earn operating expenses, and certainly paid no great income to its owner, is now worth more than it cost when ready for its first trip. Hauling lumber at \$3.50 to \$4.00 per thousand, or coal at \$1.00 per ton and more, is what these old fellows are doing in 1917 (Beeson 1917:66).

The *Frank O'Connor* evidently operated profitably during the war years (Door County Advocate 12/19/1919). But wartime profits come at a cost of human lives. And for the O'Connor Transportation Company, the price included the May 3, 1918 death of young Frank O'Connor on a German battlefield (Greenwood 1986:372). Seventeen months later, a second tragedy would hit the family firm.

On September 29, 1919, the *O'Connor* loaded 3,000 tons of coal at Buffalo and left for Milwaukee. On October 2, the vessel entered Lake Michigan. Favored by good weather, the ship proceeded down the west side of the lake and was expected to make port ahead of schedule (Frederickson 1963:II:56-57). About 4 p.m., fire was discovered forward and Capt. William Hayes, James O'Connor's son-in-law, turned the ship toward land ten miles away (Door County Advocate 10/10/1919; 2/5/1920). Roughly an hour later, the steering gear burned away, leaving the ship helpless about two miles from Cana Island. The ship was clearly doomed and the order was given to take to the lifeboats. The billowing smoke had attracted the attention of the Cana Island lighthouse keeper Oscar Knudson who, along with his assistant Louis Pecon, met the retreating crew with a power boat and took their lifeboats in tow. Some time later Coast Guardsmen picked up the tow and pulled it into Baileys Harbor. The *Frank O'Connor* was seen burning well into the night, and eventually sank in about sixty feet of water (Door County Advocate 10/10/1919; Lake Carriers Association 1919:148-149).

The cause of the fire was unknown. It was believed to have started somewhere in the bow. The most likely candidates, however, the oil room and paint locker, were housed in steel compartments. Suspicion centered on a discarded match or cigarette butt. The ship had been carrying grain all season and the grain dust caked in the hold reportedly "burned like tinder" (Door County Advocate 10/10/1919). The United States Steamboat Inspectors at Milwaukee investigated the incident and, in a trial the following spring, declared Capt. Hayes blameless in the incident (Door County Advocate 3/5/1920).

The 3,000-ton cargo of anthracite coal, valued at \$30,000 in 1923, inspired salvage attempts. When initial search efforts failed to locate the vessel, it was assumed to have sunk in deep water. The early searchers, however, had looked too far to the north. On June 29, 1923, the Door County Advocate reported that Charles Innes of North Bay and Chester Smith of Milwaukee had found the wreck of the *O'Connor*. The men, using two gasoline launches and a 1,000-foot long

rope sweep, dragged the area off North Bay and quickly found the ship (Door County Advocate 6/29/1923). In August and September of that year, the Marine Salvage and Wrecking Company of Milwaukee worked for five weeks, using centrifugal pumps to suck coal off the wreck. Hampered by bad weather, only 700 tons were recovered, not enough to warrant further efforts. The wreckers also claimed that most of the coal had been lost when the sides of the ship burned away (Door County Advocate 9/21/1919; 8/24/1923; 9/21/1923).

In 1935, Charles Innes, still believing that money could be made from the old steamer, interested noted Chicago diver Frank Blair in another salvage attempt. Innes's son-in-law, Charles Rohrback, relocated the wreck after three weeks of dragging "about three miles off of the point in 65 feet of water." One hundred tons of coal were clammed off of the site, and plans were made to return the following year with better equipment (Door County Advocate 10/18/1935). The latter scheme never came to fruition and the *O'Connor* lay quietly forgotten until rediscovered by modern sports divers.

Survey and Documentation

The rediscovery of the *Frank O'Connor* was reported to the SHSW in the fall of 1991. A close proximity to shore, and a moderate depth makes the site accessible to sport divers and looters. The *O'Connor* is truly a transitional vessel. Representative of the terminal stages of large wooden bulk carrier construction, the *O'Connor* also has a modern triple expansion steam engine. With its archeological potential and its vulnerability both quite high, it was deemed necessary to make the *Frank O'Connor* a top priority for field survey in 1991.

Despite the fire and salvage operations, much of the lower hull and machinery of the *Frank O'Connor* remain. The huge museum-quality triple expansion steam engine and boilers sit on their beds and rise up over twenty feet off the bottom. The propeller shaft and wheel are still attached. In the bow, the anchor chain lies piled where the chain locker burned away. Major features in the bow also include a large Trotman-type bower anchor, mushroom anchor, and steam windlass. The fire, time, and salvage operations have taken a toll on the hull. The bilge of the *O'Connor* is intact for the entire length of the vessel (from the bow to the sternpost and horntimber), but the existing portions of the sides have broken away, laying flat alongside the main portion of the wreck. Artifacts are scattered throughout the entire wreck site with major concentrations from the engine beds aft (beneath the aftercabins), and in the bow (beneath the pilothouse and forward cabins).

Seven working days were spent in surveying the *Frank O'Connor* site. The four archeologists were limited by the sixty to seventy-foot depth to two thirty-five minute dives per working day. For safety reasons, the archeologists were divided into two dive teams of two persons. One group remained on the surface at all times as anchor watch and backup divers. Initial survey included two reconnaissance dives by each team. Because of its size and complexity the site was divided into different sections for recording. An initial baseline was lain along the keelson from just forward of the boiler beds, to the aft portions of the bow area. Offset and triangulation measurements were taken from the baseline to establish the shape of the site and place prominent

Figure 1

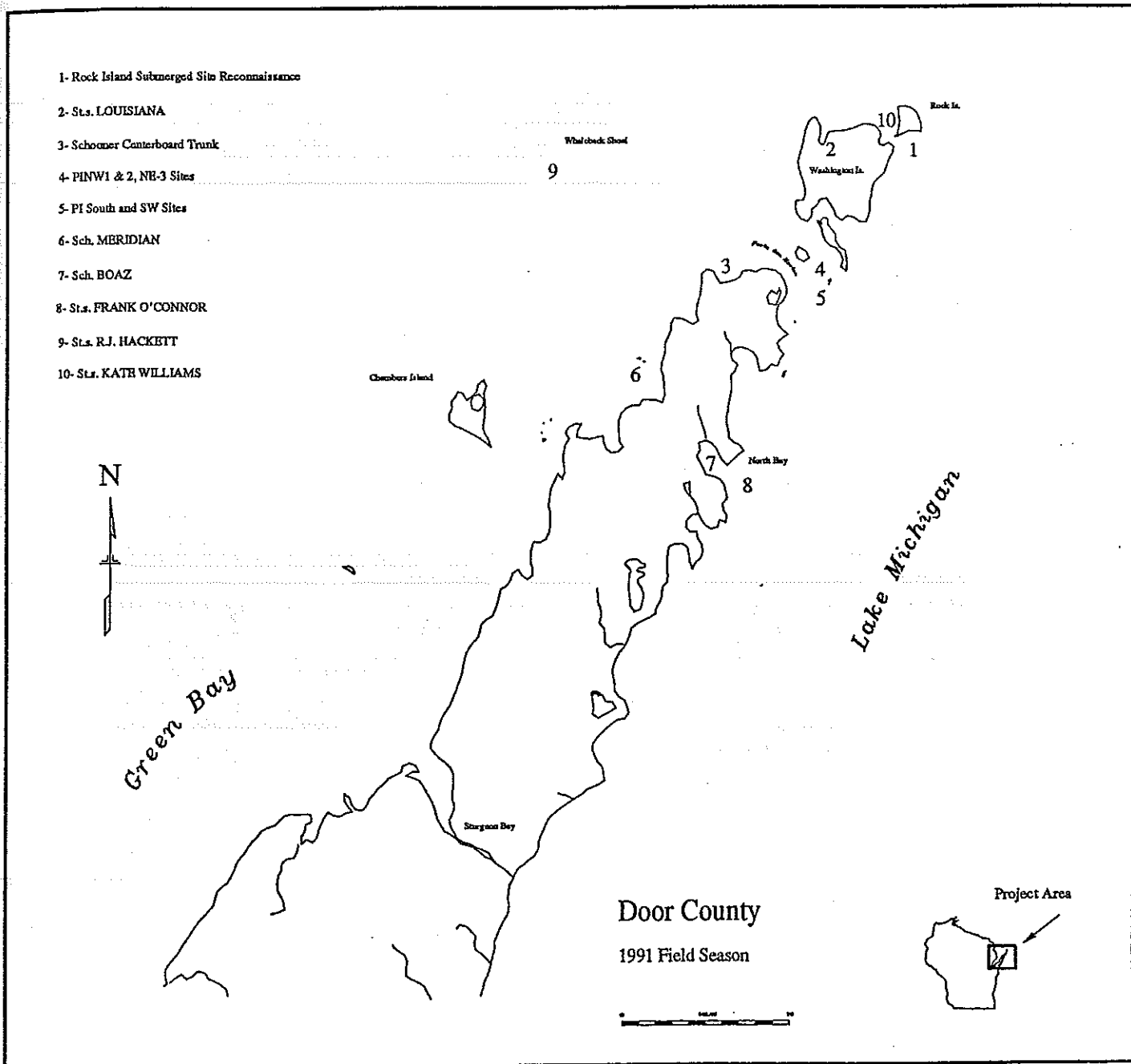
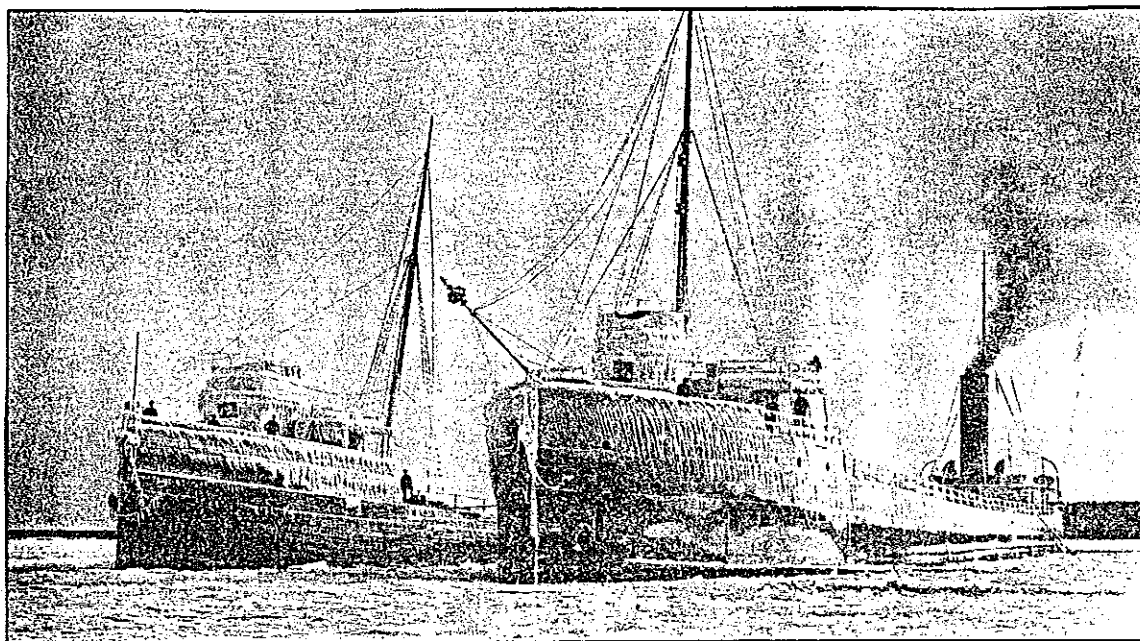


Figure 2.



St.s. City of Naples (at left)

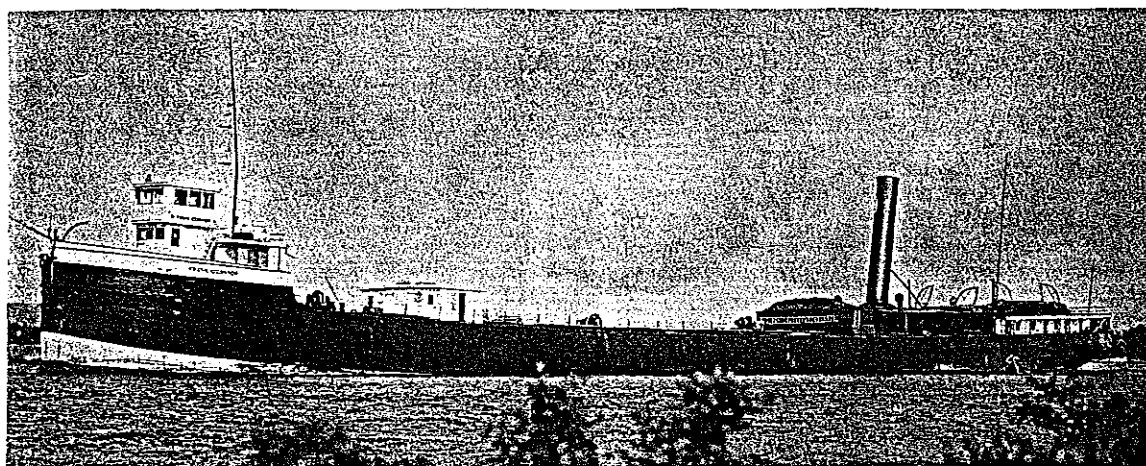


Figure 3. St.s. Frank O'Connor

features. Measured sketches were made of the bilge and sides. The bow components were sketched and recorded using an interrupted baseline and triangulation. Two separate baselines were used in recording the site from the engine beds aft. All baselines were tied together to produce a measured planview of the site.

Aspects of vessel architecture, machinery, and artifacts were sketched and close-up photography was undertaken, as visibility permitted. General site views using video, however, were not possible due to the generally low visibility. Where necessary, electronic depth gauges were used to establish the major vertical measurements on the site, such as the height of the engines and boilers. The most significant features of the vessel, such as the machinery were recorded with more detailed measured sketches and still photography.

Due to the *O'Connor's* great size (for a wooden vessel) her timbers and scantlings are of remarkable dimensions. Her floors consist of triple-timbered frames, with a room of 18 inches and a space of 3 1/2 inches. Each futtock was molded 17 inches at the floor, and was sided 5 1/2 inches. The vessel's major longitudinals include a centerline keelson, with multiple floor keelsons set either side over the floors. Measurements taken in the forward part of the hold show three floor keelsons on either side, spaced 20 inches apart (on 32-inch centers). Doubtlessly, in the midships area the floor keelsons would have continued all the way to the turn of the bilge (the ceiling is almost completely intact amidships, and the keelsons are not accessible for measurement in this area). The centerline keelson measures 20 inches by 20 inches. The floor keelsons measure 12 1/2 molded, by 12 inches sided. Bilge ceiling was fastened athwartships over the floor keelsons, with strakes ranging from 6 to 8 inches in width, and measuring 1 5/8 inches thick. Exterior planking was quite massive: 6 inches thick by 8 in width.

Adjacent to the keelson over the limberways, spacers measuring 5 1/2 inches sided and 13 1/2 inches molded are fastened over the middle futtock in each frame set. These would have provided support for the limber boards, which would have been lain atop the spacers. Steampipes of 2-inch diameter run through the limberway, probably to carry steam forward to run the windlass, winches, and perhaps heat for the pilothouse and cabins. At points along the keelson, there are also steps placed to the hold stanchions. Two timbers measuring 5 inches by 10 inches by 7 feet in length form the sides of the step, drift pins cross-fastened through the sides of the step would have secured the bases of the stanchions. As these step assemblies were not continuous, it seems that the *O'Connor* did not have a continuous series of centerline hold stanchions supporting its upper decks.

Fastenings used in the *O'Connor's* lower hull include 1-inch diameter peened drifts in the keelson and floors (occasionally using 2-inch diameter clinch rings or roves), 1/2 inch square spikes in the forward cant frames, and 1/4 inch square nails with round heads to fasten the ceiling.

In the very bow, the hull was framed with doubled futtocks, not the triple-futtocks used in the main hold. Due to either fire or salvage, the stempost and apron structure has broken away from the keel and fallen to starboard. The heavy stem is 16 inches molded, with a measurement of

6 feet 8 inches across the entire stem assembly and apron. Iron or steel sheathing (against ice) is fastened over the stem assembly 3 feet 11 inches back to the apron. The sheathing is fastened with 7/8-inch drift pins. Exterior planking in the bow is fastened using 1/2-inch square shank spikes.

The lower hull framing devolves into double-timbered frames above the turn of the bilges. Here, the frame room is 12 inches, space is 11 inches, frames are molded 9 inches, and each futtock is sided 5 1/2 inches. The *O'Connor's* upper hull exhibits remnants of her iron cross-bracing, including long hogging straps of iron or steel. The heavy straps measure 30 inches wide by 3/4-inch thick. Due to the burning of the upper hull, many of these straps are displaced and lie strewn about both sides of the wreck.

The bow contains a good amount of interesting material including chain from the chainlocker, a Trotman-type bower anchor with a pivoting arm, a mushroom anchor, the ship's steam windlass, and remnants of the forward superstructure. The Trotman-type anchor (A.B. Nordbok 1975:55) measures 10 feet 3 inches from the top of the shank to the crown. The metal stock measures 5 foot 6 inches from tip to tip. The stock forks at the crown, allowing the anchor arm to pivot or "rocker" laterally to the shank on a pin, and set at their most advantageous angle into the bottom. This anchor remains shackled to its chain cable, and sits amongst a great deal of chain in the chain locker. The mushroom anchor is still held inside the port hawsepipe, where in fact, it is just visible in the historical photograph of the *Frank O'Connor* (Figure 3). Such anchors were apparently used in harbors to help in maneuvering the bow of the vessel, as well as around canal locks, to keep the vessel properly oriented in a cross-wind. This anchor measures 2 feet 7 inches in diameter, with a 1-foot diameter inside base.

Divers later reported the existence of a stockless iron anchor lying about 100 yards from the wreck, with a length of wire cable attached to it. As vessels of the *O'Connor's* size would generally use chain cable (for easier stowing), it was theorized that this anchor was lost by one of the salvage barges working the wreck in 1923 and 1935 (Shastal, personal communication, June 1991). Subsequently, this anchor was salvaged (illegally) by a third party. An opportunity to examine it later revealed it to be a Baldt patented stockless anchor, patent dated 1896 and 1908, manufactured by the Baldt Company of Chester, Pennsylvania. Its stock was stamped "ANNEALED STEEL 800," the latter probably designating the weight. Though probably not from the *O'Connor* itself, the item is considered to be associated physically and historically with the wrecksite.

The ship's windlass is also lying forward amongst the ruins of the chain locker. Originally positioned above, on the forecastle deck, the fire dropped the windlass down onto the piled chain. It is a two-cylinder, steam powered windlass, of the type depicted in use aboard the steamer *John M. Nichol* (built 1888), and much in use aboard other lake steamers of the period (see, generally, Institute for Great Lakes Research, F.W. Wheeler and Company Hulls 46-75 and Labadie 1989:229). The windlass barrel features a central drive gear, with chain wildcats on either side, and warping heads outboard. Brake wheels with cam-lever brakes are located alongside the wildcats. Two steam cylinders of 14-inch diameter are arranged fore and aft on the after end of

the windlass, and a steam throttle is placed between the cylinders. The cylinders are connected to an overhead crank which drives the windlass via a worm gear. Contemporary drawings show this worm gear as also driving, via a bevel gear, a capstan situated on the forecastle deck above the windlass. An 18-inch diameter flywheel (which may have been used as a power takeoff wheel) is located on the forward end of the overhead crankshaft. The entire windlass is mounted on a heavy semi-circular steel base, with the flat edge facing forward. The windlass was most likely powered using steam piped up from the main boilers.

Similarly powered two-cylinder steam winches were found in the forward and midships sections of the hold. These may be seen in the historical photograph of the *Frank O'Connor* placed upon the spar deck (Figure 3), one just aft of the forward superstructure, and one just forward of the coal bunker. The photograph shows them placed with the axis of the winch running fore and aft. The winches measure 4 feet by 4 feet 9 inches across at the base, and feature a central drum of wire cable, with warping heads on either side. The steam cylinders measure 10 inches in diameter by 16 inches in length.

Possibly the most interesting aspect of the *O'Connor*, certainly the most dramatic, is her superbly well-preserved propulsion machinery. The huge triple-expansion steam engine and twin Scotch marine boilers dominate the stern, along with the propeller, shaft, and towering horn timber. The engine is approximately twenty feet in height, rising from a depth of 63 to 43 feet. The valve chest sits atop eight cylindrical columned footings, each 10 inches in diameter. At its footings, the engine measures 10 feet 8 inches in length, and 6 feet 9 inches in width. The inner diameter of the tops of the cylinders measure, fore to aft, 57 inches, 20 inches, and 41 inches. The engine's air pump sits directly to starboard of the engine. Though much of the smaller steampiping is broken, the large pipes (10 to 12-inch diameter) connecting the cylinders and air pump are still intact.

The rivetted Scotch boilers measure 13 feet 9 inches long and 11 feet 8 inches outer diameter. Atop each boiler is placed a steam drum, 7 feet long by 3 feet 8 inches in diameter. Safety valves are mounted on the forward inside of each steam drum, with a lever weighted-type valve on each. A scant 14 inches of space separates the two boilers. They were formerly connected together, side by side, with a 6-inch inside diameter steam pipe, with a globe valve between the two boilers.

Each boiler is equipped with multiple longitudinal fire-tubes, of 3-inch diameter, and are reinforced with longitudinal stay-rods. The front of each boiler contains two furnace doors for stoking and ash removal, and three oval manhole plates, 19 by 15 inches, bolted and dogged down (as illustrated in Durand 1901:101). The furnace doors are circular, 3 feet 10 inches in diameter, with a split semicircular upper door, and open lower ashpit (lighter doors that were probably in place here are now missing) (see Durand 1901:102-104). As was common practice with Great Lakes bulk carriers of this time, the boilers were probably elevated up onto the main deck above and forward of the engines, to slow the rolling of the vessel (Labadie 1989:229-230; personal communication, June 1992). If this was the case, the *O'Connor's* boilers have dropped perhaps ten feet down into the bilge, still sitting upon their iron saddles, with no other

discernable effect other than a slight displacement of two or three feet to port of centerline, and breakage of the connecting pipes.

The propeller shaft assembly and propeller are still in place, and though covered with debris from the upper stern, the shaft coupling, thrust bearing, and the shaft itself are readily visible. The distance from the engine footing to the base of the horn timber along this shaft is 15 feet 6 inches. Six feet of this distance is taken up with the large thrust bearing assembly. The shaft measures 10 inches in diameter; the thrust bearing rings or collars measure up to 25 inches in diameter. The huge propeller is four-bladed, and 12 feet 1 inch in diameter. The blade tips are squared, with rounded corners, and measure 3 feet 5 inches at their widest point. The hub measures 20 inches, with a 14-inch boss placed over the end to secure the wheel to the shaft.

Off the stern, aft and to lying to port of the propeller, the *O'Connor's* rudder has broken from the hull and lies flat on the bottom. From the rudderhead to its base, the rudder measures 27 feet 2 inches. The blade is constructed of five vertical timbers, edge-joined, with horizontal metal reinforcing straps. The rudderstock is iron or steel, 17 inches in diameter, with a metal bearing collar set 8 feet 8 inches from the top of the rudderhead to fit into a bearing and stuffing box in the transom overhang. The rudder blade is metal-sheathed against ice, from 1 foot 4 inches below the bearing collar to 17 feet below the rudderhead.

On the rudderstock, above the bearing collar and 2 feet 3 1/2 inches below the rudderhead, is fitted the steering quadrant. The quadrant is an open fan-shaped metal structure, 4 feet 9 inches in radius, and describing an arc approximately 7 feet 6 inches across, with the wide end of the arc facing aft, and the apex fastened around the rudderstock. Steering chains, of 4-inch long open links, connected the quadrant to the steering gear mechanism. A portion of steering chain is still connected to the quadrant, and is draped over the propeller and the horn timber. Pieces of the transom, including a section of upper hull, and a transom fragment carrying a towing bollard, may also be found in the vicinity of the rudder.

The stern area also contains a great amount of artifactual material, including engineering tools (such as wrenches), burned galleyware (such as crockery and cooking utensils), and many miscellaneous items relating to the engine room, galley, and aftercabins. Unfortunately, looters have already been at work in this area, judging from diver reports and visible traces of digging in the debris (see below). Many other charred artifacts from the upper hull and decks, including piping, fastenings, sections of iron railing, cleats, lamp housings, and fairleads, lie strewn along the length of the wreck, with another significant concentration forward around the windlass and chain pile. Also, a field of coal, scattered by salvage efforts, rings the site. As the wreck rests on a generally hard bottom of dolomite bedrock, interspersed with pockets of sand and cobble, many of the loose artifacts are easily accessible to looters.

Conclusions

The *Frank O'Connor* appears to be unique in the Door County area as one of the few surviving historic steam vessels whose machinery is still largely intact and upright, and as a historic

shipwreck site which has not yet been subjected to years of intensive diver looting and collecting. Also, the fact that the *O'Connor* represents the terminal period in wooden bulk carrier construction, and was a product of the noted James Davidson Bay City yard, makes her an important local example of the last of the large wooden bulk carriers. To this extent, she possesses local historical, architectural, and archeological significance. Due to the extraordinarily high level of integrity of her propulsion and auxiliary machinery, richness of artifactual material, and extent of architectural information, the *Frank O'Connor* meets several criteria for listing on the National Register of Historic Places, and a nomination is in preparation by Division of Historic Preservation staff.

Disturbingly, the *O'Connor* survey found ample evidence of repeated, recent looting, and in one instance observed extremely suspicious behavior by a group of out-of-state divers. Clear evidence of breakage and theft were found around the machinery, and many more loose artifacts were reportedly removed by looters. Even small, relatively worthless items such as metal handwheels from steamvalves were found broken from their stems. This purposeless vandalism disallows other divers from viewing and understanding this marvelously intact steam engine, and the ship it powered. Diver reports indicate that brass oilers, gauges, whistles, a capstan cover, galleyware, tools, and other items have also been stolen by unscrupulous visitors. Other divers report that items are frequently moved around the wreck, either for photography, display, or possibly from aborted collecting efforts, with many small items (including the badly cracked ship's bell) ending up being placed atop the engine.

Diver's should be aware that displacing artifacts in such a manner is quite illegal, and by gathering them in a convenient location, can facilitate their removal from the site by collectors. It also disallows archeologists from understanding their placement and function on the ship, once the artifacts have been removed from their original location.

The looting of the *O'Connor* wreck began immediately upon its discovery, and the reported levels of continued looting around the site prompted the Wisconsin Trust for Historic Preservation to place the *Frank O'Connor* wrecksite on its 1991 list of Ten Most Endangered Historic Properties in Wisconsin. The wreck's discovery created a frenzy of visitors from both Wisconsin, Illinois, and elsewhere, many interested simply in seeing the new find; many others simply interested in picking over the newest "treasure trove".

However, some improvement in the situation is at hand. Local divers have become increasingly concerned about their newest and most interesting divesite being stripped by looters, and have monitored both the wreck and those diving it rather closely. As a result of their vigilance and pressure on local law enforcement authorities, the district attorney has brought charges against one diver for theft of the Baldt anchor from the wrecksite, and another reported looting incident is currently being investigated. Listing of the site on the National Register should instill yet more local pride in the wreck, and assist her preservation.

Ideally, the *Frank O'Connor's* inclusion in a future state bottomland preserve or National Marine Sanctuary would enable careful monitoring and better law enforcement at the site, as well as

interpretation and improved access (through site guides, mooring buoys, and on-shore exhibits). Given the continued looting of this new wreck, the sooner monitoring and enforcement efforts can be implemented, the better. It would be a shame to lose this fine new addition to area dive sites through irresponsible diving behavior and managerial neglect.

The discovery of the *Frank O'Connor*, the subsequent publicizing of its location, diver looting, and state efforts at emergency documentation and law enforcement all point to some major problems with the current abilities of the state to manage historic shipwrecks. As long as wreck hunters and divers are allowed unrestricted ability to search for new wrecks, and are not required to maintain the secrecy of their finds, the state is unable to control the looting of new wrecksites. While it is probably unrealistic to control all access to such sites (enforcement would be a real problem), there should be some responsibility placed upon the finder for the responsible treatment of the find. Canada and Vermont both require deliberate shipwreck search efforts that use remote-sensing equipment to be licensed as an archeological survey. Wisconsin appears to have this authority under 44.47 Wis. Stats., but its implementation would be difficult. Also, such a change in policy would potentially be undertaken at a great political cost to shipwreck preservation efforts, as even many preservation-oriented divers consider wreck hunting something of an inalienable right.

None the less, those who work to discover these wrecks should be held accountable for the results of their doing, if not legally, at least ethically. The state (and its taxpayers) should not be suddenly presented with the need to clean up after someone's Memorial Day weekend wreckhunting excursion, through emergency site surveys, documentation, monitoring, and law enforcement. In other, happier, cases, divers have not publicized the discovery or site location, have worked with authorities on documentation and responsible treatment of the site, and have participated in decision-making about the site's subsequent disposition. Often, the preferable alternative is not to advertise the new wreck's existence, much less location. Some divers' rights advocates argue that this secrecy actually works to the wreck's detriment, with unauthorized visitors eventually finding the wreck, and looting it, undisturbed by legitimate visitors (Harrington 1992:103-108). In some cases, where a site might actually be usefully monitored by other divers and by law enforcement agencies, this argument has some merit. However, when the wreck cannot be reasonably monitored by responsible divers, nor is there an active marine law enforcement presence to back them up, such open-handed tactics could be simply giving away the store.

At present, secrecy of location is the wreckdiver's and resource manager's best strategy for preserving new finds. Until divers themselves support tight licensing for wreck searching, beefed-up law enforcement, and universally embrace a staunch ethic of in situ preservation, the old wreckdiver's adage holds true: "a wreck found is a wreck lost." We hope that is not true of the *Frank O'Connor*.

Ground Truthing and Phase I Documentation of Magnetic Anomalies -- Pilot Island

Pilot Island Maritime History

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

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

As a result, sailing vessels were exceptionally susceptible to the navigational hazards of the Door (more so than steamers), despite construction of a light on Plum Island in 1848, a lighthouse on Pilot Island in 1850, and a new Plum Island lighthouse in 1896 (Eaton 1974:6-7; U.S. Lighthouse Board 1896:72-73).

Current historical research indicates that some 24 vessels were lost in the Death's Door area proper (Plum, Pilot, Detroit Island) from 1837 to 1914 and an additional 40 were lost on adjacent islands, shoals, and bays from the 1830's up to the 1940's. All of the known losses in Death's Door proper were sailing vessels (schooners, barks, or brigs). Many hundred other vessels of all types stranded, foundered, or were otherwise wrecked in Death's Door, but were pulled off by nineteenth and twentieth century salvage efforts and refloated. The local maritime mishaps of the twentieth century have been mostly occasional strandings, with a few fires and collisions, most of which took place outside of the Door proper (Cooper 1988a; 1989:31-33).

Much of the fancy regarding Death's Door has surrounded the origins of the name. The marine mishaps of the nineteenth century in the Door produced little more than some very close escapes from death, thanks mostly to the heroic efforts of locals, passing ships, and the U.S. Light House and Life Saving Services in providing aid to shipwrecked mariners. However, the Door has claimed the lives of unwary or unlucky travelers who ventured across the ice in the winter (Eaton 1974:7,29). As a shipkiller, however, the Door excelled, enough that a canal was cut through at Sturgeon Bay in 1881 to allow vessels to pass through to Green Bay without hazarding the Door. Ironically, many sailing vessels continued to use the Door rather than pay canal tolls and tug fees (Cooper 1988b:92-94).

The origins of the Death's Door name, therefore, must be found in an earlier period. The modern legend regarding the destruction of a large Indian warparty in a sudden storm seems to have its roots in late-nineteenth century and twentieth century embellishments of eighteenth and early-nineteenth century French and American travelers' accounts (Eaton 1974:8-18). However, these earliest accounts mention nothing of a warparty or other aspects of the story as it reaches us in its modern form, indicating only that "there were a hundred Indians dashed against these rocks and killed in a single storm" (1835 account) or that a band of Indians, resting on a rock shelf in the Door enroute in canoes to a French trading post, were trapped and drowned by a sudden storm (1831 account); an event reportedly later recorded in pictograph form on nearby bluff faces by Native Americans (Eaton 1974:18-20).

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

The most comprehensive study of this legend summarizes:

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

Pilot Island is known through historical sources to have claimed at least eleven ships between the period 1858 and 1899, for which no evidence of later removal could be found. One or more of six other vessels reported to have wrecked in the area of Death's Door between 1841 and 1859 may have also ended up at Pilot Island. The Pilot Island wrecks include:

Vessel Name	Rig	Year Lost	Casualty Type
<i>Shakespeare</i>	brig	1858	stranding
<i>Henry Norton</i>	schooner	1863	stranding
<i>Daniel Slauson</i>	schooner	1863	stranding
<i>Lydia Case</i>	schooner	1872	stranding
<i>Cleveland</i>	bark	1875	stranding

<i>E.M. Davidson</i>	schooner	1879	stranding
<i>Forest</i>	scow-schooner	1891	stranding
<i>J.E. Gilmore</i>	schooner	1892	stranding
<i>A.P. Nichols</i>	schooner	1892	stranding
<i>Mystic</i>	schooner	1895	stranding
<i>O.M. Nelson</i>	schooner	1899	stranding

The Death's Door wrecks include:

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

Pilot Island Wrecks

Brig *Shakespeare*

The brig *Shakespeare* was built in Cleveland, Ohio in 1848. The vessel was 118 feet 2 inches in length and 25 feet 3 inches in beam and measured about 265 tons, old measurement (WSSI, n.d.). She was the product of a short partnership between two shipbuilders, John Codey and Thomas Quayle. The partnership produced at least two ships, the *Shakespeare* and the *Caroline* before Codey caught gold fever and left for California during the rush of 1849. Of the two men responsible for the *Shakespeare*, Quayle probably directed the construction. Born on the Isle of Mann in 1811, Quayle may have served a partial apprenticeship to an English shipbuilder before coming to Cleveland in 1827. One source indicates that Quayle learned shipbuilding from a Mr. Church of Huron, Ohio. Possibly, this was Mr. F. Church who built many early Ohio ships, including some in conjunction with Augustus Jones at Black River. Quayle was a shipwright of more than twenty years experience when he built the *Shakespeare*. He became one of Cleveland's most prominent shipbuilders until his retirement in 1879 (Joblin 1869:164; Mansfield 1972 [1899]:II:691).

We know little about the *Shakespeare's* career which apparently spanned from 1848 to 1858. On October 28, 1850 she arrived in Buffalo from Milwaukee carrying 432 pigs of Wisconsin lead (Milwaukee Sentinel 11/1/1850). In mid-August 1853 she was dismasted and towed into Cleveland (IGLR, n.d). In 1857 she was in the lumber trade, running primarily into Chicago from Oconto and Green Bay, Wisconsin. Her normal load that summer was 170,000 board feet of lumber, her largest was 180,000 board feet (Chicago Tribune 6/30, 7/13, 7/30, 8/13, 8/31, 9/14/1857). The following year she resumed the lumber trade and was lost with a load of Oconto lumber at Pilot Island on June 16, 1858. The vessel was valued at \$4,000, and the cargo \$1,000, at the time of the accident (Chicago Tribune 5/8/1858; IGLR, n.d.). Mansfield suggests that the ship was salvaged and later called the *Empire State*, however no evidence seems to support this

conclusion (Mansfield 1972 [1899]:I:822, 866).

Schooner *Henry Norton*

The *Norton* was a two-masted topsail schooner, built in 1834 at Richmond, Ohio, by Lind. She measured 84 feet in length by 23 feet 1 inch in beam by 8 feet 2 inches depth of hold. Her tonnage was 150 53/95 (old measure). She stranded on Pilot Island in September of 1863, enroute to Menominee to pick up a load of lumber for Kirby, Carpenter, and Company. The *Norton's* cargo (probably some type of mixed freight and/or package goods from Chicago) was owned by the same company, and was a loss. At the time of her wrecking at Pilot Island, the *Henry Norton* was owned by Hackett and Judd of Milwaukee (Cooper 1988a:50-51; Green Bay Advocate 10/01/1863).

Schooner *Daniel Slauson*

The *Daniel Slauson* was a two-masted schooner built at Racine in 1857 by A. Gilson. The vessel measured 115 feet 5 inches by 27 feet 5 inches by 9 feet 7 inches. Her tonnage was 273 91/95 (old measure). She was stranded on Pilot Island on October 18, 1863 with a cargo of wheat, enroute from Chicago to Buffalo. The cargo of wheat (12,500 bushels) was insured at a rate of \$1.15 per bushel. Caught in a southeast gale, she stranded near the lighthouse, about 100 feet from shore, holing the vessel's bottom. Though the crew was saved the vessel proved to be a total loss. At the time of her stranding, the *Slauson* was owned by Daniel Slauson and Isaac Taylor of Racine (Chicago Tribune 10/30/1863; Cooper 1988a:22-23; Mansfield 1972 [1899]:I:698; Milwaukee Sentinel 10/27/1863).

Schooner *Lydia Case*

On the final day of April, 1862 hundreds of people crowded the Racine, Wisconsin waterfront to watch the launching of the city's latest schooner, the *Lydia Case*. Laid down in Racine for F.M. Knapp and Jerome Case on January 8 by Manitowoc shipwright G.S. Rand, the *Lydia Case*, with her "patent windless, wheel capstan, and blocks" was hailed as a "creditable acquisition" to the local fleet (Racine Advocate 1/8, 4/30/1862). The ship's dimensions were 122 3/10 feet in length, 25 6/10 feet in beam, and 10 2/10 feet depth of hold. She had a plain head and a square stern (Bureau of Navigation, Temporary Registry no. 1, Cleveland, 4/16/1869).

The *Lydia Case* began her maiden voyage on May 14, 1862, clearing for Buffalo with 14,000 bushels of grain. She returned from Buffalo on June 4, with 75 barrels of salt and 25 tons of coal (Racine Advocate 5/14, 6/4/1862). The Racine newspapers do not provide a complete record of the *Lydia Case's* activities during the 1862 season but the ship made at least five trips carrying grain to Buffalo. Her return loads included salt, coal, pig iron, and lumber, and were generally small. This first season appears representative of the ship's ten-year career.

In 1863 the *Case* had an insurance rating of A1 with a \$15,000 value. The following year the rating had dropped to A1 and the value to \$12,000. In 1866 the rating remained A1 with a value

of \$11,000. In 1871, the *Lydia Case* was still under the ownership of Mr. Knapp. Her insurance rating was B1 and her value a respectable \$9,000 (Board of Lake Underwriters 1863, 1864, 1866, 1871).

Sometime in 1871 or 1872, the *Lydia Case* was acquired by the Racine firm of Orson and Company. On September 4, 1872 the Milwaukee Sentinel reported that the *Case* had cleared for Port Colborne with 14,400 bushels of wheat (Milwaukee Sentinel 9/4/1872). The ship was lost sometime in late September or November of the 1872, although there is some confusion on this matter. An official roster of marine casualties list the *Lydia Case* as a total loss at Pilot Island in September of 1872. The value of the ship was listed at \$12,000 and that of her cargo at \$8,000 (Marine Casualties, n.d.). The destination listed in the register was Buffalo and the port of clearance Milwaukee. This would indicate a cargo of grain. Later newspaper references to the *Case* mention a cargo of coal. One unpublished source indicates that the ship grounded at Pilot Island twice in 1872, once in September and again in November when on the way to Green Bay from Milwaukee (WSSI, n.d.). No evidence of this appears in the Milwaukee Sentinel maritime columns for that month. At this point the date and circumstances surrounding the ship's demise remain in question. It seems likely, based on the available evidence, that the ship picked up a load of coal at Buffalo or another Lake Erie coal port and ran aground at Pilot Island when heading for Chicago. In November of the next year the coal was salvaged from the wreck of the *Case* and taken to Green Bay (Milwaukee Sentinel 11/10/1873).

Bark *Cleveland*

The *Cleveland*, registry number 4330, measured 149.51 feet in length, 24.2 in breadth, and had a 10.05 depth of hold. She was built for a Mr. Burkle in Cleveland in 1846 by George W. Jones, of the famed Jones shipbuilding family. The *Cleveland*, as one of the early propellers, was a rather unusual vessel. Its construction, however, probably posed few challenges to Jones, who, in 1844 built and operated the 260-foot sidewheeler *Empire*, the largest steamer of her day. In addition, this was not Jones' first propeller. In 1845 he built the ill-fated propeller *Phoenix* that later burned with great loss of life (Cleveland Herald 11/17 1845; Lytle-Holdcamper 1975:172, 39; Mansfield 1972 [1899]:I:7,873; Marine Review 10/11/1894; WSSI, n.d.).

In April 1847, a Cleveland newspaper printed a rumor that the ship had foundered on Lake Michigan, adding, "we fear the above report is correct, as it is probable that the *Cleveland* left Chicago in time to have been caught in a terrible gale" (Cleveland Daily True Democrat 4/21/1847). Fortunately this report proved erroneous and the *Cleveland* went on to a career that stretched nearly thirty years.

In 1860 the *Cleveland* was owned by the Northern Transportation Company of Ogdensburgh. Inland Lloyds listed her value at \$6,000 and her insurance rating at a poor C1 (Inland Lloyds 1860). Later that year the *Cleveland's* machinery was removed and she was rigged as a bark (WSSI, n.d.) Presumably the vessel was extensively overhauled at that time. In 1863, she was rated a respectable B1 with a value of \$7,000. Her owner was R.H. Becker of Cleveland (Board of Lake Underwriters 1863). The 1866 Inland Lloyds listed her rating at B2 with a \$5,000 value

(Inland Lloyds 1866). By 1871, the *Cleveland* had been acquired by Chicago lumber interests, her rating was still B2, but her value had dropped to \$3,000 (Board of Lake Underwriters). In 1874 her insurance rating had dropped back to C1 and her value to mere \$1,000 -- a figure that might reflect the depressed national economy as much as the condition of the vessel (Board of Lake Underwriters 1874).

On June 11, 1875, the Cleveland encountered a summer gale in Wisconsin's Porte des Mortes passage and was blown ashore at Pilot Island. An old ship of little monetary value, she was stripped and abandoned (Door County Advocate 6/24/1875; WSSI, n.d.).

Schooner *E.M. Davidson*

The *E.M. Davidson* was a three-masted schooner built at Bay City, Michigan in 1871 by James Davidson. The 138-foot long, 281-ton schooner was only the second vessel in Davidson's notable shipbuilding career (Baker 1975:20). In 1874 the ship was owned by Mader and Combs of Chicago, had an insurance rating of A1, and a value of \$20,000 (Board of Lake Underwriters 1874). On October 16, 1879, the *E.M. Davidson*, under the command of Capt. William Morris, went aground at Pilot Island. Early reports indicated that the ship was "well out upon the rocks," but the chances for her release appeared good. Orders for a wrecking tug seem to have gotten confused. This caused a short, but ultimately fatal, delay in salvage efforts. On October 25, the *Davidson* was reported in a "very bad fix." Although the wrecking tug *Leviathan* succeeded in placing a steam pump aboard the *Davidson*, southerly winds made it impossible to pull the ship to safety (Chicago Tribune 10/20, 10/21, 10/25/79). By October 30, the Door County Advocate was predicting a total loss. In December, the *Davidson's* outfit was stripped and the ship was abandoned for the winter. Two weeks later the outfit was attached and sold to pay the crew's wages (Door County Advocate 10/30, 12/4, 12/18/1879). The following April, the tug *Welcome* returned to the *Davidson* and reported the bottom was gone and salvage was now pointless (Door County Advocate 4/15/80). Other people felt differently, and the tug *Leviathan* made several salvage attempts in the late summer and early fall. As a last-ditch effort, a false floor was built in the *Davidson*. All attempts failed and the *Leviathan* abandoned salvage efforts at the end of September 1880. On October 28, it was reported that the *Davidson* had completely disappeared from view (Door County Advocate 4/15, 8/19, 9/23, 10/28/1880).

Schooners *A.P. Nichols*, *J.E. Gilmore*, and *Forest*

Of the vessels wrecked at Pilot Island, the *A.P. Nichols*, *J.E. Gilmore*, and *Forest* are notable for reason of their freak triple stranding in almost the same location, the subsequent daring nighttime rescue of two crews by lighthouse keeper Martin Knudsen, and for the fact that the physical remains of all three vessels have been identified archeologically. The remains of the schooner *A.P. Nichols* and scow-schooner *Forest* were identified during the course of an underwater archeological survey in 1988, and were listed on the National Register of Historic Places in 1992 as the PINW site (see Cooper 1989:31-47) for a discussion of this site).

The story of the strandings begins with the scow-schooner *Forest*. This vessel was built in 1857

at Newport, Michigan by and for David Lester. Her dimensions were 87 feet 6 inches length, 22 feet 3 inches beam, and 6 foot depth of hold. Her tonnage was 102 78/95 old measure, she had one deck, two masts, and was issued official number 9740. Her insurance value in 1874 was \$2,500, classified B2 (scow). She was rebuilt and lengthened over the winter of 1879-1880, and her rig changed from two to three masts. Her new dimensions were 115.6 by 23.0 by 6.0 feet, gross tonnage of 113.45, and net tonnage 107.78 (Board of Lake Underwriters 1874:42; Hirthe and Hirthe 1986:33; Bureau of Navigation 1885:138).

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

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

Vessel for Sale

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

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

The *Forest* was lost at Pilot Island on October 28, 1891 enroute from Chicago to Nahma, Michigan (in Garden Bay, Big Bay de Noc) to take on a cargo of lumber slabs. While running before a high sea and a south-southwest gale, she stranded on the reef extending to the southwest of Pilot Island. The next day the crew of four and Capt. George Petersen landed on the island, and took refuge at the lighthouse manned by keeper Martin Knudsen, where they stayed until November 5th. By this time, the *Forest* had broken up and was abandoned as a total loss. The vessel was dismantled on November 2-3 and her outfit was placed into storage on Pilot Island (Hirthe and Hirthe 1986:35) The vessel lay with her stern wedged into the rocks on shore, and the hatches and cabin were washed away. Keeper Knudsen's enterprising children used the cabin, beached by winter ice, as a playhouse (Knudsen 1948:49). The scow was uninsured

(Racine Daily Journal 10/31/1891 p.4,c.3). The *Forest's* last enrollment was surrendered at Chicago on November 16, 1891; cause of surrender, "vessel lost" (Hirthe, personal communication 1988).

The *Forest* lay alone amongst the rocks of Pilot Island until the following autumn, when both the schooner *J.E. Gilmore* and the schooner *A.P. Nichols* were driven ashore at the same point. The *A.P. Nichols* was built at Madison Dock, Ohio in 1861 by the Bailey Brothers (A. and D.E. Bailey) for James Butler of Buffalo, N.Y. Originally rigged as a bark, she was later re-rigged as a three-masted schooner (Hirthe and Hirthe 1986:36; Runge, n.d.).

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

She was sold to A.P. Dutton of Racine in 1871, received repairs in 1873, and in the summer of 1877 she was rerigged at Manitowoc to a three-masted schooner (called a "three-and-after") (Board of Lake Underwriters 1874:83; Hirthe and Hirthe 1986:36; Runge, n.d.). She was sold to Capt. David Clow and Son of Crystal Lake, Illinois in 1883, with a home port of Chicago, and was again repairing in 1884 (Runge, n.d.). This latter may have been the result of an incident on August 22, 1883 where the *Nichols* dragged her anchors off Mackinac during a heavy southwest gale, and went ashore on Mission Point. She lost her small anchor, chain, broke her steering gear, and began to leak badly. She was pulled off the Point and towed to Cheboygan, Michigan by the propeller *Messenger*, and temporary repairs were effected by a diver sufficient to get her back to Chicago. Her repairs at Chicago included part of a new keel, a new rudder post, and recaulking (Hirthe and Hirthe 1986:38).

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

The *Gilmore* was a canaller and was characterized by a plumb bow and highly-canted jibboom (Figures 5 & 6). She measured 137.7 feet in length, 25.4 feet in beam, and 11.0 feet in depth of hold, with a gross tonnage of 290.89, net tonnage of 276.35, and official number 13307. The *Gilmore* had a wood hull, two masts, single deck, and was built at Three Mile Bay, New York by Asa Wilcox in 1867. She was built for Thomas S. Mott, Asa Wilcox, and James E. Gilmore (Hirthe and Hirthe 1986:35; Bureau of Navigation 1885:138).

Asa Wilcox founded Three-Mile Bay as a shipbuilding station in 1835. One account credits Wilcox with the construction of 48 vessels at Three-Mile Bay and other small towns he founded in the Jefferson County, New York area. The development of the county's shipbuilding industry was, according to a late nineteenth century county history, an outgrowth of local fishing and stone quarrying enterprises (Emerson 1898:717, 730).

In 1871 the *Gilmore* was listed as belonging to T.S. Mott and Co. and registered at Oswego. She was valued at \$19,000 with an insurance rating of A2. In 1873, the *Gilmore* was registered at the port of Chicago under the ownership of Magill & others, with a value of \$16,000 and a rating of A2 (Runge, n.d.). In 1874, she remained at Chicago with Magill, her rating dropping to A2 1/2 and value to \$14,000 (Board of Lake Underwriters 1874:46). In 1875 the *Gilmore* sank in Cleveland harbor, but was refloated and refitted (Hirthe and Hirthe 1986:36). That year, the schooner was purchased by John Gerlach and partners, and her registry transferred to Cleveland. At that time her insurance rating remained A2 1/2, but her value was down to \$12,000. John Gerlach was a partner in the Cleveland firm Peter Gerlach and Co., makers of tools and saws. The *Gilmore's* financial relationship to this firm, if any, is unclear. John Gerlach remained the vessel's owner until its loss in 1892 (Runge, n.d.).

A wooden schooner with a long career, the *Gilmore's* insurance record reveal a history of fluctuating values and insurance ratings. By 1878, age and, perhaps, the national economy combined to bring the schooner's value down to \$4,000, and her insurance rating was down to B2 (Board of Lake Underwriters 1878). The *Gilmore's* value dropped as low as \$3,500 in 1879, but major repairs instituted that year brought her value and ratings back up. Throughout most of the 1880s an extensive program of maintenance and repairs kept the ship in good condition and her value at \$6,000. In 1892, the year of her demise, the *Gilmore* retained a B1 rating, although her value had dropped back to \$3,500 (Runge, n.d.).

A particularly bad string of autumn gales in the fall of 1892 conspired to unite the *Nichols* and the *Gilmore* with the *Forest* at Pilot Island. October 17 found the *Gilmore* running through Death's Door before a heavy gale, carrying only her staysail, foresail, and jib enroute from Chicago to Elk Rapids, Michigan, light, under command of Capt. D.B. Smith. Abreast of Pilot Island the wind shifted to the southwest, and the under-canvassed light vessel was driven upon the southwest reef into three feet of water at approximately 11:00 p.m. (Hirthe and Hirthe 1986:38-39). Keeper Knudsen managed to make contact with the crew, and as the vessel cabins were intact and provisioned for several weeks, they decided to remain there until the seas calmed. As a precaution, a breeches buoy was rigged from the schooner to the island (Knudsen 1948:57). Although initial reports appeared confident of releasing the schooner, she was found to be solidly placed on the rocks, and work commenced on stripping and abandoning her (Door County Advocate 10/29/1892 p.5, c.3; Milwaukee Sentinel 10/20/1892 p.6, c.4).

The crew of the *Gilmore* had apparently escaped to the lighthouse when the next gale struck on October 28. The barometer and mercury were steadily falling, and wind was building from the west shifting to the northwest, driving sleet and snow before it. A group of schooners had taken refuge in the lee of Plum Island, but found their anchors dragging. Two schooners, the *George*

L. Wren and the *Harrison*, cut their cables and ran for open water. The other two, *Walhalla* and *Democrat* finally came to anchor precariously close to Pilot Island. Around 2:00 p.m., Martin's keepers spotted a three-masted schooner under reefed sails approaching the Door from the southeast. With a spyglass, it was ascertained that she was the *A.P. Nichols*. The *Nichols* was enroute from Chicago to Escanaba, light, with a crew of six under Capt. David Clow, Jr. She missed stays while abreast of Plum Island, and dropped her largest anchor to prevent her going ashore on Plum Island's south side. The wind was nearing hurricane proportions, breaking the *Nichols'* foreboom, main gaff, and carrying away the mizzen topsail and raffle. The *Nichols* struggled under damaged rigging into the lee of Plum, dropping her 1,400 lb. anchor and 600 feet of chain cable, but began dragging towards Pilot Island throughout the afternoon (Hirthe and Hirthe 1986:39-40; Knudsen 1948:57-58; Milwaukee Sentinel 11/08/1892 p.6, c.1).

At approximately 8:00 p.m., a loud crash announced the arrival of the *Nichols* to the lighthouse crew, who emerged from the light in oilskins, dropping their hard-earned cups of hot coffee enroute. In the flash from the light and through the blowing snow and sleet, they could see the *Nichols* driven upon the southwest reef near the *Gilmore*, and almost touching the bow of the *Forest*. The proximity of the two wrecks gave Martin the inspiration for a daring nighttime rescue of the *Nichols* crew, for which he was later to receive medals from the Life Saving Benevolent Association of New York as well as from the U.S. Congress. With the aid of an assistant keeper, Martin encouraged the crew to jump, one by one, from the rolling *Nichols* to the icy deck of the wrecked *Forest*. The lighthousemen assisted the crew (including a woman cook and the 320 lb. David Clow, Sr.) off the wreck and across the reef to shore (Knudsen 1948:58,62).

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

The next day Knudsen took Capt. Clow out to the steamer *Outhwaite* in the lighthouse sailboat to telegraph from Escanaba to the Chicago underwriters regarding the loss of the *Nichols*. The rest of the vessel crews found their way to the mainland in boats, the *Nichols'* crew not reaching Chicago until November 9 (Milwaukee Sentinel 10/31/1892 p.2,c.3; 11/08/1892 p.6,c.1). The lighthouse crew monitored the subsequent deterioration of the schooners, allowing modern archeologists insights into the site formational processes and rate of attrition the schooners experienced. The *Nichols* was reported as a total wreck on December 3 following heavy gales, after which she was purchased from the underwriters by F.H. Van Cleve of the Escanaba Wrecking Company (Door County Advocate 12/03/1892 p.5,c.4; 12/31/1892 p.5,c.3). A March gale in 1893 carried away the *Nichols'* topmast and strained her hull, and by February, 1894 the wreck had completely disappeared, having been broken up by the sea and ice and some portions having been pushed up on the beach (Door County Advocate 3/11/1893 p.5,c.3; 2/10/1894 p.5,c.3; 2/17/1894 p.5,c.3).

The *Gilmore* appears to have been somewhat more resilient, either due to her position or

construction. By February, 1894 the *Gilmore* lay in about the same condition as when she wrecked (Door County Advocate 2/10/1894 p.6,c.4), and a photograph of Pilot Island at this time (Figure 7) reputed to show the dismantled hulls of the *A.P. Nichols* and the *J.E. Gilmore* ashore on Pilot Island (Runge, n.d.; Hirthe and Hirthe 1986:42). Hirthe and Hirthe (1986:42) suggest that F.H. Van Cleve may in fact have been successful in removing the hulls, whose salvage may never have appeared in the Door County, Escanaba, or Milwaukee papers. However, archeological survey results have concluded that the *Nichols* was certainly not salvaged, and though it appears that efforts had been made to salvage the *Gilmore* (perhaps by F.H. Van Cleve), these were also unsuccessful. The last enrollment of the *Nichols* was surrendered at Chicago on November 17, 1892, and the last enrollment of the *Gilmore* was surrendered on April 25, 1893; both vessels were total losses (Hirthe and Hirthe 1986:42).

Schooner *Mystic*

The 161-ton schooner *Mystic*, registry number 17210, was launched at Milan, Ohio in April 1866 (Board of Lake Underwriters 1871). Built by William Raynor, the *Mystic* was one of the last of a long line of ships built on the Milan Canal during the middle nineteenth-century (Ryan 1974:67-77). A two-masted schooner, the *Mystic* measured 112.5 feet in length, 25.7 in breadth, and 8.4 depth of hold (Runge, n.d.).

From 1866 through the early 1870s, the *Mystic* sailed out of Milan. In 1866 the ship was valued at \$10,000 with an insurance rating of A2. Five years later the ship was valued at \$9,000 and the insurance rating was still A2 (Runge, n.d.). About 1873, the *Mystic* was sold and her port of registry permanently changed to Chicago. At that time her owners were listed as Reed & Selkirk. The value and rating remained the same as in 1871 (Board of Lake Underwriters 1873). After years of stability, insurance records indicate an abrupt decline both in the *Mystic*'s value and insurance rating, dropping in 1877 to \$3,000 and with rating of B1- (Board of Lake Underwriters 1877). The *Mystic* changed hands several times between the late 1870s and the end of her career in 1895, her value varying from a high of \$3000 in 1877 to a low of \$1800 in the early 1890s. In 1885 she sold at auction for \$2120 (IGLR, n.d.). Her insurance rating varied considerably as well. In 1884 she was listed as uninsurable. In 1893 the rating was a very respectable A2 (Runge, n.d.).

The ship was repaired many times during its career. In 1874, its deck was replaced. On June 10, 1883 the steamer *Sheboygan* ran into the *Mystic* in heavy fog off of Evanston, Illinois. This required the construction of a new port bow, repairs to the deck, and a recaulking (Milwaukee Sentinel 6/11, 6/15/1883). The bottom was recaulked again in 1888. New deck frames were installed and a complete recaulking performed in 1892. In 1895, the year of her loss, the *Mystic* was rated a solid B1, with a value of 2,500 (Runge, n.d.).

In mid-October 1895, the schooner left Chicago for Little Bay du Noque under the command of Captain H. Schuenemann. Schuenemann had planned to bring a load of Christmas trees back to the city. On the trip up the lake, the *Mystic* ran aground on the east side of Pilot Island (Door County Advocate 11/9/95). The ship, visible with her bright green hull and white bulwarks, had

damaged her stern in the stranding, but was otherwise reportedly in good condition. It did not take long, however, for the fall weather to destroy the exposed craft. She was quickly declared a total loss, stripped, and abandoned to the lake (Door County Advocate 11/2, 119/1895). The *Mystic's* papers were surrendered at Chicago on November 22, 1895 (WSSI, n.d.).

Schooner *O.M. Nelson*

The schooner *O.M. Nelson* was built by L.E. Bahle at Suttons Bay, Michigan in 1882. A two-masted schooner, the ship was 107.7 feet in length, 25.3 feet in breadth, 8.4 feet in depth of hold with a gross tonnage of 167.23 and net tonnage of 158.87 (Hirthe and Hirthe 1986:127). Born in Norway in 1849, L.E. Bahle came to the United States as a young man and worked in a Wisconsin shipyard before moving to northern Michigan. Shipbuilding was not Bahle's primary occupation. He had lumbering interests and in 1885 started a very successful general store at Suttons Bay (Powers 1912:721). When launched, the *O.M. Nelson* was owned in equal partnership by the builder Bahle and its captain, O.M. Nelson, a fellow Norwegian who lived in Milwaukee (Hirthe and Hirthe 1986:127; Gjerset 1979:157). Milwaukee was the ship's port of registry through out most of its career (Bureau of Navigation 1885).

On June 4, 1899 the *O.M. Nelson*, sailing in dense fog and a south-westerly gale, ran aground at Pilot Island. The mishap occurred despite the presence of two lookouts stationed aloft. Captain P. Hanson knew the ship and these waters well. He resided on Washington Island and had commanded the *Nelson* since 1893. He also owned a 1/5 share of the vessel along with John Mallach, a Mr. Halverson, and the Milwaukee Brickyard Company (Door County Advocate 6/10/1899).

The Pilot Island lighthouse keeper gave out four quick blasts with his fog signal to notify the U.S. Life Saving Service station at Plum Island, 2 1/4 miles to the northwest. The Plum Island lifesavers responded in their Mackinaw boat, but underestimated the foulness of the weather. The heavy seas breaking over the *Nelson*, coupled with shallow water, made approach impossible. The lifesavers went back to Plum Island and returned with the station surfboat. The *Nelson* must have been taking a savage beating as the crew of six, which included the captain's daughter, had taken refuge on the exposed bowsprit. The crew was eventually taken off the ship with no mishap (United States Life-Saving Service 1899).

The Escanaba wrecking tug *Monarch* tried to free the *Nelson*, but failed and the vessel was declared a total loss. On June 6 and 7 the Plum Island lifesaving crew assist in stripping the ship's outfit (Door County Advocate 6/17/1899; United States Life-Saving Service 1899). The ship's papers were surrendered at Milwaukee on June 13, 1899 (WSSI, n.d.). In early July, a steam car ferry tried to pull the vessel free, but failed and the ship was soon claimed by the lake (Door County Advocate 7/8/1899).

Remote-Sensing Survey and Ground Truthing

Most of the wrecks occurring around Pilot Island were due to stranding on reefs, and,

archeologically speaking, the vessel's structural integrity was almost immediately compromised. The high energy lake environment has continued to disrupt and erode the wreck sites over the years. The disarticulated nature of the sites makes vessel identification and site analysis particularly complicated (Cooper 1988a; Cooper and Rodgers 1990). In 1989 the SHSW in conjunction with East Carolina University, the Wisconsin Coastal Management Program, and the UW Sea Grant Institute, conducted a magnetometer survey around Pilot Island, in an effort to locate and assess remains of these shipwrecks.

The 1989 survey covered approximately 9.42 square kilometers, consisting of 128 survey lanes over approximately 248 linear kilometers. The survey was focused around Pilot Island and the southeast end of Plum Island, two major concentrations of historically-reported shipwrecks. During the 1989 survey, sixty-four magnetic anomalies and anomaly clusters were identified and recorded in the vicinities of Pilot and Plum islands in the southeast end of the Death's Door Passage. Material relating to potentially twelve historic shipwrecks received preliminary assessment and documentation by divers, including measured sketches and photography (Cooper and Rodgers 1990). A number of additional anomalies were later slated for ground truthing during the 1991 season, and additional archeological documentation was to be sought from previously located sites.

The selected anomalies were relocated using the Motorola Mini-Ranger III radar positioning system -- the identical instruments used in the 1989 survey. The Mini-Ranger data was checked against LORAN-C navigation data and magnetic bearings taken with a Brunton hand transit. Once the position of a magnetic anomaly was relocated, an anchored marker buoy was dropped. After checking the position of the marker, a team of two archeologists swam down the line and systematically searched the surrounding area. In most instances a line was attached to the anchor and gradually increasing circles were swam out to a distance of at least 100 feet. When this was not feasible, the archeologists swam survey transects directed by a handheld magnetic compass.

The following sites were ground truthed in 1991 by archeologists on SCUBA gear:

Site (1989 designations) 1991 Results

Pilot Island NW-3	Iron pipe, three wreckage sections nearby.
Pilot Island NW-8	Three light buoy-type batteries, scattered planks.
Pilot Island NW-13	Iron fastenings in timbers, eight foot plank, timber pieces. Anomaly source undetermined; possibly buried.
Pilot Island NW-15	Four Edison light buoy-type batteries, planks, large chock.
Pilot Island NW-18	Timber fragments, one knee. Anomaly source undetermined; possibly buried.

- Pilot Island SW-12 Fastenings, old flashlight. Anomaly source undetermined; possibly buried.
- Pilot Island SW-13 Iron fastening, steel can lid (associated with "*Santa Maria*" coordinates). Anomaly source undetermined; possibly Pilot Island South Site.

Survey Methodology

Of the anomalies ground-truthed in 1991, only the PINW-3 site was considered to have significant structural remains, and was then slated for initial documentation at the Phase I level. Additionally, the PINW-1, 2, South, and SW sites were inspected and additional drawings were made of each of these sites. The following were generalized objectives for each site:

Phase I Reconnaissance/Survey Objectives

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
3. Pinpoint site location using Mini-Ranger III and LORAN-C coordinates.

While each site was unique, survey methods were basically the same. After initial site location and preliminary reconnaissance, a baseline or series of baselines were laid out. Triangulation and offset measurements were taken to document hull shape and place structural members, fittings, and other hardware into the site plan. Fittings and important architectural details were documented by measured sketches and tied into the baseline. This documentation was supplemented with extensive still photography and video recordings.

Unidentified Wreck Sites Documented

Pilot Island NW-1

This site consists of the entire port side of a two-masted sailing vessel, probably a schooner. The side, from the inside edge of the bow timbers, runs 141 feet 1 inch, tapering in at the stern. It is intact from the turn of the bilge up to the waterway and includes portions of the rail. Archeologists noted a very plumb stem configuration, full bow, and a fine run to the stern. Particularly important features noted were two nearly identical rectangular holes cut in the side of the vessel. These were determined to have resulted from a salvage attempt and proved important for later analysis.

This wreckage section was originally discovered in 1987 by dive charter operators Daniel and

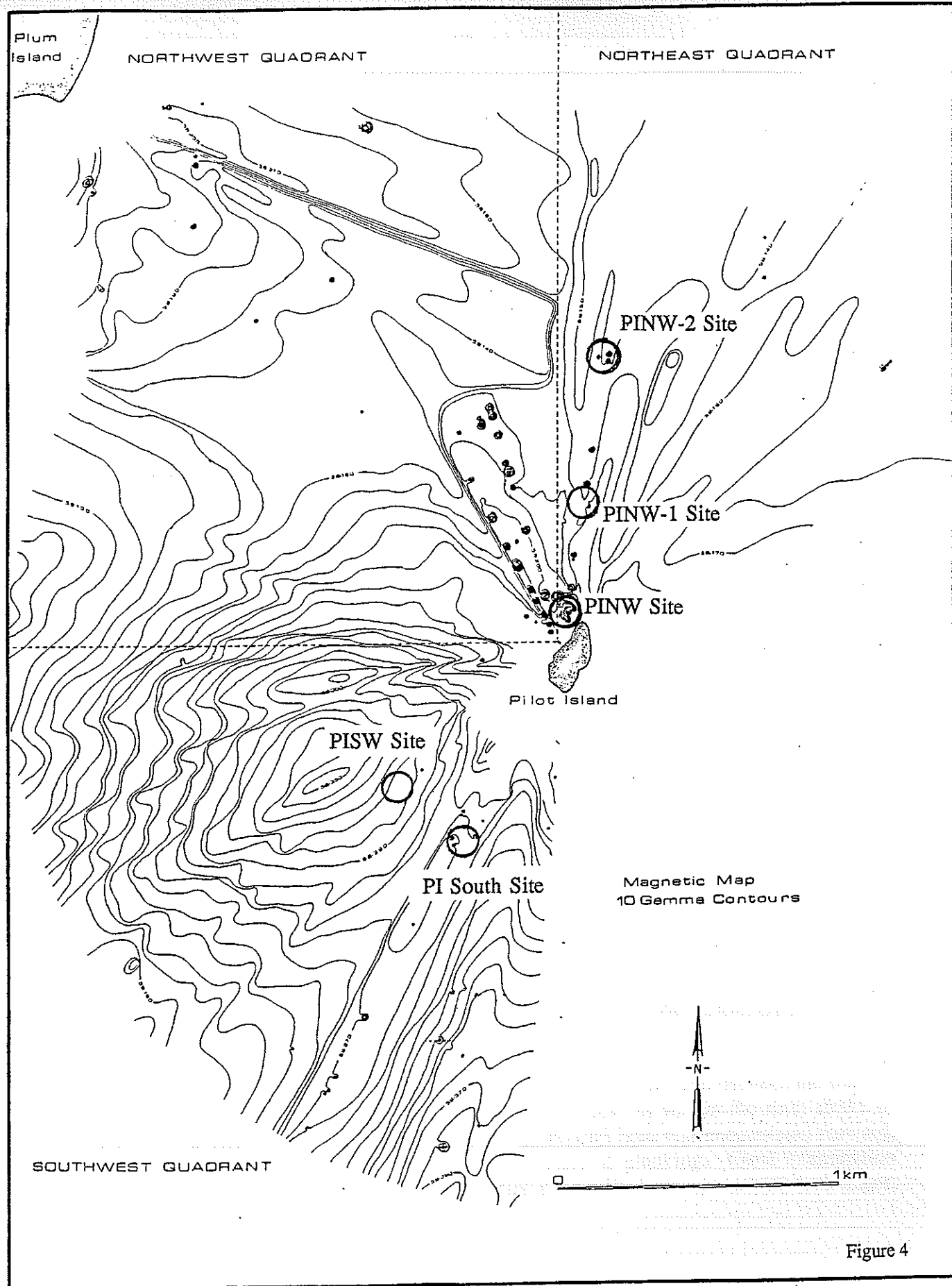


Figure 4

Pilot Island Magnetometer Chart

Kevin Kaniff, using towed side-scan sonar. Some preliminary documentation work was done by volunteers in 1987 and by ECU field school students during the 1989 magnetometer survey (Cooper and Rodgers 1990:9, 26-27). The 1991 survey produced a more detailed and accurate planview of the wreckage, and confirmed previous suspicions that it was the port side of PINW-2. The site was surveyed by the SHSW on June 24, 1991.

The hull was framed with double-timbers, as appears to have been quite standard with mid- to late-nineteenth century Great Lakes schooners. The frame room was 10 inches with space of 11 inches between frames. The frame timbers measured 4 1/2 to 5 inches sided, and were molded 10 inches at the turn of the bilge and 12 inches in the floors. Portions of the bow timbers, including what was probably the port knighthead were extant, the latter measuring 7 inches sided and 6 inches molded. The bow of the vessel was oriented at approximately 155 degrees off magnetic north.

Surviving portions of the rail were documented and measured. The bulwark stanchions were sided 4 inches and molded 4 1/2 inches. Exterior bulwark planking measured 7 inches in width and 2 in thickness. It was fastened with 1/8 and 1/4-inch square shank nails. The waterway covering the frame ends measured 4 1/2 inches in thickness and 12 inches in width.

Exterior hull planking measured 6 inches in width, and 2 inches in thickness. Exterior hull planking was fastened with 3/8-inch square shank spikes, interspersed with occasional 3/4-inch peened drift pins. Twenty-five strakes of exterior planking were extant. As was common, the inside of the hull was completely ceiled. This ceiling measured 8 inches in width, and 2 inches in thickness.

Traces of white paint were encountered on the upper side, and black paint on the lower portion of the side. However, these traces were not extensive enough to determine the vessel's original color scheme.

Also associated with the wreck were two 7 1/2 in. diameter *lignum vitae* deadeyes attached to wire shrouds. The shrouds measured 1 1/2 inches in diameter. The shroud (or "Z"-laid) rigging had, in certain locations, remnants of serving made up of 1/8-inch diameter hempen lashings. Two chainplate stations identified the vessel as a two-master. While the iron plates were broken off in many places, mortises in the hull identified six chainplates originally were fastened to the hull at each station. These plates measured 18 to 21 inches in length, and 3 inches in width. An iron martingale plate was fastened to the hull exterior in the bow, one strake below the sheerline. This plate measured 24 inches in length and 3 inches in width. The eye in the plate would have accommodated a 1-inch diameter stay.

Two unusual rectangular holes were found cut through the exterior planking, between the frames. One hole in the after end of the vessel measured 7 by 9 inches. It was in the sixth strake of planking below the sheer, a distance of thirty inches. A second hole was encountered forward, measuring 7 by 14 inches, located in the same sixth strake of planking. Close examination revealed that the corners of the rectangular hole had first been drilled out with a 1 1/2-inch auger,

and a keyhole saw had been used to cut the section of planking out of the hull. These unusual features will be further discussed in relation to the PINW-2 site.

A scatter of additional material near PINW-1 included a large rudder, a boom or gaff, coal, and a spade (Cooper 1987:5-8; Van Harpen 1987). These were not re-examined during the 1991 survey.

Pilot Island NW-2

This site consists of the starboard side of a two-masted sailing vessel, probably a schooner. The side measures approximately 139 feet in length as measured along a baseline and includes the bow stem, hawseheads, and most of the rail and bulwarks. Various pieces of nautical hardware including deadeyes, wrought iron ringbolts, a pinrail, and cleats were still in place. Particularly significant for analysis purposes were two rectangular holes, similar to those found at NW-1, cut into the side at approximately 25 and 103 feet from the bow. Dimensions of key scantling elements (frame room and space, frame molding, waterways, bulwarks) were nearly identical on both sections, further confirming their origination as a single vessel. The site was surveyed on July 17 and 18, 1991.

Together, the two wreckage sections (Pilot Island Northwest 1 and 2), comprise virtually the entire port and starboard sides of a wooden sailing vessel from the stem aft and from the turn of the bilges to the railcap. They are lying flat on the bottom, PINW1 with the hull exterior exposed, and PINW2 with the hull interior exposed, including a row of knees at the former deck level, and with deadeyes still attached to the wire-rigging.

Like PINW-1, the wreck at NW-2 utilized double-timbered frames. Floor timbers measured 11 3/4 inches molded at the turn of the bilge, and 4 3/4 inches sided. Futtocks, at the sheerline, measured 4 1/2 to 5 1/2 inches sided (the foremost timber in a frame generally was observed to be the larger), and were molded 6 inches. Room measured 9 1/2 to 10 inches; space measured 11 inches.

Bilge ceiling varied between 8 1/2 to 13 inches in width, and 5 inches in thickness, with a 5 1/2-inch strake at the turn of the bilge. Ceiling was fastened with a combination of 3/4-inch drift pins and 1 3/4-inch clinch rings. The hull was planked on the outside with 4 1/2 to 5-inch wide planks. The waterway measured 13 1/2 wide by 4 1/2 inches thick; the deck shelf measured 14 inches wide by 3 1/2 inches thick. Beneath the shelf ran three deck clamps, measuring 17 to 17 1/2 inches in width, and 3 3/4 inches in thickness. The segments of the clamps were connected using flat scarphs.

The deck shelf was notched with 12-inch wide by 2 1/2-inch deep cuts to accept the deck beams. The beams (none are extant) were fastened to the shelf with pairs of 3/4-inch diameter iron drift pins. The original deck was supported by wooden hanging knees, spaced between 1 foot 7 inches and 4 foot 7 inches. Sample measurements on the extant knees indicated they generally measured 36 inches vertically, 29 inches horizontally (the portion that supported the deck beam),

and 11 inches across the radius of the knee.

The bulwark was largely intact, save for shattered segments at the extreme bow and stern. Bulwark stanchions appeared to be separate timbers, fastened alongside of the upper futtocks, 4 1/2 by 4 1/2 inches in cross-section. The bulwark included a flat main rail running across the top of the stanchions, 13 inches wide by 3 3/4 inches thick, surmounted by a lighter topgallant rail and cap, 6 1/2 inches high by 4 inches wide. The overall height of the bulwark was approximately 3 feet 10 inches from railcap to waterway.

The inner face of the bulwark contained a variety of hardware associated with the running rigging, line handling, and securing of cargo. Just aft of the stempost, a hawse eye was fitted into the bulwark. The iron fitting had an outer diameter of 13 inches and an inner diameter of 8 1/2 inches. A small pinrail was located well forward in the bow, probably for securing the jib downhauls. Further aft, just forward of the foreshrouds, wooden bitts stood, likely for securing the jibsheets. Miscellaneous ring bolts, hawser fairleads, a second pinrail (at the foreshrouds), a wooden cleat, and other fittings were documented along the inside face of the bulwark.

Nearly identical wire rigging to that located at PINW-1 lay on and around the wreck. Several upper deadeyes remain attached to shrouds, and all the lower deadeyes remain attached to the chainplates. The *lignum vitae* deadeyes measured 7 1/2 inches in diameter. The wire rigging was one-inch diameter, shroud laid, with remnants of hempen serving similar to that on PINW-1.

Many of the bow timbers are still in place, including the stempost, stemson, and apron. The stempost is backed by the stemson, which in turn is backed by the apron. The timbers are fastened together using 3/4-inch diameter drift pins. The stem is molded 13 inches and sided 11 inches; the stemson is molded 9 inches and sided 11 inches; the apron is molded 10 inches and sided 11 inches. The stem includes some hardware associated with the ship's headgear, including an iron bobstay plate, with a length of 3-inch long open link chain attached, and other miscellaneous fastenings.

A 7-inch wide shelf, probably for an elevated chainlocker or the forecastle deck, ran for 15 feet 3 inches aft of the apron, fastened over the bilge ceiling in the bow. It carried two 12-inch sided by 3 1/4-inch molded by 2 1/2-inch deep mortises for deck beams. The mortises were slightly rhomboidal, and the shelf sloped down and forward (this would seem to indicate that it was intended for the chain locker).

A critical piece of evidence that helped to tie the PINW-2 section with PINW-1 were similar rectangular holes cut through the exterior planking and deck clamps. Like those on PINW-1, the holes were located fore and aft in the hull, at approximately 25 and 103 feet from the bow, just below the deck shelf, approximately 30 inches below the waterway. The forward hole measured 6 by 12 inches; the after hole measured 6 by 10 inches. As these were too small for lumber loading ports (and bore evidence of having been cut hastily into the hull) it is quite possible that these holes may have been associated with some type of salvage work on the vessel after it had stranded. The symmetrical location of the holes argues for some type of lifting use: perhaps for

passing a cable beneath the deck clamps of the ship, providing a means by which salvage barges on either side of the vessel could have lifted her. This would have been easier (and possibly more secure) than placing lifting cables beneath her hull.

A combination of historical, iconographic, and archeological evidence indicates that PINW1 and 2 are associated, and most probably the wreckage of the schooner *J.E. Gilmore*. The stem, as can be seen from the drawings, is extremely plumb, and is typical of bow construction described for canaller-type schooners (a schooner built with dimensions to navigate through the Welland Canal) (Cooper 1988b:39-40; Cuthbertson 1931:234-235). The historical photograph of the *J.E. Gilmore* (Figures 5 & 6) shows an identical plumb stem, as well as the highly-canted jibboom attributed to canallers. Other photographic evidence from the *Gilmore* appears consistent with the wreckage at PINW-1 and 2: the full bow, relative placement of the chainplates and bobstay plate, and the hull coloring (dark hull, possibly black, with bands of white on the upper hull).

These are not positively identifying characteristics, as many schooners would have featured similar hull shapes, rigging, and color schemes. However, characteristics of the PINW-1 and 2 wreckage are very consistent with the known photograph of the *Gilmore*, and the vessel length and design strongly point to it being a canaller of the *J.E. Gilmore's* approximate dimensions. No contradictory evidence has yet appeared for identifying the PINW-1 and 2 wreckage sections as the port and starboard sides, respectively, of the *J.E. Gilmore*.

What has become of the *Gilmore's* stern, keelson assembly, and centerboard trunk is yet unknown. These sections may have been badly fragmented during the breakup of the hull, and thus went undetected by the magnetometer survey; they may be buried, and went undetected during ground-truthing efforts; they may lie outside of the survey area, or may otherwise have gone undiscovered by survey efforts. The keelson and stern section at the PINW site have been reliably attributed to the *A.P. Nichols* (Cooper 1989:31-47), and the PISW site, with keelson assembly, centerboard trunk, and associated sections of port and starboard hull, appears to be another vessel altogether.

Why the wreckage of the *Forest* and *Nichols* would have remained in close proximity to the island (the present day PINW site), and the remains of the *Gilmore* were moved one half to one kilometer away is unknown, and raises interesting questions about archeological site taphonomic processes on the Great Lakes. It appears from all the evidence that the *Forest* and *Nichols* broke up sooner than the *Gilmore*, and were deposited close to where they stranded. The *Gilmore*, on the other hand, took a while longer to break up, but when a storm finally came along to move the vessel off the rocks, it moved it quite a distance. It is also possible that salvage attempts moved the vessel some distance from its point of stranding, placing it closer to its present resting place in Detroit Island Passage.

The two sites combined, PINW-1 and 2, comprise a significant portion of the schooner *J.E. Gilmore*, and should be considered eligible for the National Register of Historic Places. The sites contain much articulated hull architecture, hull fittings, rigging elements, and some other material culture. The sites also comprise an architectural database for comparative studies of canaller

schooners. Canaller schooners are a relatively rare vessel type in Wisconsin waters, with only twenty-four schooners known to have been built on Lake Ontario wrecked in Wisconsin waters (all reportedly in Lake Michigan). Other, unknown canallers may have been built on the other Great Lakes and were lost in Wisconsin: unfortunately, current data cannot supply an answer on which schooners were actually canaller-type. Of these twenty-four, only five are known sites (including the *Gilmore*); one is broken up, and one is only fragmentary (a small section of stern in extant). Two are very intact (the *Northerner* off Port Washington and the *Walter B. Allen* off Sheboygan) and appear (from existing information) eligible for the Register as very good, intact examples of canaller schooners (WSSI, n.d.).

The PINW-1 and 2 sites may be combined into a single National Register of Historic Places nomination for the *J.E. Gilmore*, or may be tied into the PINW site (with the *Gilmore's* partners in death, the *Nichols* and *Forest*), by expanding the National Register boundaries for that site. Also, consideration should be given to designating a National Register archeological district around Pilot Island, encompassing all the wrecks discovered to date.

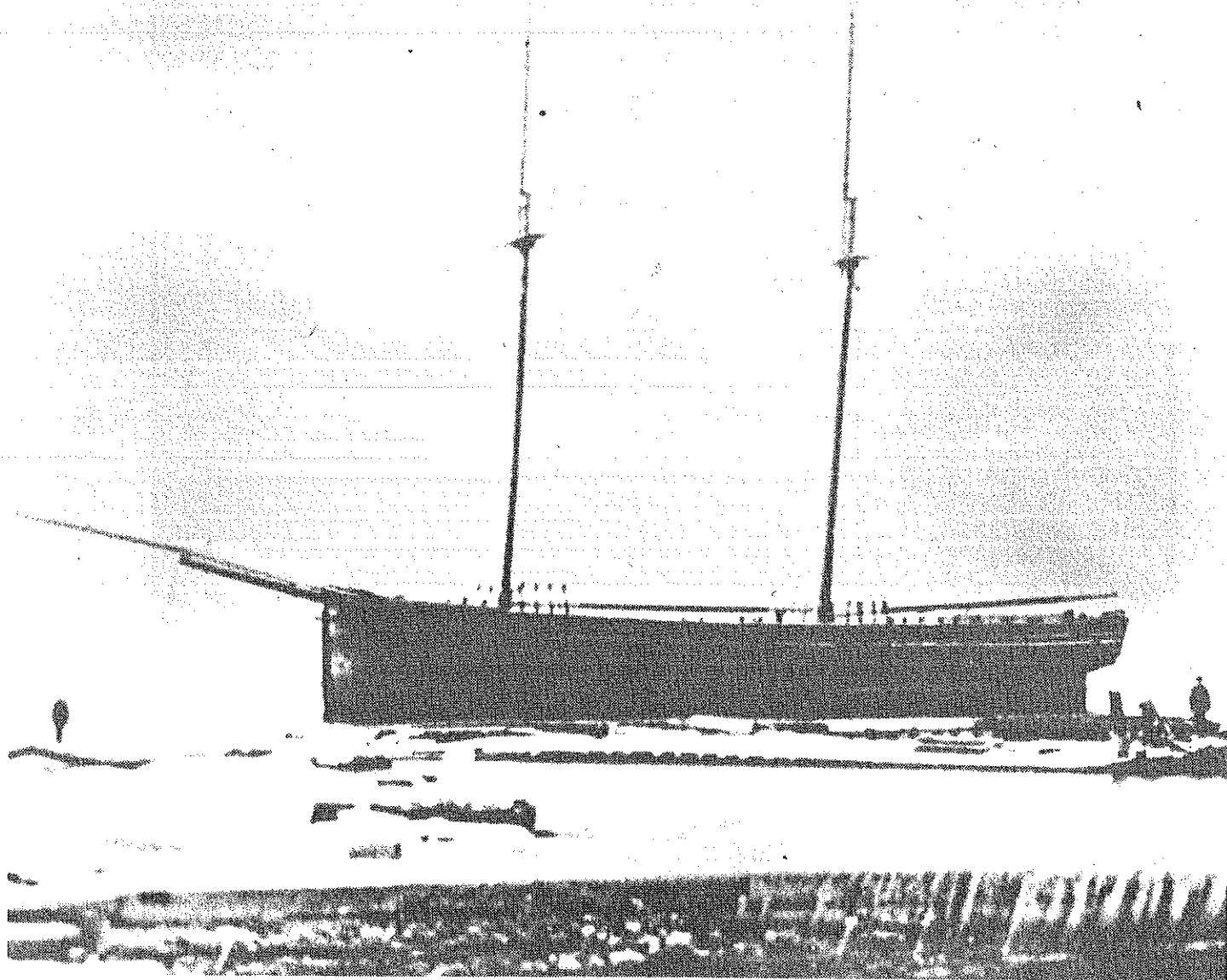
Pilot Island NW-3

This site consists of three sections of wreckage lying in twenty feet of water, northwest of the Pilot Island dock. The largest piece of wreckage at the site is a portion of hull 102 feet 3 inches long, and 9 1/2 to 11 feet in width. This was the side of a wooden sailing vessel, probably two-masted, and is largely intact from the turn of the bilge up to the sheer. The vessel utilized double-timbered framing. Also associated with this largest piece of wreckage was a length of 1 1/4-inch diameter shroud-laid cable. This wreck assemblage straddles the location recordings for 1989 anomalies NW-1 and NW-3, and may be the source for both anomalies. The site was inspected and received some brief documentation on June 19, 1991.

Frame room on the large section varied from 9 to 12 inches, with a space of 10 to 11 inches. Frame molding at the sheer was 6 1/2 inches, and 8 1/2 inches just above the turn of the bilge. Paired futtocks were sided 4 1/2 inches each. Compared with the *J.E. Gilmore* (PINW-1 and 2 sites), the PINW-3 vessel was framed slightly more heavily (though it was not necessarily a larger ship). Exterior planking measured 6 to 7 inches in width, with wider strakes 12 to 13 inches at the turn of the bilge. All the exterior planking was approximately 2 inches thick. One set of chainplates was evident on this section.

A second, 52-foot long section, 9 1/2 feet in width was located nearby. This section contained four chainplates, as well as a lumber loading port, 24 inches in width. Frame room measured 9 inches, space measured 14 1/2 inches, paired futtocks were sided 4 inches each, and were molded 8 1/2 inches. Exterior planking measured 8 to 8 1/2 inches in width, with a thickness of 2 inches. Two small fragments (sections D and M) and one large section (X) with very similar framing dimensions are located at the PINW site, approximately 100 meters to the east-northeast from PINW-3. In addition to similar framing, section X contains a lumber loading port, though of larger size (35 1/2-inch by 10 1/2-inch), as well as chainplates (Cooper 1989:43,45).

Figure 5. Wreck of J.E. Gilmore at Pilot Island



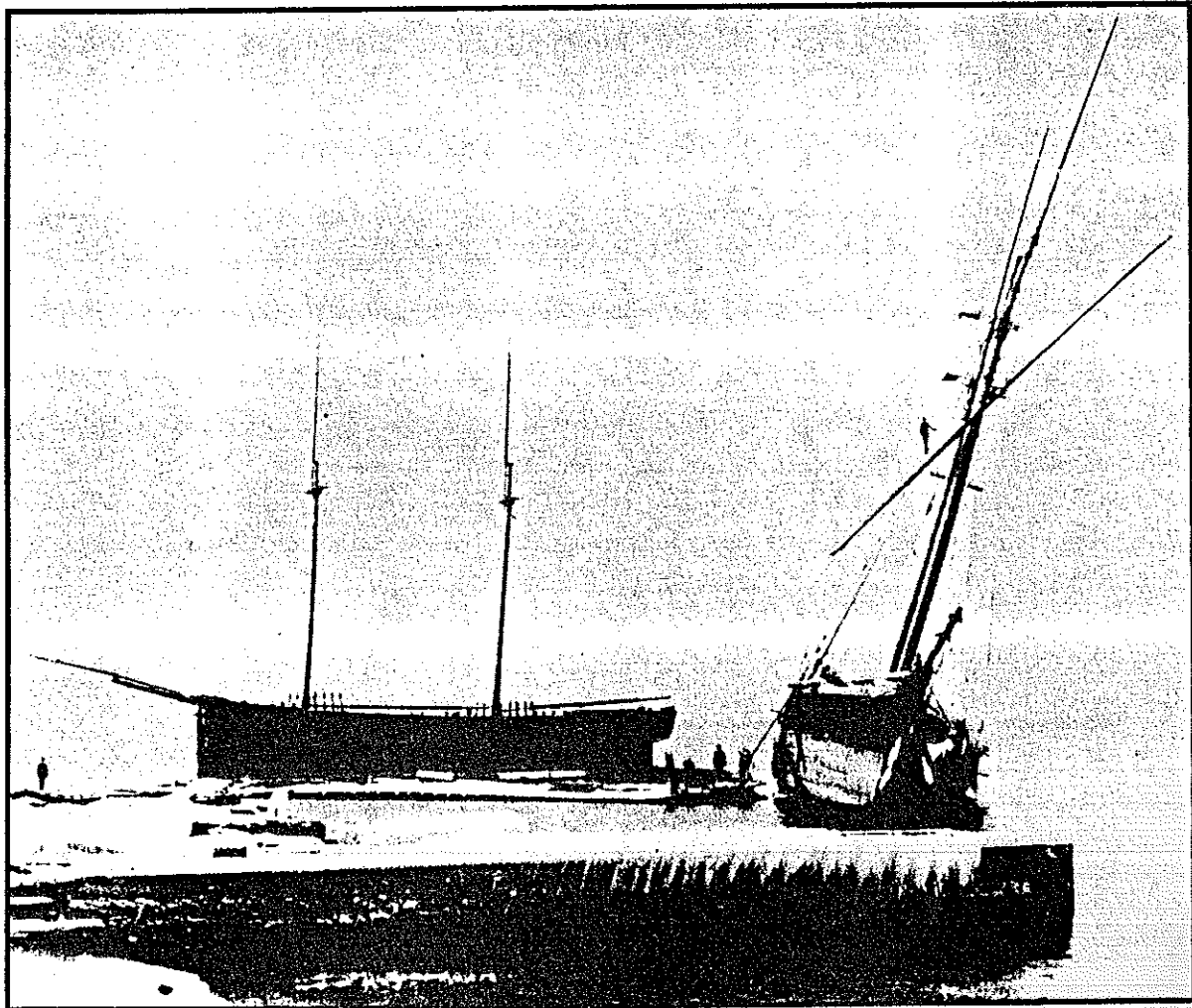


Figure 6. Wrecks of A.P. Nichols, J.E. Gilmore, Forest at Pilot Island, October 1892. Gilmore is center left, Nichols at right.

Figure 7. Dismasted hull of J.E. Gilmore (left) ashore at Pilot Island (1893-1894?). Unknown wreckage at far right.



A smaller, 29 foot 10 inch long section that lay near the large section was also briefly inspected. It had a frame room of 12 inches, space of 15 inches, molded frame measurement of 6 inches, and sided measurement of 4 inches per futtock. A section of hull (section E1) with similar framing is also located at the PINW site (Cooper 1989:43,45). PINW-3 seems to be an extension of the debris field of the PINW site, representing portions of at least two vessels from the latter site. Between these two sites, at least four different shipwrecks are represented, with possible elements of one or two more.

Measured sketches of this site have been prepared, but the site, on its own, is not believed to be eligible for the National Register of Historic Places. It could, however, be linked to the PINW site, either by expanding the boundaries of the former, or included in a National Register archeological district around Pilot Island, as with the remnants of the *J.E. Gilmore*. From present information, the wreck remains at PINW-3 cannot be attributed to any known vessel, although they certainly could be from one or more of the several schooners reportedly wrecked at Pilot Island and not presently identified or otherwise accounted for.

Pilot Island South

This site consists of the starboard side and almost completely intact bow of a two-masted sailing vessel (probably a schooner). It lies in 55 to 60 feet of water, on a slope, south of Pilot Island. The wreckage section measures 109 feet 11 inches overall from the stem rabbet to the stern. The bow section included the cutwater knee, trailboard knees, hawseheads, and hawsepipes. The site was surveyed June 26, and July 9, 1991.

The wreck appears to have several local names. Many local divers and charter operators refer to it as the schooner *Riverside*, which was stranded at Pilot Island in 1887 (Frederickson and Frederickson 1956). However, the *Riverside* was refloated the following year, and put back into service (Hirthe, 1988, personal communication). It actually was in operation until 1893, when it was lost on Lake Erie (Mansfield 1972:I:881). A wreck nicknamed the "*Santa Maria*," discovered on Columbus Day, 1988 by Dan and Kevin Kaniff (Cooper and Rodgers 1990:10,21) may be the same vessel as the Pilot Island South Site, a.k.a. *Riverside*. For the purposes of this report, and its listing in the Wisconsin Shipwreck Site Inventory, this wreck will simply be known as the Pilot Island South Site.

The wreck is oriented north-south, with the bow bearing 145 degrees magnetic. The frames are double-timbered, with each futtock sided 4 1/2 inches, molded 4 1/2 inches at the sheerline and 7 1/2 inches at the turn of the bilge. Frame room measured 9 3/4 inches, space was 13 inches. The hull planking ranged from 5 to 10 inches in width (as measured in the vessel's midships), with an average width of 7 inches. Thickness varied from 5/8- to 3/4-inch, with 2-inch thick strakes at the sheer. These were fastened to the frames with 5/8-inch square shank spikes. Thirteen strakes of midships hull planking were extant from the turn of the bilge to the vessel's sheerline; 18 strakes were visible at the stern, and 19 at the bow. The distance from sheer to the turn varied from 9 to 12 feet, due to breaks in the hull and hull shape.

Two chainplate stations were visible along the sheer, indicating that the vessel was a two-master (a schooner, or possibly a brig). Lower fragments of these plates (of iron or steel), and surviving mortises in the hull where they were fastened indicate that the plates were 3 inches in width, 8 inches in length, and were fastened to the hull with two 1 1/4-inch diameter bolts per plate. The foremast chains extended approximately 21 to 29 feet aft of the stem rabbet; the mainchains extended 72 to 77 feet aft of the stem rabbet. The deadeyes and upper ends of the chainplates are missing from the wreck, and were probably removed by artifact collectors years ago.

The most interesting aspect of this wreckage is the nearly intact section of bow, including the stempost, cutwater knee, trailboard knees, hawseheads, and hawsepipes. The bow retains much of its original shape, but has been twisted out ninety degrees, so that the stem faces directly up towards the water's surface, while the starboard side of the hull lies flat on the bottom. The archeologists likened the wreck to a fish fillet with the head left on.

One is struck by the particular elegance of this bow, especially when contrasted with the snub, plumb bow of the canaller *J.E. Gilmore*. The stempost, canted slightly forward, includes an elegant cutwater knee, set below the original position of the bowsprit. This cutwater knee is supported by two curved trailknees on each side, creating a "beakhead" appearance typical of many earlier sailing vessels, and later modified into the sharp clipper bow. While this vessel's actual bow lines are not particularly sharp, the cutwater knee/trailknee combination gives the bow a sharp model appearance, which contrasts with the many unadorned "plain heads," as they were called, of contemporary Great Lakes schooners. Decoratively carved trailboards may have originally accompanied the trailknees.

The vessel's stempost measures 13 feet 4 inches in original height on the outside of the bow, and 11 feet 4 inches on the interior of the bow. Access to the inner dimension was provided by crawling beneath the inverted bow. The stempost is sided 17 inches and extends 7 inches forward of the stem rabbet (the complete molded dimensions was inaccessible due to the bow planking). The knightheads flanking the stem measure 6 1/2 inches sided, and 5 inches molded. They are adjoined by 11-inch sided by 4 1/2-inch molded hawseheads. The metal hawsepipes, 6 1/2 inches inner diameter and 11 inches outer diameter, were set in heavy 40-inch long by 18-inch wide by 7 1/2-inch thick timbers fastened on either side of the vessel's stem, with the hawsepipe itself running between the knight and hawseheads. The four sets of bow cant frames aft of the headtimbers are 4 1/2 inches sided and 5 inches molded, with a timber room of approximately 9 inches and space of 5 1/2 inches.

The cutwater knee is constructed of three separate timbers, with a total length of 9 feet running down from the top of the stempost. The cutwater knee protruded approximately 42 inches from the forward edge of the stempost. The upper trailknees supporting the cutwater knee on either side measure 25 inches (portion affixed to hull) by 36 inches (portion affixed to cutwater knee) by 8 inches (across radius) by 3 1/2 inches in thickness. The lower, slightly smaller trailknees measure 27 by 36 by 6 inches, and are 3 inches thick. A set of smaller knees were also affixed to the upper part of the cutwater, as if to support trailboards or a headrail. The starboard member of this set is extant: it measures 13 inches vertically (up the cutwater) by 14 inches (athwartships)

by 8 inches (across the radius) by 3 inches thick.

Below the trailknees, the stem has mountings for various pieces of headgear. Three mortises measuring 4 inches by 2 inches are set into the stem. Originally, athwartships drift pins held the ends of the bobstay chains in these mortises, in lieu of bobstay plates strapped over the stempost. The ends of one of these chain segments is still extant in the upper mortise, 9 foot 10 inches below the top of the stempost.

Measured sketches have been prepared of this site, and when time permits, a more complete, to-scale site plan may be developed. The bow is really the most remarkable and significant attribute of the site, providing an example of an interesting variation on schooner bow construction and ornamentation. If the vessel can be identified, the archeological data from the site could certainly improve our understanding of the builder, his methods, and shipbuilding traditions. The ornate bow may have been a particular fancy of the builder or owner, or may reflect an ethnic influence, perhaps British, where such decorative bows, incorporating trailboards, figureheads, and scrollwork, appeared to have been more common (see, generally, Greenhill 1980 and MacGregor 1984). Though not certain, the *O.M. Nelson* appears to be the best candidate for the PI South Site's historical identity, particularly in the area of length and depth of hold measurements. More research on the *Nelson* will be required to confirm this identity. Historical photographs could be particularly useful for matching the PI South Site's unusual bow with that of the *O.M. Nelson*. An existing photograph in the collections of the Milwaukee Public Library seems to show a very similar cutwater knee beneath the bow of the *Nelson*; however, the area is shaded enough and the image sufficiently blurred to make positive identification impossible. Additional research may bring other photographs forward which would help resolve the identity of the wreck.

Due to the Pilot Island South site's unusual and intact bow architecture, along with the other data on schooner architecture that the hull contains, the site may be eligible for the National Register of Historic Places on its own, or may be tied into an archeological district for the Pilot Island area.

Pilot Island SW

This site is a complex wreck assemblage consisting of four sections, including a partial bilge section with a centerboard trunk, a port side with rail intact, the vessel's transom, and an unidentified section (probably from the vessel's lower bow) consisting of portions of keelson, deadwood, frames, and a segment of chain. The site was surveyed July 15 through 17, 1991.

The port side section is intact along the rail 96 feet forward of the stern, with ceiling plank fragments extending out to 108 feet 7 inches. Two chainplate stations along the side indicate that the vessel was a two-master. The lower iron chainplate fittings are still affixed to hull at these points, and segments of wooden chainwale are also extant. The surviving exterior hull planking runs from the stern to approximately seven feet forward of the forechains. Eighteen exterior planking strakes are extant in the area of the forechains, thirteen strakes in the area of the mainchains, and seventeen strakes are extant in the stern. This section is oriented southeast,

directly towards Pilot Island's southwest reef, with the forward end bearing 120 degrees magnetic.

The bulwark and rail are intact for most of the length of the upper port side. The bulwark stanchions are on 41- to 46-inch centers, and measure 4 1/2 by 5 inches by 3 feet in height. The bulwark is topped with a railcap measuring 9 1/2 inches in width and 3 inches in thickness. At the base of the bulwark, the covering board measures 3 1/2 inches in thickness. A single bitt for securing mooring lines or sheets is located along the rail just forward of the mainchains. It protrudes 2 feet above the railcap, and measures 7 by 4 inches. In the stern, a hawser fairlead is located between the stanchions just above the waterway. It consists of an elliptical hole 6 inches high by 8 inches long cut into a 12- by 38- inch wooden chock fastened to the stanchions.

The disarticulated transom lies a scant 4 1/2 feet away, and at right angles, to the after end of the upper port side. The transom is lying flat on the bottom, with the interior portion facing upwards, exposing fairleads, stern hawse holes, a cleat, lodging knees at the corners of the inside of the stern bulwark, and the horn timbers. The beam measurement taken at the transom is 18 feet 8 inches at the rail, 19 feet 5 inches at deck level. A small wooden box or shelf was found fastened to the inside center of the bulwark. It may have been for the binnacle, or may have helped house part of the steering gear. The port stern hawse eye is 11 inches in outer diameter, 5 inches in inner diameter. The starboard eye is missing, but the hole for the fitting indicates that it was of similar dimensions to the port eye. The fairleads on the taffrail consist of 10-inch long elliptical cuts into the rail, probably for the yawlboat falls or stern mooring lines.

The question of what may be seen under the transom is rather interesting. On many Great Lakes schooners, traditionally the vessel's name and home port would be painted or carved onto the transom (as is the modern practice), sometimes accompanied by a pattern of decorative metal stars. The identity of the wreck may perhaps be readily established by a glimpse of the transom's backside. It might be possible to jack or lift one end of the transom off the bottom, in combination with a mild suction from an airlift to gently release the piece from the sand. However, such an effort would need to be very carefully undertaken, so as not to destroy any surviving paint in the process, thereby deleting the vessel's identity. As a disturbance to both the site and lakebed, such an effort would require a state archeology permit, as well as Wisconsin Department of Natural Resources authorization.

The remainder of the site (bilge and centerboard section) lies nearly parallel to the upper port side, about fifty feet to the northwest. The port bilge section is 60 feet 7 inches long, with the centerboard trunk laying on its starboard side adjacent to it, and remnants of the starboard bilge fanned out alongside. The forward end of the wreckage was identified by the kingbolt on the forward end of the centerboard trunk. Like the upper port side, the wreckage is oriented to the southeast, directly towards the southwest reef; indeed, the forward end of the wreckage comes quite close to the base of the slope leading up to the shoal. The port bilge lies on a bearing of 110 degrees, the centerboard bears 120 degrees, and the starboard bilge bears 135 degrees.

Measurements on the port bilge show the vessel's frame room to be 9 1/2 to 10 inches, with 12 to 13 inches of space. Frames are double-timbered, with each futtock sided 4 1/2 inches, and

molded 8 inches above the turn of the bilge. The hull is ceiled with 13-inch wide by 2 1/2-inch thick ceiling, fastened to the frames with 5/16 square shank rosette-head spikes. A sample of exterior planking measurements showed a widths ranging from 6 to 8 inches, 1 3/4-inch thickness, and 3/8-inch square shank spike fastenings.

The centerboard trunk measures 8 feet in height (to the top of the pocket piece), with a height of 9 feet 2 inches from the top of the trunk to the bottom of the pocket piece. The trunk length is 24 feet 8 inches. The centerboard kingbolt is placed 5 feet 5 inches aft of the forward edge of the trunk. The iron pivot measures 2 inches in diameter, with a 4-inch diameter head. The trunk headledges measures 15 inches sided, with the trunk side planks ranging from 5 1/4 to 10 1/2 inches in width, and 5 inches in thickness. The ends of the planks are fastened onto the headledges using 3/4-inch iron drifts and 1 3/4-inch clinch rings peened over the ends. The topmost plank on the trunk (measuring 19 inches in width) contains a series of 8-inch sided by 2 3/4-inch molded mortises for the deck beams, spaced 29 to 31 inches apart.

The pocketpieces flanking the trunk measure 16 inches molded at the trunk, tapering to 11 1/2 inches aft of the trunk. They are sided 13 inches. The pockets for the half-floors measure 9 1/2 inches molded by 10 inches sided by 7 inches deep, which is consistent with room and space in other areas of the hull.

Oddly, the disarticulated floors curve upwards very close to their former juncture with the centerboard pocketpieces, suggesting that the vessel hull possessed an unusual degree of deadrise, or that the port and starboard bilge sections are somehow juxtaposed on either side of the trunk/pocketpiece assembly. It is not clear how such a juxtaposition could have occurred; nor is it clear precisely where (and how) these curved bilge sections would have articulated with the pocketpieces, if they are indeed in the right locations. Pending more detailed investigation and mapping, the identities of the port and starboard bilge sections, and their reported orientation must remain tentative.

A small disarticulated section (probably lower bow) consists of a 17 foot 7 inch piece of keelson and frames with a length of chain knotted around it. It lies 16 feet to the east of the forward (southeast) end of the bilge and centerboard section. The fragment has an overall width of 14 feet. The section has three sets of extant floors (double-timbered), each frame 4 1/2-inch sided and 8 inches molded. The room is 9 inches, and space is 11 inches. The keelson is 11 inches molded and 11 inches sided, surmounted by a 8 1/2-inch molded by 11-inch sided rider. A section of forward deadwood, 9 inches molded by 11 inches sided contains mortises for the cant frames (frames missing). A small step on the aft end of the section may have been for a foremast, or perhaps the vessel's sampson post.

Though this wrecksite has not yet been identified, one interesting possibility is that it is associated with the Pilot Island South site. The South Site consists of the upper starboard side and bow of a two-masted vessel -- precisely those elements missing from PISW. The hull sections are almost identical in length, have identical frame siding, room and space measurement are very nearly identical, and planking measurements may be closer than limited sampling would

suggest. The spacing of the chainplates is also identical on both sections, as are (as near as can be ascertained from broken fragments) the chainplate fittings themselves.

Whatever the identity of this vessel (possibly the *O.M. Nelson*), it appears to have stranded on the reef that runs southwest from Pilot Island, subsequently broke up, and slid backwards off the reef to its base, a depth of sixty feet. The PINW1 & 2 sites (*J.E. Gilmore*) provide a very similar example of how wreckage may become separated and pushed to different locations by wind and ice. It is not inconceivable that a schooner may have stranded on the southwest reef, broke into several large sections, and slid off the reef, with the upper bow and starboard side heading south, and with the bilge, lower bow, transom, and port side heading southwest.

Conclusions

After several years of field research, Death's Door has begun to reveal a few of her secrets. The identifications of the *A.P. Nichols*, *Forest*, and *J.E. Gilmore* seem well established, with a possible identification for the *O.M. Nelson*. While the identities of the other vessels reportedly wrecked here have yet eluded us, the discrete fragments of two or three additional vessels have been identified in the archeological remains. Of course, the historical identification for each wreck is not the ending point, but a starting place for further research. Identification of the wrecks affords us the opportunity to date and study the remains, and compare them with other Great Lakes schooners. While many other schooners are wrecked in Wisconsin waters, Death's Door holds a unique place in our maritime history, both for its legendary dangers, and its concentration of shipwrecks.

As has been observed previously (Cooper 1989:46-47) the wrecks of Pilot Island should be recognized as a valuable archeological database pertaining to sixty-five years of Great Lakes schooner construction and use, beginning with the construction of the schooner HENRY NORTON in 1834 (reportedly lost at Pilot in 1863), and ending with the loss of the schooner O.M. NELSON at Pilot in 1899 (WSSI, n.d.). Pilot Island Lighthouse, the Plum Island range light, and the PINW site are currently listed on the National Register of Historic Places, and important consideration should be given to adding the other historic vessel remains of the Pilot Island sites to the National Register as a historic district. The wrecksites are important components of the events associated with the lighthouse's history (such as the famous rescue conducted by Keeper Knudsen) as well with the activities of the U.S. Life Saving Service Stations on Plum Island. Furthermore, an impending transfer of Plum Island to the Wisconsin Department of Natural Resources may provide an opportunity for studying and interpreting that island's historic and archeological resources. These include prehistoric Native American sites, the U.S. Life Saving Service (later Coast Guard) Station, and the ruins of the original 1848 Plum Island lighthouse (Eaton 1974:6-7).

Pilot Island and the Door are a popular dive destination in northern Door County. Preservation efforts should be cognizant of the important recreational usage of the Pilot Island wrecks, and should be directed at preserving wreck remains and artifacts, while providing better access and interpretation of the sites to sports divers. The volume of wreckage, clear waters, and sand

bottom combine for an extensive recreational diving site of considerable interest. Buoying and boat mooring (as has been proposed for recreational preserve sites) would assist divers in locating wrecksites and orienting themselves. Considering such potential future users as kayakers, hikers, and sailboaters, efforts to interpret this area for non-divers should also be undertaken. Using Newport State Park, Plum, or Pilot Island as an interpretive center, informational guides, markers, onshore exhibits, and perhaps even walking tours regarding Death's Door history and archeology could be provided which would greatly heighten visitor interest and appreciation of this treacherous, historic, yet beautifully scenic passage.

Survey and Documentation of the Schooner *Meridian*

Vessel History

The schooner *Meridian*, official number, was built in 1848 at Black River, Ohio by William Jones. She measured 184.84 tons, and 120.35 feet in length by 23 in beam by 8.95 feet in depth of hold. The oldest of the vessels surveyed during the 1991 season, *Meridian* offers a rare glimpse into the less standardized world of pre-Civil War Great Lakes ship construction.

Little is currently known about the early history of the *Meridian*. More, however, is known about her builder, for the name Jones is almost synonymous with mid-nineteenth century Great Lakes shipbuilding. On April 8, 1814, British forces raided the Connecticut River near Essex, Connecticut, destroying twenty-eight ships and a total of \$160,000 worth of property (History of Middlesex County, Connecticut 1884:44-45). Among those whose property was wiped out was William Jones' father, the shipwright and ship captain Augustus Jones. Born in Essex in 1782, Augustus Jones' background is not known, but he probably belonged to a family with a long maritime tradition (Mansfield 1972 [1899]:II:365-366). Essex had been the site of significant shipbuilding since the early eighteenth century. During the early years of the nineteenth century, Essex builders were launching between 1,200 to 2,000 tons of shipping annually (History of Middlesex County, Connecticut 1884:354).

According to Mansfield, Augustus Jones was compensated by the government for his losses with a grant of land, a part of Connecticut's Western Reserve, at Black River, Ohio. He moved to Black River in 1818 and found work helping F. Church build the *General Huntington*, the first ship built in the area. The following year Jones' family, which included five sons, William, George W., Fredrick N., J.M., and Buel B. -- all future shipbuilders, joined him. Between 1828, when Augustus Jones launched the sloop *William Tell* and the early 1880s, when George W. retired, the Jones family built, at various points around the lakes, hundreds of ships of all types (History of Lorain County, Ohio 1879:209;215; Marine Review 10/11/1894; Mansfield 1972 [1899]:II:365-366).

William Jones built his first Black River ship, the schooner *White Pigeon*, in conjunction with his brother Buel B. in 1832 and his last one, the *H.G. Cleveland*, in 1867. During his career William Jones built twenty-eight vessels in Black River and probably built ships in other places

as well. His period of greatest activity in Black River commences in 1848, with the construction of the schooner *Meridian* and the brig *Mahoning*. Between 1848 and 1863 Jones built at least twenty ships. William Jones appears have been a traditionalist, building primarily schooners, a few brigs and barks, and only one propeller (History of Lorain County, Ohio 1879:215). This is in stark contrast to his younger brother George W. Jones, who was a noted innovator and builder of large steamers. Perhaps this conservatism reflected William Jones' age. Born around 1806, his first thirteen years were spent in Connecticut. As the son of a shipwright, he may have absorbed many of the local shipbuilding traditions before leaving for Ohio.

Following her launching in 1848, *Meridian* made the Milwaukee newspapers in 1849 when her second mate, James Bain, was killed in a scuffle amongst the officers. Bain had attacked the captain and thrown the first mate, Harvey Rammage, overboard. Rammage, hauled back aboard by the crew, subsequently killed Bain with a blow from his fist. (Runge, n.d., citing the Milwaukee Sentinel August 3, 1849 [article not found]).

A vessel called the *Meridian* reportedly sank in 1852 near Malden, but this has not been confirmed, and might not be the same ship (Mansfield 1972 [1899]:I:858).

Much of the *Meridian's* career was involved hauling timber of various kinds. For example, in August and September of 1857 the ship, under the command of Captain Byron, was making regular trips carrying timber into Chicago. The *Meridian*, with a capacity of at least 160,000 board feet, seems to have been one of the larger schooners calling in Chicago that summer. Of the Chicago trips completed in during that period, three originated in Sturgeon Bay, and one in Saginaw (Chicago Tribune 8/1, 8/17, 8/26, 9/16/1857).

In 1859 the *Meridian* was again hauling timber into Chicago, but the loads were mixed and the trips a bit less frequent. From the end of June through the beginning of September, the *Meridian* made four trips into Chicago, under the command of as many as three different masters. Cargoes included 178,000 board feet of lumber, various mixed loads of laths, shingle bolts, posts, railroad ties, and in one instance 9,000 pickets, presumably for picket fences (Chicago Tribune 6/1, 7/15, 8/5, 8/22/1859).

The 1860 Board of Lake Underwriters classification indicates that the *Meridian* had undergone large repairs in 1858 and rates her at B2 with a value \$4,200 (Board of Lake Underwriters 1860). The owner was listed as Chicago lumber dealer Abraham H. Covert (Smith and Du Moulin's Chicago Directory 1860). Covert appears to have retained some ownership until 1863. That year the *Meridian* still maintained a B2 rating, but her value had dropped to \$3,000 (Board of Lake Underwriters 1863). During this period vessel ownership was often fluid and partial shares routinely changed hands. Evidence indicates that William G. Conkwright, occupation unknown, had partial interest in the vessel between 1860 and 1866, as did a C. Walker (Runge, n.d.). This may have been Chicago lake captain Charles Walker (Chicago City Directory 1867).

In 1864 the Board of Lake Underwriters classification gave the *Meridian* a rating of I, but her valuation had risen to \$3,600. In 1866 her rating was again B2, but the value remained \$3,600.

In 1871 the *Meridian* had a new owner, J. Downey. The Lake Underwriters list a \$4,000 value and a B2 rating. By 1873 she had slipped to a C1 rating, but the listed value remained \$4,000, a figure that appears greatly inflated (Board of Lake Underwriters 1864; 1866; 1871; 1873).

In 1873, the *Meridian* was sold to A.M. Crawford of Milwaukee (WSSI, n.d.). This was not a good year to be in business as the United States had slipped into a devastating recession known as the "Panic of '73" and cargoes may have been hard to come by. In late October, the *Meridian*, carrying no cargo and bound for Oconto, probably for a load of lumber, ran into a freak fall storm. Stiff northerly winds brought heavy snowfall and dangerous icing conditions to Green Bay. The *Meridian* was driven up on the Sister Island Reef and eventually pounded to pieces. A Green Bay newspaper described the intensity of the late October storm:

We hear continually of the effects of the storm of last week, which exceeded in fury anything known in the memories of the oldest living inhabitants. It broke with great violence upon the east shore of the bay, sweeping away docks which have withstood the many previous storms of former years without moving a timber (Green Bay Press Gazette 11/8/1873).

The *Meridian*, valued at only \$1,000 and insured for \$700, was one of several marine accidents attributed to the storm and her loss attracted little notice in area newspapers. Despite a C1 insurance rating, and considerable storm damage, at least three unsuccessful attempts were made in mid-November to pull the ship free (Marine Casualties, n.d.; Milwaukee Sentinel 11/16/1873).

Survey and Documentation

A relatively early vessel for Lake Michigan, the *Meridian* site promised to shed light on little known pre-Civil War Great Lakes nautical architecture. The *Meridian* was surveyed over the course of four days, July 2, 3, 4, and 8, 1991. Initial reconnaissance revealed that the vessel had broken into three major sections. The largest section included an almost intact bow and port side running aft approximately 105 feet. It included floor timbers, ceiling, knees, part of the rail, portions of the keelson and forward deadwood, and a variety of other architectural features including scarps and unique reverse arch-shaped longitudinal members probably added to inhibit hogging. Less easily explained was the presence of numerous pieces of split wood about four feet long and 5 to 7 inches on each side, possibly comprising a small cargo of cordwood, though the vessel was reported to have been light when she was lost. The forward end of the wreck is the deepest portion of the site, with a depth of 39 feet at the base of the stempost.

Fifty feet to the ^{east}west of the bow and side section lies the disarticulated stern, including the sternpost, sternson knee, after deadwood, floors, and exterior planking. About twenty-eight feet of this section is currently exposed, with more covered by gravel from the shoal. A third section consists of 71 feet 10 inches of starboard side lying approximately fifty feet ^{east}west of the stern section. This includes the starboard ceiling, frames, shelf, and fragments of lodging knees. A small fourth fragment of wreckage, mostly buried in gravel deposited from the shoal, was discovered just forward, and to starboard, of the stern section. The portion protruding above the

discovered just forward, and to starboard, of the stern section. The portion protruding above the bottom revealed this to be the centerboard trunk. Possibly, portions of the keel, keelson assembly, and pocketpiece are also buried in this section of the shoal. Four and one-half feet of the headledge is exposed, and two and one-half feet of the trunk's length.

Each wreckage section was surveyed using a separate baseline. Measured sketches were made of the entire site, including detailed sketches of the complex bow structure. The sketches were supplemented by still photography and underwater video. To tie the individually-mapped sections together, a datum was established at the sternpost, and ranges and bearings were recorded from the datum to points on the various sections. This allowed the relationships and orientation of the separate wreckage sections to be determined.

The survey of the *Meridian* provided a great deal of architectural information on this early schooner. In comparison, the *Meridian's* rounded, "apple-cheeked" bow bore a strong resemblance to that of the *Alvin Clark*, an 1846 schooner built near Detroit, and salvaged intact from the waters of Green Bay in 1969 (McCutcheon 1982; 1983:55-56). Because she was a contemporary, two-masted, and similar in size, the *Meridian* probably looked a great deal like the *Alvin Clark* (though the latter vessel had an unusual type of topsail schooner rig, that would have been classed as a "schooner brig" or "schooner brigantine" on the Continent) (MacGregor 1984:126-127). However, because the *Meridian* is broken open, many important details inaccessible on the *Clark* are available for inspection, including vessel framing and deadwood. The *Meridian* is also comparable with another local wreck, the schooner *Winfield Scott*, built in 1852 at Cleveland, also by William Jones, and lost off Washington Island (Cooper 1989:16-18). The three sites complement each other as rich and accessible sources of comparative data on pre-Civil War schooner architecture.

The *Meridian* was framed with doubled timbers, each futtock sided 4 1/2 to 5 inches, and molded 7 1/2 inches below the turn of the bilge and 5 1/2 inches above the turn. Frame room is 11 to 12 inches, space is 12 inches. Very interestingly, the builders provided for a small amount of deadspace between the futtocks in each frame set. Spacers (or "chocks") measuring 14 1/2 inches long and 1 3/4 inches thick are placed alongside the butts between the floors and futtocks, and at the butts between the lower and upper futtocks, providing a 1 3/4 inch deadspace between adjacent futtocks (possibly for salting, or as an airway to curtail dryrot).

This use of spacer blocks in the framing has been variously called "open-joint" framing (Greenhill and Manning 1988:114-115,117) or "split framing" (Lenihan 1987:65,228). It has not been observed on any other American-built Great Lakes vessel known to the authors. The *Meridian* appears to be an exception to a rule for this type of framing, which states that chocks were never to be put between the floors and first futtocks: these lowest timbers should be fastened hard together (Greenhill and Manning 1988:115). As is visible in the stern, *Meridian's* builder placed chocks clear down to the floor timbers, providing a deadspace from the keel to the sheer.

As the construction method cited by Greenhill and Manning (1988:114-115,117) appears to be



Figure 8. Open-joint frames and chock in Meridian stern.

of use on the Great Lakes, or perhaps a British method which never saw much use in the United States. This latter possibility is suggested by open-joint framing observed at Isle Royale on the wreck of the sidewheel steamer *Cumberland*. This vessel was Canadian, built in Port Robinson, Ontario in 1871 (Lenihan 1987:65, 221). Due to political and cultural ties, Canadian shipbuilding may have made more direct use of British shipbuilding methods than American yards. In any case, the "open-joint" or "split" framing pattern on the *Cumberland* and *Meridian* appear to be two of the only known examples of this technique on the Great Lakes, though its use has been briefly mentioned in some historic sources (Lenihan, Labadie, and Murphy 1987:221, 228). Interestingly, this framing pattern does not appear to have been used in William Jones' schooner *Winfield Scott*, built just four years after he built *Meridian*. However, most of what survives of this hull is the lower bilge; therefore it is possible that open-joint framing may have been used in *Winfield Scott*'s upper futtocks, and the evidence does not survive (Cooper 1989:16-18).

The *Meridian*'s exterior planking ranged from 6 1/2 to 7 1/2 inches in width, and was 1 3/8 to 1 1/2 inches thick. The deck clamps measured 16 inches in width, 2 inches in thickness, and was scarphed with plain scarphs 6 feet in length, tapering to 4-inch nibs. The bilge ceiling provided an example of yet another interesting construction technique. Overlying the longitudinal bilge ceiling strakes are fragments of additional ceiling laid down in an inverted arch. The arch ran from just under the clamp in the bow, arched down the side, and rose up again in the stern. The arched ceiling ranged from 7 to 11 inches in width, and 2 inches in thickness. The arch is best preserved and most visible on the port side and in the *Meridian*'s bow. A thickstrake of ceiling at the turn of the bilge was also noted, measuring 11 inches wide by 4 1/2 inches thick.

This was obviously a reinforcing arch to impede hogging in the bow and stern, and a similar design was reported on the schooner *Bermuda*, built in 1860 in Oswego, New York (Labadie 1990:36,40,43). The *Meridian*'s arch appears to be a later addition over the existing bilge ceiling, yet was tightly fitted enough to warrant caulking between the arch strakes. This arch may have been added during *Meridian*'s 1862 lengthening and rebuild. The hogging arch in the ceiling gives *Meridian* something else in common with the Canadian-built *Cumberland* at Isle Royale. The latter vessel also had a hogging arch built into her ceiling (Lenihan, Labadie, and Murphy 1987:221): in her case, as the arch was integral to the ceiling, and not an overlay, it appears to have been original to her 1872 construction.

Section of *Meridian*'s rail are extant on the upper port side. The rail stanchions measure 2 feet in height, and 5 inches in width; the railcap measures 3 3/4 inches in thickness. Beneath the railcap on the inner side, a 7 1/2-inch wide plank is fastened to the stanchions. Like the *Alvin Clark*, the *Meridian* appears to have had a solid bulwark in the bow, and an open rail along much of the side. Chainplates for the masts are visible protruding just above the waterway. Three iron chainplates are extant at each of the two port side chainplate stations. Just aft of the forechains and mainchains, three eyebolts are fastened into the railcap, possibly for the topmast backstays, or some other light standing rigging.

Below the rail, the frame tops are covered with a waterway, 4 inches in thickness. Below the waterway, stumps of deck beams and fragments of the lodging knees were found. The deck

beams measure 10 by 4 1/2 inches in cross section. The fore and aft arms of the lodging knees overlap with each other between the beams. The beam shelf is trapezoidal, nearly triangular in cross-section, measuring 11 inches horizontally (supporting the deckbeam), and tapering down 11 1/2 inches in an acute angle nearly to a point where it meets the clamp. The inner, vertical face of the shelf fastened over the clamps measures 9 inches.

The bow of the *Meridian* is the best-preserved portion of the wreck, and certainly the most dramatic. It is intact from the keel to the top of the forward rail, with sagging portions of the foredeck and a leaning sampson post to keep one alert. The bow is heeled over to one side, with the port cathead partially buried in the sand bottom. When the *Meridian* was originally discovered in the late 1950s, the bow was in near pristine condition. The bowsprit was intact and in place. One was able to swim beneath the foredeck and visit the bosun's lockers and ship's stores in the forecabin. Doors were still in place, and blocks and other equipment hung inside. Unfortunately, other, less respectful divers soon discovered the site, removing the lockers, artifacts, and cutting the bowsprit off with a saw. Other artifacts such as a coin and stoneware crockery were also reportedly removed (Boyd, personal communication, 1988).

Despite the predations of some irresponsible individuals, the bow of the *Meridian* still maintains something of its original appearance. The stempost is elegantly molded, with a cutwater knee placed under the now missing bowsprit. A 2-inch diameter iron dolphin striker protrudes through and beneath the cutwater knee for a length of 54 inches. Straps and rings for bobstay plates are extant in the lower stempost, with mortises into the wood to admit the chain links, as at the PI South site. Interestingly, both the dolphin striker and the bobstay plates utilized square nuts instead of the usual round clinch ring or peened iron bolt. The stempost measures 12 feet 8 inches in height, though a portion of the bottom is buried in sand and not accessible for measurement. The bow measures 17 feet 6 inches high from the railcap to the base of the stem. The stem is 14 inches sided and combines with an outer stempost (or cutwater) for a full molded measurement of 23 inches. The cutwater knee protrudes another 27 inches, is 8 inches sided, and 12 inches across its radius.

The rail is intact around the bow, about 14 feet from the port cathead. Scarphed portions of the railcap and waterway are extant, along with the supporting stanchions, knightheads, and cant frames. A fragment of pinrail for the jib downhauls survives on the port forerail, and 5-inch long oval fairleads for other running gear are carved into the forward railcap. Details and measurements of other reinforcing timbers such as breasthooks, clamps, and the hogging arch are also accessible in this area. The 7 1/2-inch outer diameter iron hawsepipe is still in place in the port hawsehead: its starboard sister appears to have been pirated.

Approximately twelve feet of foredeck sags around the bow, with the heavy sampson post leaning precariously to forward and port. The sampson post (which probably held the windlass pawl as well as the heel of the bowsprit) measured 20 inches wide by 17 inches in width. It is heavily eroded, unstable, and was afforded a wide berth by the archeologists. Some of the deckbeams are intact, as well, though generally unsupported on the starboard side.

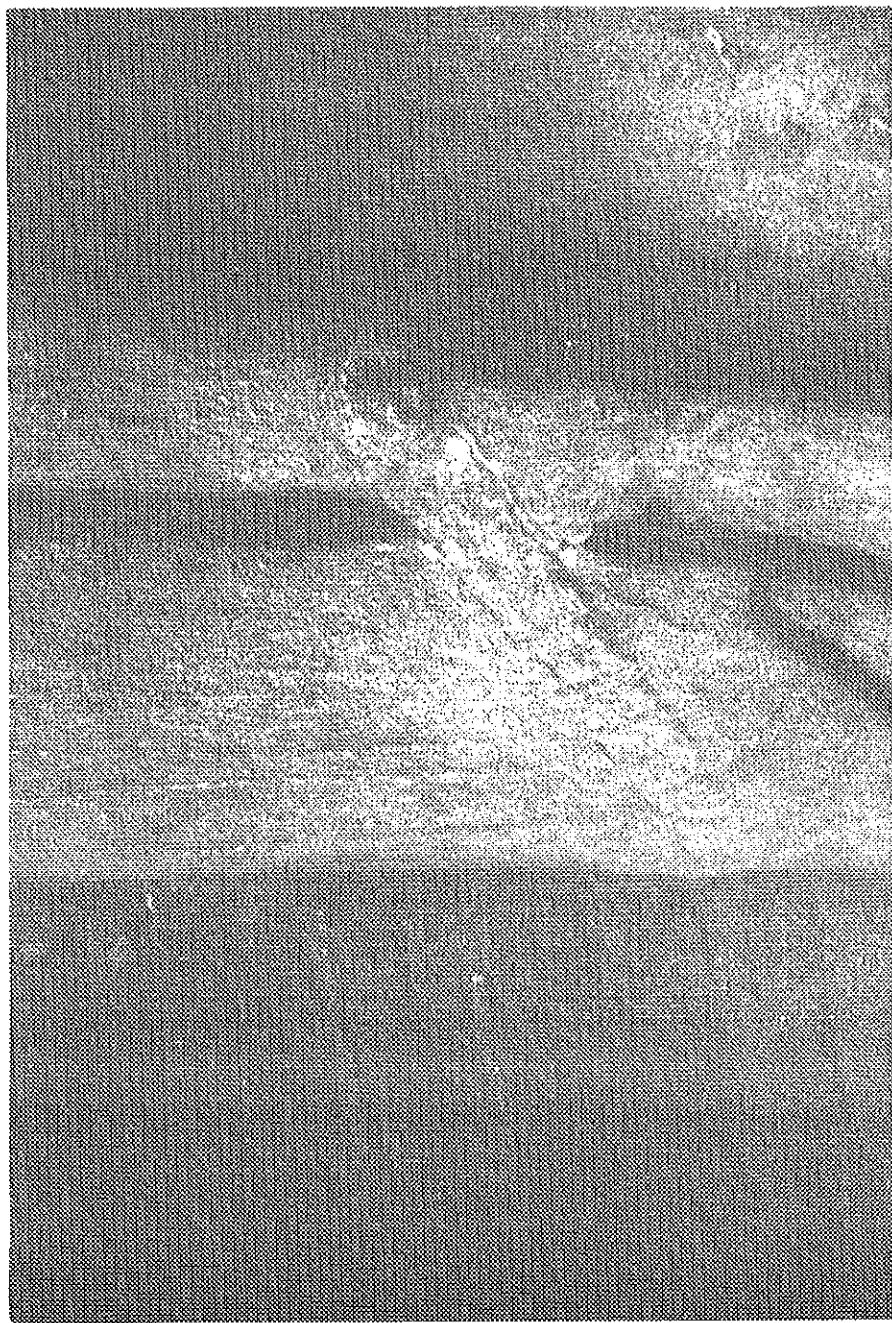


Figure 9. Meridian bobstay plate, stempost, and starboard planking rabbett (left)

The starboard side of the bow is shorn away, leaving the starboard rail and deck hanging in open space (water). Beneath this, the keel and forward deadwood are accessible. Due to the breakup and crushing of the bow, the keel is skewed off center, converging at an angle into the forward deadwood and bow. The keel is molded 2 inches and sided 9 inches, flush with the bottom planking, and slightly convex in cross-section. Unusual hooked iron fastenings fasten the keel to the keelson, and the lower ends of the bolts hook over and are driven back into the keel, probably to prevent these members from loosening. The fastenings protrude 3 inches below the keel, suggesting that they also held a shoe or some type of sacrificial plank over the keel. The garboard is extant alongside the keel, measuring 6 inches in width and 1 1/2 inches in thickness.

Mortises for the cant frames, sided 8 inches, molded 13 inches, and 1 1/2 inches deep are placed forward of the keel in the deadwood. The single keelson (no sisters or rider were evident) measured 11 inches sided and 12 inches molded. The floors are extant here, with 4-inch wide limberholes cut into the undersides. Floor dimensions are similar to those in the stern, but the riot of collapsed, eroded, displaced, and distorted timbers in the bow makes the forward framing measurements somewhat unreliable. Frame room was approximately 11 to 12 inches; space 12 to 13 inches. Siding for floors was approximately 4 inches, molding approximately 10 inches. As in the stern, chocks were used in the floors as spacers, contrary to the Greenhill-Manning rule (Greenhill and Manning 1988:115).

Conclusions

Despite the disarticulation of the *Meridian* wreck, and subsequent vandalism of the wreck by certain divers, the site retains a good amount of structural integrity. It is certainly one of the few known schooners in northern Door County with a relatively intact bow and foredeck, and virtually the only known example of open-joint framing and arched ceiling known in Wisconsin (though others probably exist). There is relatively little specific information on pre-Civil War schooners and their construction: this is partially why the *Alvin Clark* was so important a find. Many vessels of this period were never even photographed, and there are no known historic photographs of either the *Clark* or the *Meridian*. A very similar, contemporary vessel, the *Meridian* is an important source of comparative data, and as observed earlier, contains visible examples of details inaccessible on the articulated *Clark*. As a source of rare archeological data on early nineteenth-century schooner construction, the *Meridian* is certainly eligible for the National Register of Historic Places, under criteria C and D, and a nomination will be prepared by Division of Historic Preservation staff. Additional research might include excavation around the centerboard trunk, to reveal details of the *Meridian's* longitudinal reinforcement, keelson, and pocketpiece. It would be of great interest, for example, to know whether the *Meridian's* centerboard trunk was offset to one side of centerline, as it is with the *Alvin Clark*, and also in the schooner *Winfield Scott* (Cooper 1989:16-18).

Due to its age, and the fragile state of the bow, the *Meridian* is probably more sensitive to anchor dragging than many other area wrecksites. It is also a very popular panfishing site. Inclusion and management in a preserve would help protect the *Meridian*, using a buoy to mark the site and provide easier dive access, and prohibiting fishermen and divers from anchoring into the

wreck. A number of bleach bottles and cinder blocks from ad hoc fishing boat anchors and buoys, and a water-ski tow rope wrapped around the sampson post might also be removed from the site to restore its appearance as a historic shipwreck and natural lakebed.

Divers should also be warned about the condition of the foredeck and the precariously placed sampson post. However, outside of a mooring, monitoring, and a some garbage cleanup, little else would need to be done to appropriately manage the *Meridian*. Vandals have done their worst, loose artifacts are not visible (apart from an amazing collection of post-World War Two beer cans), and the site appears to be little threatened by visitation, provided a boat mooring is placed on the wreck and divers do not further vandalize the site. An effort might also be made to locate artifacts from the site or underwater photographs from its earlier days, to be used for research and interpretive purposes.

Visual Reconnaissance of the Lake Bottom Adjacent to a Seventeenth-Century Fur Trade Post Site at Rock Island

On July 12, 1991, an extensive visual reconnaissance dive was made in an area adjacent to a known seventeenth-century fur trade site and historic Indian occupation on Rock Island (see Mason 1986). This reconnaissance was made to explore the possibility of offshore components to the adjacent land site, perhaps dumped or lost cargoes or other artifactual materials. Archeologists researching Rock Island fur trade activities have also hypothesized that some of the areas in use during the seventeenth-century may have been inundated by lake level changes. Three SHSW archeologists spent a total of five man-hours on a visual reconnaissance of the lake bottom offshore of the location of Mason's Rock Island Site II (Mason 1986:22).

The lakebed in the visual survey area consisted of mixed dolomite cobble, sand pockets, dolomite boulders, dolomite rock shelves, and some chert nodules. Many of the dolomite cobbles were covered by a very friable grey-green concretion. While no artifacts were encountered, one potentially important discovery was made. At a depth of eight feet, a massive rooted tree stump, approximately five feet in diameter, was located -- indicating significant lake level changes had indeed taken place in the vicinity of Rock Island. The stump will have to be radiocarbon dated before its significance may be adequately assessed. Plans are in place to take C14 samples of this stump in the 1992 field season, to be submitted to the U.S. Geological Survey for analysis.

Though no artifactual material was encountered, a more extensive survey using small test excavations could possibly reveal cultural material. However, due to the general high-energy environment here, it is doubtful that archeological deposits would retain any meaningful associations or context. None the less, the radiocarbon dating for the tree stump could answer additional questions about Rock Island's geomorphology, and possibly reveal the approximate shoreline configuration of the island at the time of its earliest Euro-American contact.

Miscellaneous Surveys -- Northern Door County

St.s. *Kate Williams*

In addition to the underwater reconnaissance at Rock Island, a beached portion of a wrecked vessel reported by a DNR ranger was recorded using standard baseline and measured sketch techniques. Preliminary assessment of the data suggests that the wreckage was in fact the lower bow of the tug *Kate Williams*, a 370 horse power steam tug built at Cleveland, Ohio by Ira Lafrener in 1862. Of 162 gross tons and 111 net tons, the vessel measured 112.6 by 20.9 by 9.8 feet. On October 1, 1907, the *Kate Williams* dragged anchor and was driven up on the beach at the east side of Jackson Harbor, Washington Island. Subsequent salvage efforts failed, and the vessel went to pieces under the pounding of the lake (WSSI, n.d.). The section documented at Rock Island (just across a narrow straight from the east point of Jackson Harbor) included about 24 feet of keelson from the stempost aft, several floor timbers, and bow deadwood. This section was probably pushed by ice and waves across from Jackson Harbor to its current location on Rock Island's southwest shore.

The hull fragment incorporated double-timbered framing, and carried a central keelson over the floors flanked by two sister keelsons. Paired floors were sided 5 inches (forwardmost in a pair) and 4 1/2 inches (aftermost in pair), with a room of approximately 11 inches and space of 6 inches. Floors were molded 8 inches, with a 10-inch molded keel beneath. Limberways below the floors measured 5 inches by 1 1/4 inches. Floors and futtocks were through-fastened to their partner with 3/4-inch square shank bolts, peened out on their after end.

The keelson was molded 12 inches and sided 13 inches. A 6 1/2-inch diameter pumpshaft protruded through the keelson. The starboard sister keelson was molded 9 inches and sided 6 1/2 inches; the port sister was missing, though its position was evidenced by surviving fastenings. The keelson was fastened vertically to the floors using 7/8-inch and one-inch diameter drift pins, the sister keelsons were fastened using 7/8-inch diameter drift pins. Ceiling widths of 9 to 12 inches were also interpolated from their surviving fastenings; 5/16 square shank spikes were used in the ceiling.

A portion of the stempost was intact on the forward end of the keelson assembly, measuring 13 inches molded and 14 inches sided. A rabbet for the bow planking ran up the after edge of the stempost. Aft of the stempost, the forward deadwood contained mortises for the cant frames.

Due to its low integrity and small size, the bow fragment alone of the *Kate Williams* is not believed to be eligible for the National Register of Historic Places. However, were the remainder of the hull to be located, the bow fragment could contribute to our understanding of her overall architecture. As large overlake tow tugs like the *Williams* were numerically rare (compared with their smaller harbor counterparts, and other types of steamers), the wreck of the *Kate Williams* could supply significant information on large tug construction. Only two other large overlake tugs are known to be wrecked in Wisconsin waters; the wrecking tug *Ottawa*,

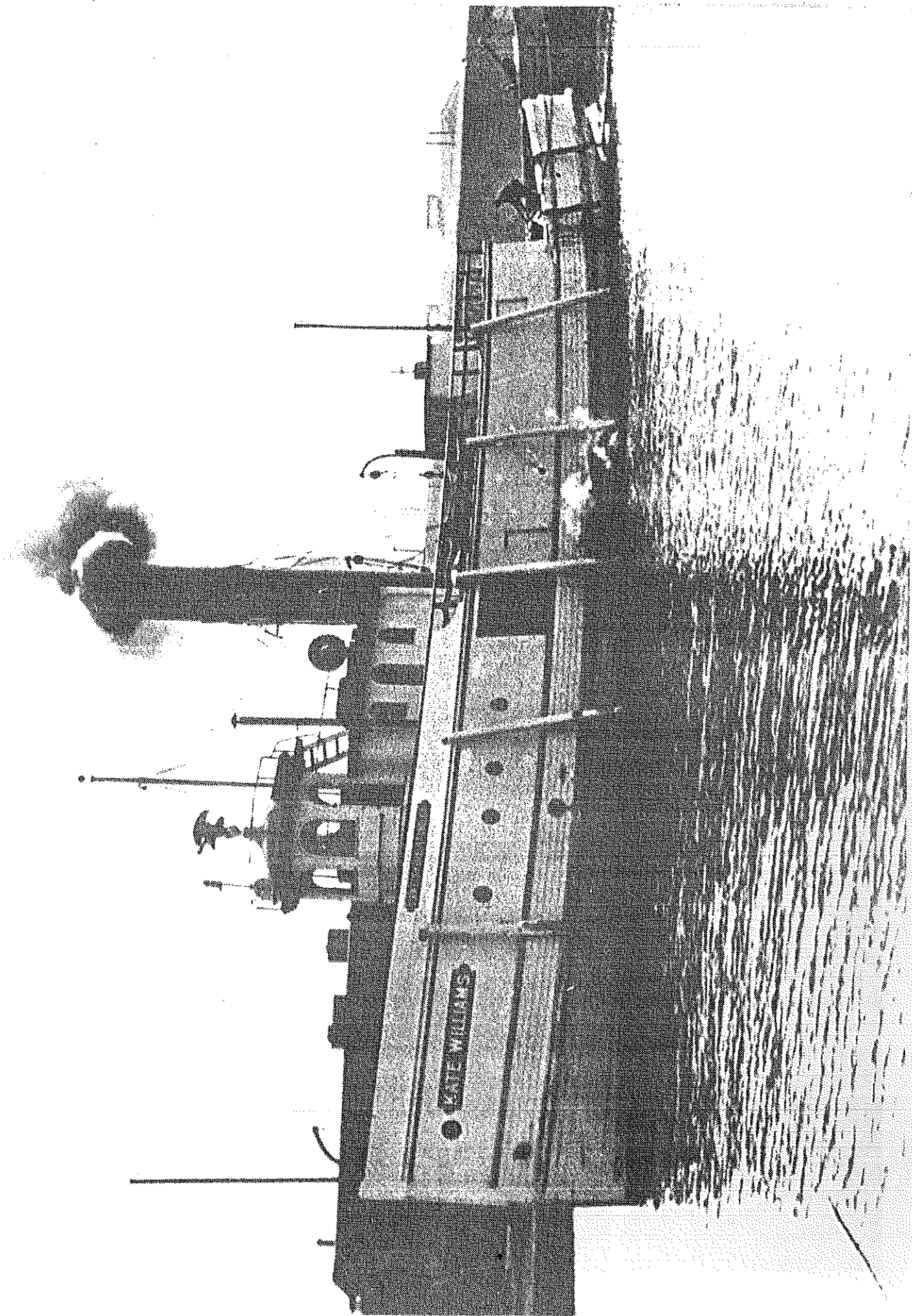
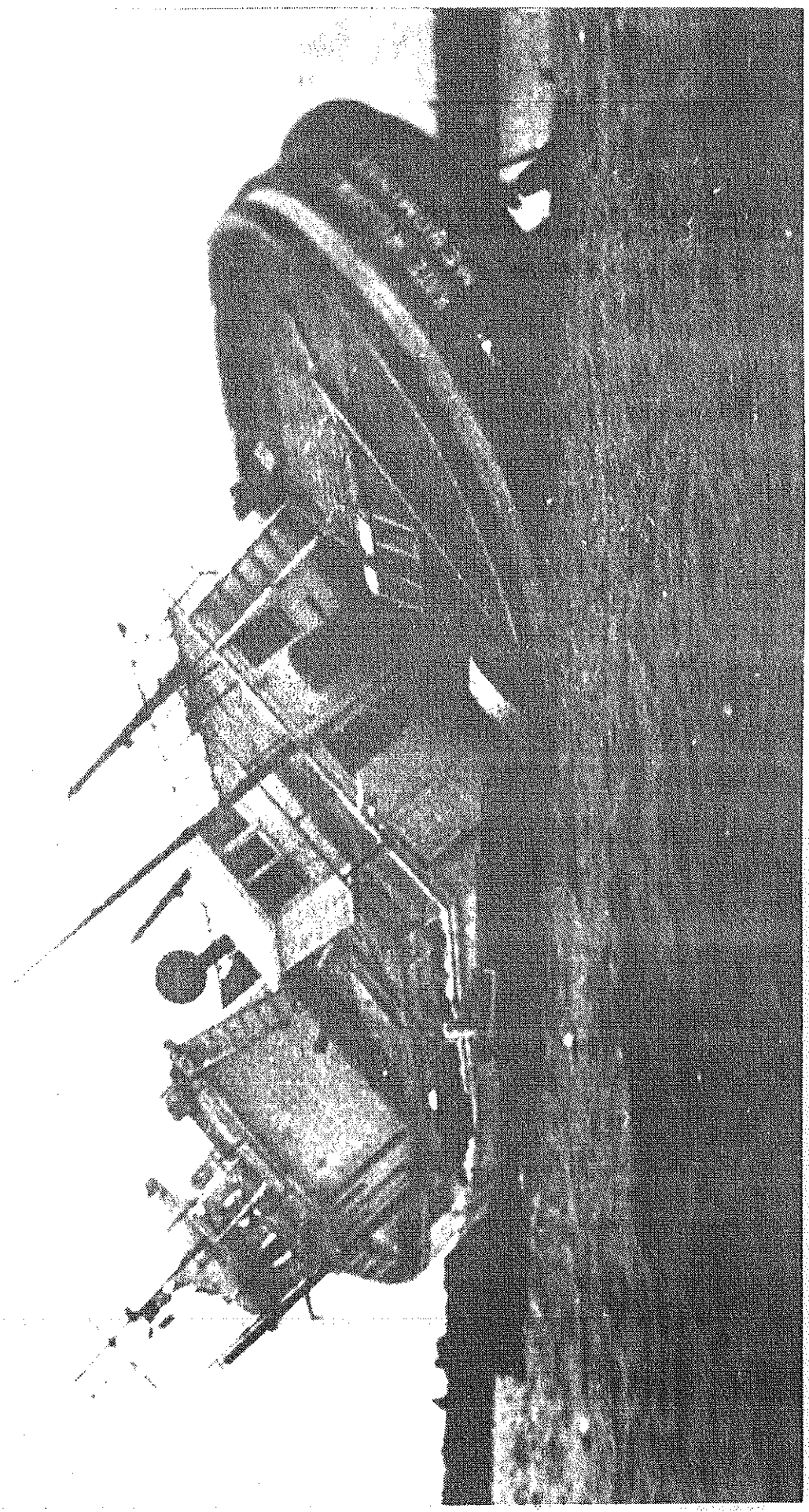


Figure 10. Tug Kate Williams at Sheboygan

Figure 11. Kate Williams, ashore at Jackson Harbor,
Washington Island. C.P. Labadie Collection.



documented as part of the 1990-1991 Apostle Islands survey (Cooper et. al. 1991), and nominated to the National Register in 1992, and the *William J. Livingstone*, which sank in a unknown location off Door County in 43 fathoms of water, and is all but inaccessible with current SCUBA diving technology.

Interestingly, the *Kate Williams* appears in a nineteenth century folk song about Great Lakes iron ore hauling, "Red Iron Ore," (also titled "The *E.C. Roberts*"), said to have been one of the most popular Great Lakes songs on both American and Canadian ships (Fowke 1964). Though the *Williams* is only mentioned briefly (working as a tow tug in the St. Clair River), she seems to have been a well-known vessel, and this slight musical notoriety contributes to her historical significance.

Future survey work in the vicinity of Jackson Harbor and the southwest shore of Rock Island should attempt to locate other remains of the tug. In the meantime, the bow section contains some architectural data, and may serve an interpretive function for park rangers to discuss Door County shipwrecks with park visitors. The wreck's location easily lends itself to beach walking tours, and a small exhibit on the ship, using photographs and historical information, might be assembled for display in the boathouse visitor's center.

St.s. Louisiana

The steamer *Louisiana* was built in Marine City, Michigan by Morley and Hill in 1887. A large wood bulk carrier, the *Louisiana* measured 267 by 39.6 by 20 feet with a gross tonnage of 1,929 and a net tonnage of 1,383 (WSSI, n.d.). The vessel typifies the application of traditional construction materials with modern steam propulsion and hull designs to meet the changing economic needs of the industrial United States (Cooper 1989:57-63).

The *Louisiana* was destroyed by fire while riding out the famed gale of 1913 in Washington Harbor, at Washington Island. Burned to the water, the vessel remains visible from the surface, with the disarticulated bow on shore nearby (Cooper 1989:57-63).

Though initially documented in 1988, SHSW archeologists returned briefly in 1991 to collect supplementary data for nomination of site to the National Register of Historic Places. SHSW archeologists laid a baseline along the exposed portions of the keelson and took off-set measurements to establish the shape of the hull and wreck site parameters. A measured sketch was made of the major debris field off the starboard stern quarter, and of debris in the engineering section of the vessel. Diagnostic measurements were taken of standard architectural features. Measured sketches and baseline measurements were supplemented by still photography. The site was surveyed on June 27, 1991.

Data generated by the 1988 and 1991 surveys were used in listing the site on the National Register of Historic Places in 1992.

St.s. *R.J. Hackett*

The *R.J. Hackett*, built in 1869 at Cleveland, Ohio, was the prototype for Great Lakes bulk carrier designs. The 1,129 gross ton vessel measured 201.8 by 32.5 by 12.6 feet. On November 12, 1905 a fire broke out in the vessel's boiler room. The captain grounded and abandoned the vessel at Whaleback Shoal. Some of the officers' personal effects were salvaged by the Plum Island lifesavers who boarded the burning vessel. The vessel sank, remaining undisturbed by divers until the 1950s. The wreck has been seriously impacted by ice, with debris from the vessel covering a large area (Cooper 1989:48-56; WSSI, n.d.).

The *R.J. Hackett* had been previously surveyed in 1988, and the purpose of the 1991 survey was to collect additional documentation on the vessel's machinery, check the alignment of the keelson and propeller shaft, and conduct a visual reconnaissance of the surrounding area.

SHSW archeologists recorded vessel machinery including the boiler with still photographs and video. Measured sketches were done of a disarticulated and previously buried section of the starboard side. Floor and futtock patterns were further documented. The visual reconnaissance revealed a previously undocumented bow assembly which included the stem, bow deadwood, keelson, rider, and flush keel. The bow assembly was recorded with measured sketches. Its relative position was estimated as slightly to starboard of, and 40 feet off the forward end of the main wreck. The survey was completed July 11, 1991.

Data generated by the 1988 and 1991 surveys were used in nominating the *R.J. Hackett* site to the National Register of Historic Places in 1992, at a national level of significance.

Schooner *Boaz*

The *Boaz* was a three-masted schooner of 127 gross and 120 net tons; official number 2791. She was built in 1869 at Sheboygan, Wisconsin by Amos C. Stokes, and measured 114.0 feet in length by 22.3 foot beam by 7.1 foot depth of hold (Hirthe, personal communication 1988; Bureau of Navigation 1900:24). The *Boaz* was caught in autumn gale on November 9, 1900 bound from Pierpont, Michigan to Racine, Wisconsin with a cargo of elm lumber, and was finally abandoned, leaking and damaged, in North Bay (Door County Advocate 11/17/1900; 11/24/1900 p.1,c.1-2; 12/01/1900 p.1,c.3; 9/05/1903 p.1,c.3; Milwaukee Sentinel 11/17/1900 p.6, c.5).

Though the *Boaz* was mapped in the 1988 survey, archeologists returned on June 4, 1991 for a brief inspection of the site, and to record further details of the vessel's midships framing pattern.

The *Boaz* appears to be eligible for listing on the National Register, principally for its architectural data related to schooner construction. As she was Sheboygan-built, and possesses an unusual double-centerboard arrangement, she may shed some new light on Wisconsin-built vessels, and provide evidence for local use of innovative construction methods. She will be nominated to the NRHP as time permits.

Hedgehog Harbor Surveys

Among the lower priority surveys undertaken in 1991 was a visual reconnaissance of Hedgehog Harbor, south of Gills Rock ferry dock. Sheltered from most winds, this area remained workable when higher priority survey areas were not.

On the afternoon of June 26, 1991, SHSW archeologists conducted a visual reconnaissance to search for previously reported wreckage in Hedgehog Harbor. Two SHSW archeologist conducted a search along a twenty-foot contour line between Teske's and Weborg's docks. The archeologists observed logs, dock timbers, an 8-foot section of the side of a vessel, a 20-foot section of keel, and one loose futtock. The bottom was mostly cobble with patches of sand and muck. Some modern debris (tires, an aluminum canoe paddle) was also present.

A visual reconnaissance of the 25-foot depth contour line between the ferry dock at Gill's Rock and Weborg's wharf was conducted by two SHSW archeologists. The archeologists encountered a centerboard trunk and centerboard laying next to a small dock crib to the north of Weborg's Wharf. No other material was observed.

On July 2, 1991, the SHSW archeologists returned to the centerboard site off of Weborg's Wharf. With weather conditions unsuitable for working on higher priority targets, it was decided to record the centerboard site using measured sketches. The centerboard and centerboard trunk are believed to belong to the schooner *Sardinia* which wrecked in Hedgehog Harbor on June 29, 1900. The *Sardinia* was built in Penetanguishene (Coldwater), Ontario by William Pigeon in 1856. Of 150 gross, and 142 net tons, the vessel measured 105.2 by 24.7 by 8.8 feet. The *Sardinia* was driven up on the beach during a heavy gale and pounded to pieces. Her outfit was stripped and she was abandoned by her owners (Cooper 1988a:98-99).

As it is only a relatively small fragment of a larger vessel, the centerboard trunk is not believed to be eligible for the National Register of Historic Places. Also, as several other schooners were wrecked in Hedgehog Harbor, it is difficult to positively identify this trunk as being from the *Sardinia*. It is approximately the correct size and in approximately the correct location: however, there are no diagnostic elements or means of positive identification which would tie it to *Sardinia*. Were the remainder of the hull to be located, the centerboard trunk would contribute to our understanding of the vessel's overall architecture. Were such wreckage to be more reliably identified as the *Sardinia*, the site's significance would also increase. As *Sardinia* was a Canadian-built vessel, and these are comparatively rare in Wisconsin waters, it would provide interesting and potentially significant comparisons with American-built vessels of the same period.

The site is currently listed in the Wisconsin Shipwreck Site Inventory maintained by the State Historical Society of Wisconsin.

Apostle Islands Site Surveys

Detailed discussions of much of the Apostle Islands survey work accomplished in 1990-1991 is provided in a separate final report (Cooper et. al. 1991). However, an abbreviated discussion of this work is presented here for the sake of providing a complete overview of 1991 field operations conducted under the 1991 Sea Grant project.

Survey and Documentation of the Steamer *Sevona*

The steel steamer *Sevona* was built as the *Emily P. Weed* at West Bay City, Michigan in 1890. In 1904, the vessel was lengthened seventy-three feet at Buffalo, New York. After reconstruction, the vessel measured 373 feet in length, 41 feet in beam, and 21 feet depth of hold (Keller 1984:95). On September 1, 1905 the vessel encountered a heavy gale and ran aground on Sand Island Reef while seeking shelter. The vessel broke in half from the pounding, isolating the captain and seven crew members from the lifeboats. All died attempting to reach shore. The sixteen others on board the vessel survived. A total loss, the vessel valued at \$220,000, was efficiently salvaged. The boilers, engine, and tons of steel plating were removed (Holden 1985:96; Wolff 1990:107-108).

In 1990 the *Sevona* site underwent a three-day archeological examination in a joint effort by the SHSW and the faculty and students of the East Carolina University Field School in Underwater Archeology, funded in part by UW Sea Grant. While extensive site description and documentation was done at that time, more remained to be done in 1991.

On August 8, 1991, SHSW archeologists and a local volunteer diver returned to the *Sevona* site to confirm parts of the 1990 documentation, gather additional data, and take video and still photographs of the site. Particular attention was paid to the area where the hull broke apart in an effort to confirm earlier findings that the lengthening of the vessel in 1904 had played no role in the final disposition of the vessel. SHSW archeologists verified the wreck orientation, recorded diagnostic measurements of ship fittings and fastenings, and took video and still photographs. Project objectives were achieved despite the work being hampered by turbid waters caused by the summer's exceptional rainfall.

A more detailed discussion of the *Sevona* survey may be found in the SHSW's 1990-1991 Apostle Islands underwater archeological survey report (Cooper, et. al. 1991). A nomination for listing the wreck on the National Register of Historic Places is currently being prepared by the Division of Historic Preservation.

Survey and Documentation of the Red Cliff Bay Wrecks

Red Cliff Bay, north of Bayfield contains three identified steam vessel wrecks. In order of size,

they are: the bulk freighter *H.D. Coffinberry*, abandoned in 1913 and towed to Red Cliff Bay in 1917; the tug *Ottawa* which burned and sank on November 29, 1909; and the *R.W. Currie* which was abandoned in 1919. The wreckage of a small unidentified vessel lies close to the other three.

Survey of the Steamer *H. D. Coffinberry*

The *H. D. Coffinberry* was built in 1874 at East Saginaw, Michigan by Thomas Arnold. The bulk freighter was 191.4 feet in length, 33.5 feet in beam, had a 13.4 foot depth of hold, and measured 858 gross tons. Originally an ore carrier, the vessel had a long career and was eventually adapted as a lumber hooker. With the decline of the timber trade the vessel was abandoned at Ashland in 1913. In 1917 the *H. D. Coffinberry* was towed to the Red Cliff bay boneyard and beached along side the sunken remains of the *Ottawa* (Holden 1985:15-16; Keller 1984:147).

The *H. D. Coffinberry* was partially documented in 1990 by East Carolina University, sketching and measuring major hull features. Most of the vessel's upper structure had been broken up by ice, except the lower hull. Much of the surviving structure remains above the water.

On July 24, 1991, three SHSW archeologists returned to the *Coffinberry* to verify the results of the 1990 survey and further document the site. Two archeologists operating on the surface, and one underwater, collected extensive diagnostic measurements of vessel timbers and fastenings. A baseline was laid down the keelson and off-set measurements were taken to place major vessel features. An archeologist on SCUBA swam a visual reconnaissance of the area around the *Coffinberry* wreck in order to determine geological site conditions and boundaries. The bottom around the vessel consists of small cobble, a few boulders and sand pockets. The maximum depth was six feet. The *Coffinberry* was found to lie just northeast of the tug *Ottawa*. The boundaries between the two sites are difficult to distinguish, as debris from one site spreads into the other.

A more detailed discussion of the *Coffinberry* survey may be found in the SHSW's 1990-1991 Apostle Islands underwater archeological survey report (Cooper, et. al. 1991).

The reconnaissance of the area around the *Coffinberry* site in 1991 also revealed the existence of a small wreck lying just inshore of the *Coffinberry*, in about one foot of water. Sketches and video were completed of this small vessel. The site included the vessel's lower bow, keel, keelson, and floors, with a surviving length of 44 feet 6 inches. As the stern was not extant, the

original vessel would have been somewhat longer than 44 feet. This may be a small fishtug that was abandoned here. Another possibility is that this is the tug *Rambler*, which was reportedly burned in the vicinity of Red Cliff in 1891 (Holden 1985:93). The tug was built in Buffalo in 1873, 57.1 by 15.4 by 7.9 feet (Bureau of Navigation 1885:364). The wreck's surviving length compares favorably with that of the *Rambler*, and the vessel's framing, construction, and fastenings are otherwise consistent with a small tug like the *Rambler*.

Figure 12

2
Over Is.

4
3
Sockton Is.

Oak Is.

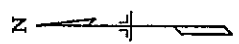
5
6
7
Bayfield
La Pointe

1
Sand Is.

8
Keshong Is.
Long Island
Ashland
Chagamingo Bay

Lake Superior

Project Area

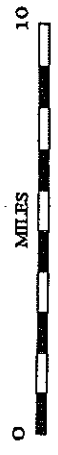


Key

- 1 - St.s. SEVONA
- 2 - Sch. bge. PRETORIA
- 3 - Quarry Bay
- 4 - Sch. bge. NOQUEBAY
- 5 - Red Cliff Bay Wrecks
- 6 - St.s. FEDORA
- 7 - Bge. FINN MCCOOL
- 8 - St.s. R.G. STEWART

Apostle Islands

1991 Field Season



State Historical Society of Wisconsin

Survey of the Steamer *R. W. Currie*

The steam tug *R.W. Currie* was built in 1882 in Algonac, Michigan. The vessel was 60 feet long, with a 14 foot beam, 7.2 foot depth of hold and measured 36 gross, and 18 net tons (Bureau of Navigation 1910:275). The *Currie* had a long and eventful career around the Apostle Islands region. Among other interesting adventures, the *Currie* picked up the stranded survivors of the *Sevona* disaster at Sand Island in 1905. The vessel eventually wore out and was beached at the Red Cliff Bay boneyard (Keller 1984:147).

On the afternoon of July 29, 1991, SHSW archeologist surveyed the beached remains of what is most likely the *R.W. Currie*. This wreckage is located about 300 feet west of the *Coffinberry* on the north shore of Red Cliff Bay. Time and the elements had taken their toll on the vessel. The wreck lies in zero to four feet of water, and nothing remains of the upper works. The site is slightly spread out, measuring seventy feet overall, and consists only of the lower vessel timbers from the forefoot and deadwood at the bow, aft to the stern post and rudder skeg. The vessel is broken and separated amidships, 26 feet 2 inches aft of the bow, with the forward section angling off about fifteen degrees to starboard of the vessel's centerline. The aft section measures 36 feet 2 inches.

In their original articulation, the fore and aft sections overlap a little, producing a total length with is less than the sum length of the two sections individually. Matching up the fragmented ends of the keelson produces an overall surviving length on keel of 53 feet 10 inches, which is just under the original size of the *Currie*. While this is also just under the size of the *Rambler*, this wreck is slightly largely and heavier than the wreckage adjacent to the *Coffinberry*, and is more likely to be attributed to the *Currie*, the larger of the two tugs.

Floor timbers and bilge keelsons were in place as were some exterior bottom planks. A variety of marine hardware remained on the site including the cutlass bearing and brass through-hull fittings.

The *Currie* site was surveyed by the standard method of tying measurements and sketches into a baseline. The task was simplified because all work could be accomplished on the surface or with snorkeling gear. Diagnostic measurements of the vessel's architecture and construction materials were taken along with measured sketches of prominent features. The site was also recorded on video.

Survey of the Steamer *Ottawa*

The *Ottawa*, originally the *Boscobel*, was for almost thirty years one of the largest and most powerful tugs on the Great Lakes. Built in Chicago in 1881, the vessel measured 151 feet by 28 feet by 13 feet, had a 600 horsepower engine and displaced 610.8 gross tons (Keller 1984:117). On November 29, 1909, the *Ottawa* caught fire and burned at Red Cliff Bay. A \$60,000 dollar loss, the cause of the fire was never determined. The engines and some

machinery were salvaged (Holden 1985:77; Keller 1984:117-120).

In July, 1990, East Carolina University archeologists and students conducted a two day survey of the *Ottawa* site and produced a preliminary map of the site. A heavily constructed vessel, much of the hull structure remains largely intact, though in separate sections. The largest section is the lower hull, including the keel, keelson, floors, bilge ceiling, boiler and engine beds, and the propeller shaft tube. The deadwood, rudder head, horn timber, and port fantail make up the large stern section. Large sections of side have collapsed outward and lay adjacent to the main wreck.

On July 31, August 1 and 2, 1991, SHSW archeologists returned to the *Ottawa* site and conducted a more extensive survey of the vessel remains. After an initial reconnaissance dive, it was decided to divide the vessel up into smaller sections for purposes of mapping. A baseline was laid along the keelson of the vessel from the forward end of the shaft alley at the stern to the forefoot in the bow. A series of offset measurements were taken along the baseline. In order to compensate for the vertical differences between the baseline and the sides of the vessel, the depth of the water was recorded at both at the baseline and at the point recorded along the vessel side. This procedure created a series of right triangles which created a plan view projection of that section of the site. A similar procedure was followed to map the stern, but improved water clarity and shorter vertical distances allowed a plumb bob to be used to compensate for vertical changes in the offset measurements. Smaller sections of the starboard side and starboard fantail collapsed out from the main wreck were mapped with separate baselines and tied into features with established locations on the main wreck.

The bow section, consisting of an iron shoe, the stem, stemson, deadwood, starboard garboard and apron was disarticulated from the main wreck assemblage and was documented separately. The *Ottawa's* 7-foot by 4-foot 9-inch rudder was also encountered forward of the main wreck and separately documented.

Extensive sketches of the entire site were completed. Diagnostic measurements were taken and measured sketches made of important architectural details such as timbers, planks, fastenings, engine beds, shaft tube, and a variety of other features. Site documentation was further accomplished through still photography and extensive use of underwater video.

A more detailed discussion of the *Ottawa* survey may be found in the SHSW's 1990-1991 Apostle Islands underwater archeological survey report (Cooper, et. al. 1991). Data from the 1990-1991 survey was utilized in nominating the *Ottawa* to the National Register of Historic Places in 1992.

Miscellaneous Surveys

The SHSW archeologists conducted surveys on four wrecks not initially targeted for work during the 1991 field season, one of which is scheduled for completion in 1992.

Survey of the Schooner-Barge *Pretoria*

The huge schooner-barge *Pretoria* was built at West Bay City Michigan by James Davidson. At 338.4 feet in length, 44 feet in beam, 23 feet in depth of hold, and with a gross tons of 2,790 and net tons of 2,715, the *Pretoria* was one of the biggest wooden ships ever built on the Great Lakes. The vessel was caught in the 1905 gale that sank the *Sevona* and broke up off the Outer Island shoals. Carrying a load of iron ore, the vessel sank drowning five of the nine crew members (Cooper et. al. 1991:133-137; Holden 1985:88-90).

In 1990, several reconnaissance dives were made on the *Pretoria* by archeologists from the SHSW and East Carolina University. These dives clearly demonstrated the problems inherent in documenting the *Pretoria*. The site is huge. The vessel remains cover a large area and the associated debris field reportedly encompasses a radius of 1/4 to 1/2 mile around the main wreckage. The 55- to 60-foot water depth somewhat limits the time archeologists can spend on the site each day. Furthermore, the site is roughly 30 miles from the base of operations at Bayfield and is very exposed to dangerous marine weather conditions, as the presence of the *Pretoria* wreck testifies. While the *Pretoria* was listed as a primary objective for the 1992 field season, these obstacles make it prudent to conduct survey operations whenever conditions permit.

On August 7, 1991 a team of four SHSW archeologists and one volunteer diver aboard the R/V *Dawn Treader*, and two volunteer divers aboard a private boat, relocated the wreck of the *Pretoria* and began documentation. After an initial reconnaissance dive to confirm the presence of the wreck, a dive team laid out a baseline along the keelson on the main section of the wreck. On subsequent dives, one archeologist and three volunteer divers took off-set measurements from the baseline to determine the shape of the wreck. The other archeologists took diagnostic measurements, still photographs, and recorded portions of the site on underwater video. On August 9, two volunteer divers returned to the site and recorded further offset measurements. On August 13, the SHSW archeologists returned to the *Pretoria* site and recovered the baseline and marker buoy.

The 1991 experience on the *Pretoria* confirmed the lessons of the previous year. The distance to, and exposed condition of the *Pretoria* site make working conditions difficult. The depth of the water and the massive size of the site further complicate conditions. Despite these obstacles good progress was made toward documenting the site.

Mackinaw Boat Site

The biggest surprise of the field season was the wreck of a small Mackinaw vessel found near shore of one of the Apostle Islands. Discovered by local divers in 1990, the location of the site was revealed to the SHSW underwater archeologists under the condition that its location not be publicly disclosed.

On August 5, 1991, SHSW archeologists and one of the small vessel's discoverers relocated the site for documentation. The site lay in 25 feet of water approximately two hundred yards

Figure 13. Mackinaw boat; foremast and pinrail

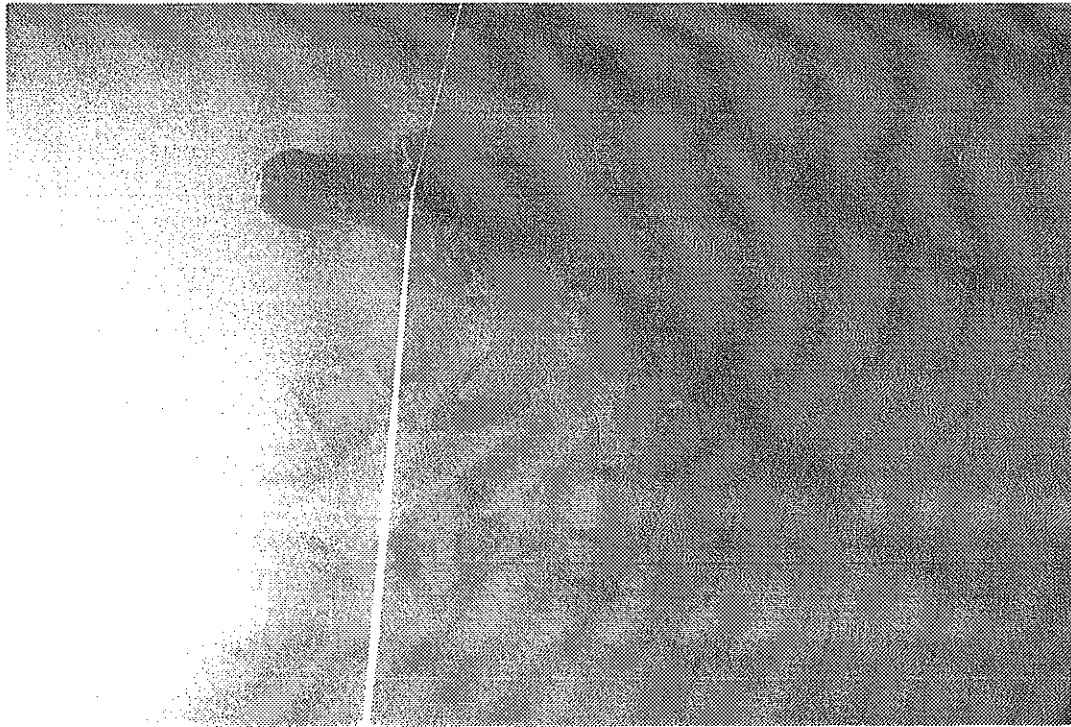


Figure 14. Mackinaw boat; bow and iron bowsprit ring.

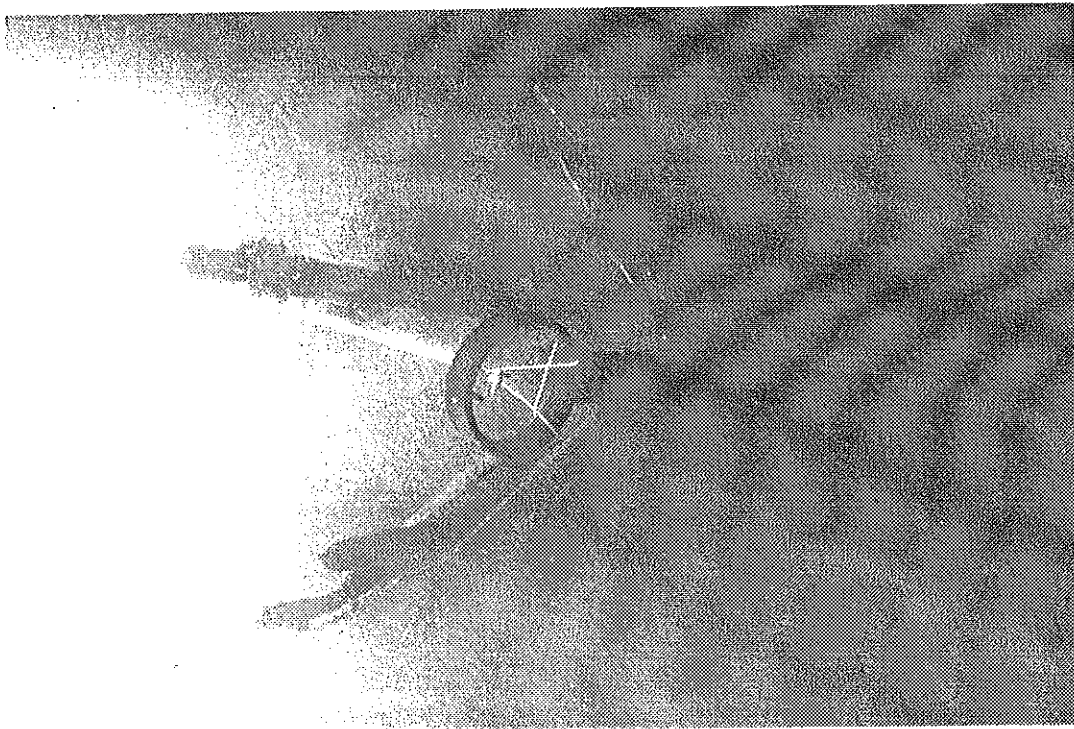




Figure 15. Mackinaw boat; pinrail and collapsed foredeck.

offshore. The bottom around the site was sandy, with some vegetation and mud. The site consisted of a small wooden centerboard sailing vessel and a log dock crib. This site had not been noticeably disturbed by divers.

The lightly constructed single-framed boat was approximately 26.5 feet long with a 10-foot beam. The foredeck, stem, and stern timbers were largely intact. The centerboard and centerboard trunk were completely intact, and the sides of the vessel were partially intact. There was evidence of a large single foremast, but the vessel may have been two-masted. The foredeck was enclosed by a wood coaming. The extent to which the coaming originally extended aft has not been determined. Also evident in the foredeck was an iron fitting for the bowsprit, the pinrail, the mast partners, and the king post. There were many artifacts visible on site including large blocks, turnbuckles, and a small wooden keg. The vessel was partially buried by silty sediments. It seems likely that more artifacts remain buried.

The mackinaw boat was mapped by taking offset measurements perpendicular to a baseline running down the center of the vessel. Diagnostic measurements were taken of planking, timbers, fittings, and associated artifacts. Because of the unique nature of the site, special care was taken in recording the site with still photography and underwater video. The associated dock crib was also documented, but more work remains.

The mackinaw boat site is very unique and fragile. Utmost care had to be taken even during preliminary documentation not to seriously damage the vessel. Sport diving, even on a restricted level, would destroy the site. An excavation, while potentially fruitful, would have to be cautiously handled by experienced underwater archeologists operating in accordance with a minimally intrusive research design.

As a rare example of an intact mackinaw boat, the site is certainly eligible for the National Register of Historic Places, for the architectural and archeological data it has to offer. Additional documentation may be required; however, a nomination will be prepared for this site as soon as it is practicable.

Survey of the Barge *Finn McCool*

A site of secondary archeological importance, the *Finn McCool* was surveyed by SHSW archeologists because of its recreational popularity and its sheltered location near Bayfield. The barge was surveyed on days when wind or poor visibility made other work impossible.

The *Finn McCool* was built in Ashland in 1926. Measuring 135 feet in length, 34 feet beam, 7.7 foot depth of hold and 343 gross tons, the barge was commonly used for hauling logs and lumber around the Chequamegon Bay area. The vessel was abandoned near Bayfield in 1964 after its pumps failed at the Bayfield dock (Keller 1984:146).

Visible from Bayfield, the *Finn McCool* is a popular spot for snorkelers and SCUBA divers. Old at the time of her abandonment, the steam driven machinery was obsolete and never salvaged.

Huge winches, cables, blocks, and a large boom remain making it an interesting dive (Engman 1984:39).

On July 25 and 26, 1991 three SHSW archeologists surveyed the *Finn McCool*. Visual reconnaissance revealed that ice and time have severely damaged the remains of the barge. The sides of the barge have collapsed outward in many places, and those places still intact threaten to fall at any time. The stern section of the barge is laying in 15 to 18 feet of water and is in the best shape. While there is no sign of the deck house, the lifting machinery is present and generally in place. The forward end the *McCool* runs almost into shore and is partially out of the water. This end has suffered extensive ice damage with the bow collapsed flat upon the bottom of the lake. The 15-inch by 18-inch by 76-foot 6-inch long timber boom extends out of the water and lies across an iron deck beam. The boom has almost worn through from chafing and wave action and will very likely soon break in two.

The barge is essentially a large box of composite construction. The sides, deck, and vertical beams are wood but fastened together with large iron rods and turnbuckles. The longitudinal integrity of the barge depended upon steel I-beams which ran fore and aft along the bottom of the barge and below its deck. In between these beams were heavy wood timbers arranged in a series of contiguous mutually supporting crossttimbers.

The *McCool* was divided into two sections for mapping. A plan of the stern was derived by laying baselines and making measured sketches. The shape of the forward section of the wreck and the placement of its structural timbers were recorded by running a baseline down the largely intact starboard side. The two baselines were then tied together. Vertical measurements were taken and cross sectional drawings were made of the barge. Diagnostic measurements were taken of important architectural features and fastenings. The entire recording process was complimented by still photography and underwater video.

While more work could be done to document the steam-driven machinery on the *Finn McCool*, its relatively recent manufacture make it a low archeological priority. If any further underwater archeological work is to be done on the site, it should be done with extreme caution. Despite shallow water and proximity to the harbor, the *Finn McCool* is potentially very dangerous. There are many areas where the barge can be penetrated and still more where divers could become trapped. There is also a definite danger of further hull collapse.

Due to its relatively recent construction and usage, the *Finn McCool* is not a priority for National Register listing, though it is older than the required fifty years in age. However, its significance may become more apparent following detailed study of Lake Superior logging barges and an assessment of surviving marine logging equipment from this later period of Chequamegon Bay timber harvesting. The site is currently listed in the Wisconsin Shipwreck Site Inventory maintained by the State Historical Society of Wisconsin.

Survey of the Steamer *Fedora*

The steamer *Fedora* was built in West Bay City, Michigan, by the renowned ship building company of F. W. Wheeler. It had a length of 282.2 feet, 41.5 feet in width, and 20.1 feet in depth of hold, with a gross tonnage of 1,848.81 and a net of 1,476.93 (Bureau of Navigation 1889). She burned on the night of September 20, 1901 between Basswood Island and Red Cliff Bay, when a kerosene lamp exploded in the engine room. She was run ashore near Chicago Creek, north of Red Cliff Bay, where she burned to the waterline (Holden 1985:37).

Though the *Fedora* had been partially mapped during the 1990 joint SHSW-ECU survey, archeologists, assisted by a ranger aboard NPS *Raven*, briefly returned to the site on July 30, 1991. Diagnostic architectural measurements of longitudinals, framing pattern, fastenings, and iron reinforcement were taken, site environmental conditions were observed and recorded, and artifacts, including loose engineering materials and ceramic fragments, were documented. The site orientation was also recorded, and photographs were taken of the site location.

A more detailed discussion of the *Fedora* survey and its National Register potential may be found in the SHSW's 1990-1991 Apostle Islands underwater archeological survey report (Cooper, et. al. 1991:83-92).

Site Monitoring Dives

Schooner-Barge *Noquebay*

The *Noquebay* was built in Trenton, Michigan in 1872. The vessel was 205 feet in length, 34 foot beam, 12 foot depth of hold and measured 684.39 gross and 652.05 net tons. In 1905 the vessel burned at Stockton Island (Holden 1985:71). In 1990 archeologists from the SHSW and East Carolina University inspected the site to follow up on work done in 1984 by NPS underwater archeologists. Changes in the sight were noted, artifacts were inventoried, and some drawing was done. On July 23, 1991, SHSW archeologists returned to the *Noquebay* to monitor site changes during the past year and correct an error detected in the earlier site plan.

The 1991 monitoring dive revealed that the site was sanding in again after the storms of 1989-1990 which had scoured out the wreck. Significant portions of the wreck exposed in 1990 were no longer visible in 1991. An iron stove door was found sitting on a starboard floor timber in the stern, where it may have been deposited by divers. Significant features of the wreck including the wheel and rudder were checked, and a series of miscellaneous still photographs were taken and drawings made.

A more detailed discussion of the *Noquebay* survey may be found in the National Park Service underwater archeological survey report (Carrell 1985). The *Noquebay* was nominated to the National Register of Historic Places in 1992.

Steamer *R.G. Stewart*

The *R.G. Stewart* was built at Buffalo, New York in 1878. A 197-gross and 169-net ton wooden steam passenger and package vessel, the STEWART was 100 feet long, had a 23-foot beam, and a 8.2-foot depth of hold. On a foggy night June 3, 1899, the *R.G. Stewart* went aground at Michigan Island. In an attempt to back the vessel off, a fire started in the engine room which eventually destroyed the vessel. One person drowned attempting to swim ashore (Cooper et. al. 1991:59-63; Holden 1985:99-100).

In 1990 SHSW archeologists and staff and students from East Carolina University conducted a four and one-half day survey and mapping of the *R.G. Stewart* site, which had been rediscovered by NPS volunteers. The site, though containing practically no visible structural remains, consists of many artifacts including tools and brass engine fittings and as well as general debris. Most of the site, it is believed, lies buried under material deposited from the eroding bluffs of Michigan Island. The 1990 survey carefully mapped the debris field and the visible artifacts. Because of the tempting nature of the artifacts, the NPS has not opened the site to sport diving (Cooper et. al. 1991:63-81).

On August 13, 1991, SHSW archeologists and a member of the Apostle Islands NPS dive team returned to the *Stewart* site to document changes to the site that had occurred during the previous year. Additional video was taken. Due to the summer's heavy rains, visibility was poor, and it was difficult to view the entire site. However, other than a minor amount of additional overburden (probably bluffline colluvium) the site appears to be unmolested and in similar condition to that observed in 1990.

A more detailed discussion of the *Stewart* survey may be found in the SHSW's 1990-1991 Apostle Islands underwater archeological survey report (Cooper, et. al. 1991:59-81). Drawing on this data, the *R.G. Stewart* was listed in the National Register of Historic Places in 1991.

National Park Service Cultural Resources Management Training Exercise

As a part of the continuing cooperative effort with the National Parks Service in improving underwater cultural resource management on the Great Lakes, four SHSW archeologists assisted NPS officials with a cultural resource management training exercise. A slide lecture by the Wisconsin state underwater archeologist was followed by a field trip to the *Noquebay* site. Approximately twenty-five NPS trainees from around the country were guided around the wreck by SHSW archeologists. Prominent architectural and archeological features were pointed out to highlight earlier classroom discussions on underwater archeology.

Conclusions

The 1991 submerged cultural resources survey was an extraordinarily ambitious undertaking, covering, in total, twenty-five shipwrecks and other site types. The nearly three months of continuous open-lake diving, combined with a summer of unusually dirty weather, made for a fatiguing and challenging undertaking, both for personnel and equipment. Nonetheless, the twenty-six sites that were newly surveyed or revisited for further work constitute a significant addition to the small but growing body of data on Wisconsin's submerged cultural resources. Six of these sites have been listed or nominated to the National Register of Historic Places, the remainder are to be added to the State Archeological Sites Inventory, and further research and National Register listings are pending.

In April, 1992, Governor Tommy Thompson signed into law Senate Bill 483, which included new provisions protecting historic shipwrecks and state underwater archeological resources. It also provided the framework for a system of state marine preserves, modeled on the Michigan program. The resource data accumulated through joint SHSW-Sea Grant research will be the backbone for decision-making about preserve candidate areas and management guidelines. Unfortunately, due to state fiscal constraints, the funding for the marine preserves program was vetoed from the state budget. The SHSW and Wisconsin Department of Natural Resources hope that the funding will be reinstated in the following budget cycle to allow the program to proceed. In the meantime, both agencies will be examining what can be done to implement portions of the new program in the absence of funding.

Despite the 1992 state fiscal setback, the passage and signing of this new legislation indicates a promising level of interest in the state's submerged cultural resources, and in developing appropriate measures for their management and preservation. With a solid foundation of research provided by the various agencies and institutions, the future of submerged cultural resources preservation in Wisconsin appears bright.

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STATE UNDERWATER ARCHEOLOGY PROGRAM
DIVISION OF HISTORIC PRESERVATION
STATE HISTORICAL SOCIETY OF WISCONSIN
816 STATE ST.
MADISON, WI 53706