

**Wisconsin Coal Haulers:
Underwater Archaeological Investigations
from the 2012 Field Season**



**State Archaeology and Maritime Preservation Technical
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**W I S C O N S I N
H I S T O R I C A L
S O C I E T Y**

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The *America*, *EMBA*, and *Australasia* sites are listed on the State Register of Historic Places and pending listing on the National Register of Historic Places.

Cover photo: Our World Underwater Rolex Scholar Matthew Carter explores the *Australasia* wreck site off Whitefish Dunes State Park in Door County.

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Much gratitude goes to Carolyn Rock of Whitefish Dunes State Park, who arranged the highly successful “Ask Diver Paul” events, in which park visitors could ask questions of project staff while they were on site conducting archaeological research. Additionally, visitors were able to view the project location and dive boats from the nearby beach. Carolyn also coordinated a public “Meet and Greet” at the park where the general public could ask questions and our research could be shared in an informal setting. At that event, the first of five exhibit panels on the *Australasia* was unveiled. The panels will be housed within the park’s Nature Center, and Carolyn has been instrumental in their design, production, and installation.

Paul Bentley deserves special recognition for tirelessly answering questions during the daily “Ask Diver Paul” events. Stationed aboard the survey vessel with a VHF marine radio, Paul answered the daily questions with humor, wit, and color. Paul has been one of the maritime program’s most dedicated volunteers and has helped survey many underwater sites, as well as serving as the boat captain, for numerous projects. Most recently, Paul has given presentations on the Society’s underwater projects around the state, representing the volunteer spirit of our program.

The *Australasia* project has allowed the unique opportunity to work once again with model maker Jim Brotz. Jim’s vast understanding of ship construction has been invaluable to the *Australasia*’s site interpretation, and he is currently constructing an interpretative ship model for the *Australasia* exhibit at Whitefish Dunes State Park. We are honored to partner with Jim and tap into his extensive knowledge of nineteenth-century ship construction as well as his superb model building talent.

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CHAPTER ONE INTRODUCTION

Archaeological surveys conducted by the Wisconsin Historical Society are a joint effort of several organizations and many individuals. The surveys conducted in this report are the result of a cooperative effort between the Wisconsin Historical Society, the University of Wisconsin Sea Grant Institute, and the Wisconsin Department of Transportation. Project funding was provided by grants from the University of Wisconsin Sea Grant Institute and the Wisconsin Department of Transportation. The surveys were organized and staffed by the Society's Maritime Preservation and Archaeology program staff and volunteers and were conducted over the 2012 field season.

The Wisconsin Historical Society is the State of Wisconsin's principle historic preservation agency and charged under state statutes (44.02 and 44.30-44.31) with the research, protection, restoration, and rehabilitation of historic properties within Wisconsin. Under Wisconsin statute 44.47, the Society is also charged with the identification, evaluation, and preservation of Wisconsin's underwater archaeological resources, including submerged prehistoric sites, historic shipwrecks, and aircraft on state-owned bottomlands. Recognizing the multiple-use value of underwater archaeological sites to scientists, historians, and recreationalists, these underwater remnants of our past are broadly termed "submerged cultural resources". Submerged cultural resource management goes beyond the scope of traditional historic preservation programs, encountering diverse multiple-use concerns such as recreation and commercial salvage.

The State of Wisconsin has additional management responsibilities for submerged cultural resources under federal law, including the National Historic Preservation Act of 1966 and the Abandoned Shipwreck Act of 1987 (Public Law 100-298). State legislation (1991 Wisconsin Act 269) and modifications to state law in adherence with federal guidelines issued under the Abandoned Shipwreck Act has provided Wisconsin with a more formalized and rational framework for underwater archaeological resource management. This legislation also authorizes the Society and the Wisconsin Department of Natural Resources to designate underwater preserves for the preservation and recreational development of underwater archaeological sites.

Created in 1988, the Society's Maritime Preservation and Archaeology program works to survey, inventory, and evaluate Wisconsin's underwater archaeological resources, develop preservation strategies, administer field management practices, and enhance public appreciation and stewardship for Wisconsin's precious and fragile maritime heritage (Cooper 1992; 1993). The program is within the Society's Division of Historic Preservation – Public History, Office of State Archaeology and Maritime Preservation. To encourage preservation and visitation of these unique resources while fostering wider public appreciation for Wisconsin's maritime cultural heritage, the Society began the Wisconsin's Maritime Trails initiative in July 2001. Winding above and below the waves, the Maritime Trails encompass five stretches of Wisconsin's coastline and inland river ways and links shipwrecks, lighthouses, historic waterfronts, historic vessels, museums, shore-side historical markers, and attractions. When viewed as a metaphorical "trail", these resources illustrate the state's diverse maritime heritage and connect them within the overall

context of Wisconsin's, as well as the greater Great Lakes region's, maritime heritage (Green and Green 2004).

The Maritime Trails initiative has become the Society's strategic plan for managing the state's diverse submerged cultural heritage while encouraging preservation and promoting public awareness and visitation. Initiatives aimed at identifying, managing, and interpreting Wisconsin's coastal cultural resources must consider these resources at both a local and regional level. The sheer length (approximately 860 miles), as well as the geographical, social, and cultural diversity of Wisconsin's Great Lakes coastline makes this essential. The Maritime Trails initiative encourages both divers and non-divers to consider each unique maritime property within the broader context of Wisconsin's maritime history. Through websites, interpretive materials, and public presentations, the Maritime Trails initiative integrates archaeological research and public education to encourage visitors to responsibly visit maritime cultural heritage sites. Wisconsin's Maritime Trails' major elements include:

Archaeological Research. The documentation of Wisconsin's submerged cultural resources, primarily historic shipwrecks, is the foundation of the Maritime Trails initiative. Beyond academic and resource management applications, archaeological research results form the basis of interpretation and outreach projects.

Shipwreck Moorings. With volunteer assistance, the Society maintains permanent moorings on 28 historic shipwrecks statewide. These moorings facilitate recreational access, provide a means of interpreting the wreck sites to visitors, provide a safe point of ascent and descent for divers, and eliminate anchor damage from recreational boaters anchoring into the site.

Dive Guides. Designed with divers, boaters, and kayakers in mind, these rugged, waterproof guides place each vessel within its historical context and highlights unique site features that might otherwise go unnoticed. In partnership with the University of Wisconsin Sea Grant Institute, the Society has produced guides to 25 Wisconsin shipwreck sites.

Public Presentations. Given at a variety of venues throughout the state, public presentations provide a direct, personal connection between the Society and the general public. The Society's underwater archaeologists and volunteers have reached thousands of people via public presentations since the Maritime Trails' inception.

Interpretive Signage and Kiosks. As of January 2012, the Society has installed shore-side informational markers for 34 historic shipwrecks and waterfronts. Utilizing an identical template that unifies the signs as attractions and information points within the statewide Maritime Trails program, the markers emphasize the broader connection between Wisconsin's many coastal historic resources. Five interactive touch-screen kiosks that highlight Wisconsin's historic shipwrecks are installed at the Wisconsin Maritime Museum, the Kenosha Public Museum, the Door County Maritime Museum, the Society's Madeline Island Museum, and the History Museum at the Castle. The kiosks reach an estimated 368,000 museum visitors annually and

make archaeological research results available in a fun, interactive format while educating visitors on the importance of Wisconsin's coastal cultural resources.

Websites. Two websites dedicated to Wisconsin's historic shipwrecks, underwater archaeology, and maritime history ensure the general public has access to timely and useful information. The gateway to these sites is the Wisconsin's Maritime Trails website (www.maritimetrails.org), which serves as a unified "maritime resource" information point for Wisconsin's residents and visitors. Unveiled in 2003, this website features a statewide database of shore-side maritime-related resources and over 700 historic Wisconsin shipwrecks. A searchable database includes contact information, Web links, and maps for historical maritime venues, as well as location and historical data for shipwrecks. An updated version of the website debuted in the summer of 2011. Wisconsin's Great Lakes Shipwrecks (www.wisconsinshipwrecks.org) is a collaborative effort between the Society and the University of Wisconsin Sea Grant Institute that began in 1996. Making underwater archaeological research results accessible to the public, this site features detailed information on historically and recreationally significant shipwrecks in Wisconsin's Great Lakes waters. Each shipwreck profile includes information about the ship's archaeology, history, final voyage, sinking, and current condition.

Partnerships. The Maritime Trails program partners with federal, state, and local agencies, chambers of commerce, non-profit organizations, and individuals. With several core partners, dozens of volunteers, and a growing list of project-specific partners, this aspect of the initiative ensures that everyone with a stake in Wisconsin's maritime heritage shares in its management and interpretation.

Research Design and Methodology

Nineteenth-century Great Lakes wooden ship construction and operation is poorly understood. Little is known about how vessels were built and operated during the nineteenth century. As a result, much of what we know about Great Lakes merchant vessels has come from the archaeological record of vessels that now lie on the Great Lakes' bottomlands. The archaeological surveys within this report were designed to provide a better understanding of nineteenth-century Great Lakes merchant vessel construction and use.

Field survey methods included traditional baseline surveys aided by digital photo and video documentation. Archaeological documentation was conducted along guidelines established by the National Park Service for submerged cultural resource survey and evaluation in determining site eligibility for the National Register of Historic Places. Research designs were directed toward formulating site descriptions and archaeological assessments with a package of management questions, some specific to the site itself (i.e. location, environment, parameters, integrity, extant features, and artifacts), as well as more general questions that place the site within its broader historical context (i.e. historical significance, archaeological potential, recreational potential, and management requirements). Research objectives included:

1. Determine the 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. Document the site using photographs, video, and measured sketches of those architectural and archaeological elements that are diagnostic of a) vessel type, b) vessel age, c) vessel construction style and method, d) vessel propulsion, e) vessel use, f) vessel identification, 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.
4. Provide assessment of a site's environmental and cultural context for determining its historic significance and archaeological potential according to the National Register of Historic Places criteria, recreational potential, and management requirements.

Site evaluation and documentation was conducted using closed-circuit scuba technology. Documentation included digital photo mosaics, measured sketches, construction schematics, digital still and video imagery, and scaled site plans for National Register-level documentation. Analysis was conducted using comparative evidence obtained from archaeological surveys of similar sites, and augmented by historical documentation relating to individual sites and general Great Lakes maritime history. Where artifacts were encountered, material culture was interpreted in the context of its relevance to shipboard activities, shipboard hierarchy, shipboard activity/use areas, and other aspects of maritime anthropology.

This submerged cultural resource survey report serves as a source document for site description, analysis, interpretation, and management recommendations used in cultural resource management planning, recreational development, and public education. It also serves as the source document for eligibility determination and nomination for listing on the National Register of Historic Places. Inclusion of these sites on the National Register and state resources management plans is an important step in achieving long-term site preservation. Suggested plans for management include mooring buoys to facilitate recreational access (where appropriate) and alleviate damage caused by on-site boat anchoring. Other possibilities include site interpretation for visitors through self-guided site maps and Web-based pages. Site preservation ensures availability both as a future recreational resource and as an important and nonrenewable source of scientific data relating to Great Lakes underwater archaeology, maritime history, marine architecture, and maritime anthropology.

CHAPTER TWO THE CANALLER AMERICA

Three schooners named *America* operated on the Great Lakes in the 1870s. Each of these vessels received frequent mention in contemporary newspapers, making a difficult task to differentiate which vessel was which in historical accounts. The Canadian-built two-masted schooner *America* was cut down to a tow barge in the mid-1870s, most likely 1873, which left only a small overlap with the other two others schooners named *America*. The most confusion comes from the barkentine *America* (Official Number US355). Built in 1853 by the famous shipwright John Oades in Clayton, New York, she was also as a canaller of similar dimensions, tonnage and lines, but was rebuilt as a three-masted schooner in 1872. In the 1870s, she was also owned by parties from Chicago, Charnley Bros. & Co., who ran a lumber mill at Sturgeon Bay, Wisconsin. It is believed that during this time period the vessel exclusively sailed in the Lake Michigan lumber trade and never left Lake Michigan. By closely examining the lists of arrivals and clearings in news reports, it was possible to differentiate with a high degree of certainty which vessel was which in these historic documents, and only those believed to belong to the schooner *America* that is sunk off Kewaunee, Wisconsin, are included in this report (ADGNFPL 2012a; 2012b; 2012c).

The schooner *America* was launched at 3:25 PM on 31 May 1873 from the Port Huron, Michigan, shipyard of Archibald Muir & Co. on the Black River. She was issued the Official Number 105244, but that number was cancelled and a new number, 105337, was assigned. The *America* was the product of Master carpenter James Perry. The *America* had one deck, three masts, and was painted black. D. Robeson of Port Huron, renowned for his reputation for “fit and quality of his work”, made the vessel’s sails. The vessel measured 137.3 feet long with a 26-foot beam and 11.8-foot depth of hold that was capable of hauling 341.67 gross tons. Built to the dimensions of the locks of the Welland Canal, her bluff bow and square lines defined her boxy hull shape as a canaller. She was built to the same lines and similar dimensions as the schooner *Groton*, which launched from the Muir yard in 1868, and was considered a sister ship to that vessel. Muir continued this pattern for vessels launched after the *America*; the next vessel launched from the Muir yard on 7 October 1873, the *Pulaski*, was an exact counterpart as far as size and build were concerned (ADGNFPL 2012a; Bureau of Navigation 1873a; *Detroit Free Press* 1873; *Port Huron Daily Times* 1873a; 1873b).

Canallers were a unique vessel type that developed on the Great Lakes and were designed to transit the Welland Canal locks while carrying the largest possible amount of cargo. With only inches to spare between their hulls and the lock walls, canallers had bluff bows, flat bottoms, bluff sterns, short bowsprits, and highly-canted jibbooms. Some canallers were rigged with a hinged or shortened jibboom that could be folded, removed, or de-rigged for passage through the locks. The mainmast (on two-masters) and mizzenmast (on three-masters) booms were typically shortened so they would not overhang the transom. Due to their boxy shape, there were claims that canallers were notoriously poor sailors in heavy weather, a claim supported by the fact that one particularly violent storm in October 1873 sent six Oswego canallers to the bottom with all hands (Karamanski 2000; *Oswego Daily Palladium* 1873b).

The Welland Canal opened on 30 November 1829. The first vessel through the canal was the British schooner *Ann and Jane* on a two-day up-bound transit from Port Dalhousie on Lake Ontario to Port Colburne on Lake Erie. The original Welland Canal (1829-1845) limited vessels to 110 feet in length, 22 feet in beam, and 8 feet in depth. It followed many natural water routes, beginning with Twelve Mile Creek from Port Dalhousie to Merritton, where vessels locked through 40 locks over the Niagara Escarpment. The canal then followed the Welland River from Merritton to Port Robinson to avoid the Niagara Falls.

With increases in grain traffic and vessel size, the small canal locks were soon obsolete. The Canadian government purchased the Welland Canal Company and expanded the canal in 1846, reducing the number of locks to 27 and cutting a more direct route. The new locks were expanded to allow vessels of 150 feet in length, 26.5 feet in beam, and 9 feet in depth. The canal's original wooden locks became control weirs for the new canal, and reduced the physical labor of towing ships from lock to lock (Aitken 1997; Mansfield 1899a; St. Lawrence Seaway Management Corporation 2003).

The large number of immigrants that arrived on Lake Michigan's western shore during the early nineteenth century soon began moving from the lakeshore to populate the rich Midwestern prairie lands. Under the industrious settlers' hands, the fertile Midwestern soil soon began producing a large surplus of grain that made its way to Lake Michigan's port cities for transport to eastern markets via the Great Lakes. The inland lake route greatly facilitated the grain trade's growth by providing cheap and ready transportation.

The brig *John Kenzie* carried the first Lake Michigan grain shipment from Grand River, Michigan, to Buffalo, New York, in 1836. Chicago followed suit two years later, sending 39 bags of wheat to Buffalo aboard the *Great Western* in 1838. In 1839, the brig *Osceola* carried Chicago's first bulk shipment of wheat, carrying 1,678 bushels from Chicago to Black Rock (Buffalo), New York (Mansfield 1899a).

It wasn't until the 1840s, however, that the Great Lake grain trade blossomed. Chicago grain exports between 1834 and 1840 totaled 13,765 bushels (Mills 1910). The year 1841 alone, however, saw 40,000 bushels exported from Chicago. By 1847, Chicago was shipping more than two million bushels yearly. Milwaukee achieved an equal volume by 1853, and surpassed Chicago in grain exports by 1862 (Karamanski 2000). Due to a lack of adequate harbor facilities and grain elevators elsewhere on Lake Michigan, Milwaukee and Chicago were the dominant grain ports.

Freight rates for grain were subject to supply and demand, dropping during summer months and peaking during the fall harvest time. Freight rates for the 1837-1838 seasons were eight cents a bushel, with an additional two cents per bushel surcharge for elevator service. During the 1850s, rates from Chicago to Buffalo remained steady between 10 and 15 cents per bushel, with steamers earning a fraction of cent more than schooners. During the 1860s, rates dropped to between 4 and 7 cents per bushel. From 1874 onward, rates were on a constant decline, reaching 1.53 cents per bushel by 1898 (Cooper 1988; Mansfield 1899a; Mills 1910).

The grain trade consisted of mostly wheat until 1848, when corn began shipping in increasing quantities. Oats, barley, and rye were also shipped in small quantities (Cooper 1988). Buffalo and Oswego were early rivals for Midwestern grain, with Buffalo capturing a larger share of the trade during the early years. Oswego's disadvantage was that to reach Oswego from Lake Michigan, vessels were required to transit the Welland Canal and were charged a toll of six dollars per thousand bushels, a toll not required to reach Buffalo. By the 1870s, however, canal tolls from Buffalo to Syracuse equaled or exceeded the Welland Canal tolls, and with a shorter route from Oswego to eastern sea ports, Oswego's grain traffic swelled (*Oswego Daily Palladium* 1897). Vessels returning to Lake Michigan were often loaded with coal from ports on Lakes Erie and Ontario, used for heating Midwestern cities and powering steam-powered factories. Coal tonnage grew with transportation improvements between the mines to eastern lake shipping ports (Mansfield 1899a).

Grain schooners made the Oswego-Chicago round trip in thirty to thirty-five days, and six to seven trips were completed seasonally (*Oswego Daily Palladium* 1897). The heyday of the canallers and the grain trade was short lived. By the late 1870s, the railroad was gaining ever-larger shares of Midwestern grain, and in 1880 rail tonnage finally exceeded lake tonnage (Mansfield 1899a).

The *America* was initially enrolled at Port Huron, Michigan, on 11 June 1873 and Chicago, Illinois, was listed her homeport. One-third of the ship was owned by her builder Archibald Muir, one-third was owned by David Muir of Chicago, and one-third was owned by Thomas Hood of Chicago (ADGNFPL 2012a; Bureau of Navigation 1873a; *Detroit Free Press* 1873; *Port Huron Daily Times* 1873a). Captain William Bronley was named her Master at the vessel's launch, but by the time of her first trip, Captain James Cornell was at her helm. The *America's* maiden voyage departed Port Huron on 18 June 1873 carrying lumber through the Welland Canal on 21 June to Clayton, New York (*Daily News* 1873a; *Detroit Free Press* 1873). A trip to Milwaukee was made in July to pick up 18,000 bushels of wheat which was discharged at the Montreal Transportation Company wharf in Kingston, Ontario, on 2 August. A trip to Chicago followed in late August to load wheat destined for Oswego, New York (*Daily News* 1873b; 1873c). On 1 October 1873, her enrollment was surrendered indicating that the *America*, despite having made several trips that season, had simply been a new vessel in transit and had now arrived at her new homeport. Thomas Hood became the vessel's managing owner and Captain James Cornell remained in command (ADGNFPL 2012a; Bureau of Navigation 1873a; 1873b).

Captain A.P. Christensen took command of the *America* on 22 April 1874 (Bureau of Navigation 1873b). The 1874 season got off to an uneventful start, but by season's end her luck would not hold out. On 20 October with 23,000 bushels of wheat onboard, the *America* went ashore on the south side of Long Point in Lake Erie. She had loaded wheat at Chicago for Bruce & Chambers of Buffalo and was en route when the accident occurred. On 21 October, the tug *Orient* was dispatched from Port Rowan, Ontario, with steam pumps and a hawser aboard to assist in her release. By the time the tug arrived on the scene four feet of water was in the *America's* hold, and it took nearly two days of work to release her. Only 8,000 bushels of wheat was saved and lightered onto the schooner *Emeu*. The *America* was then taken in tow of the tugs *Orient* and *Bryant* and brought to Buffalo where she was thoroughly gone over. The damage to her hull was

estimated at \$5,000 and the loss of her cargo cost the owners \$31,000 (*Buffalo Commercial Advertiser* 1874a; 1874b; 1874c; *Chicago Inter-Ocean* 1874).

On 21 May 1875, a new enrollment was issued for a change in ownership. Thomas Hood and David Muir of Chicago each retained their shares in the vessel, but Archibald Muir sold this portion to Colin McLachlan of Port Huron, Michigan, who owned 3/24, and David Robson, also of Port Huron, owned 5/24 of the vessel (ADGNFPL 2012a; Bureau of Navigation 1873b; 1874). Only two accounts of the *America's* travels have been located for 1875. On 15 October, the *America* arrived at the St. Lawrence & Chicago Forwarding Co. dock in Kinston, Ontario, Canada, with 18,000 bushels of wheat from Milwaukee (*Daily News* 1875a). The schooner then passed through the Welland Canal on 26 October upbound with coal from Charlotte (Port of Rochester), New York, on her way to Racine, Wisconsin (*Daily News* 1875b). No record of the *America's* service history has been found in newsprint for the 1876 season.

The 1877 season proved difficult for the schooner *America*. Around midnight on 23 June the Northern Transportation Company's steamer *City of New York* collided with the *America* in a dense fog seven miles west of Whitefish Point on Lake Superior. Both captains claimed the collision was the fault of the other. The *America* was struck on her starboard quarter, crushing her side. The schooner was bound for Kingston, Ontario, with a cargo of square timber from Munising, Michigan. It was theorized that the lumber cargo aboard was all that kept the *America* afloat as Captain Warren sailed his waterlogged schooner to Sault Ste. Marie. The *City of New York*, carrying railroad iron and general merchandise intended for Duluth, was so badly damaged that to save his vessel Captain Leonard ran the ship up on the beach seven miles west of the point, 600 feet from shore. The northwest wind carried the steamer further onto the beach and a tug was sent the next day from Sault Ste. Marie to lighten the vessel and pull her free. Incidentally, the fog was so dense that a few hours after the *America / City of New York* collision the schooner *William B. Ogden*, loaded with iron ore from Marquette to Cleveland, ran ashore just three miles west of the *City of New York* (*Detroit Tribune* 1877). Later that season, on 19 October 1877, the *America* struck the scow schooner *St. Joseph* near Beach Island in Lake St. Clair. The damage to the scow was so severe that she was determined a total loss and abandoned (*Cleveland Herald* 1877).

The *America* was one of the first vessels out on the lakes in the spring of 1878. She arrived at Port Colborne, Ontario, at the head of the Welland Canal on Lake Erie, on 7 May 1878 and arrived at the port of Oswego, New York, with corn from Chicago on 15 May 1878. The *America* was the first ship to arrive at Oswego that season, and she returned to Chicago light after passing through the canal on 21 May (*Daily News* 1878a; 1878b; 1878c). The only other mention of the *America* in newsprint during the 1878 season was a notification of arrival at the Holcomb & Stewart wharf in Kingston, Ontario, on 10 August with 15,000 bushels of corn from Chicago (*Daily News* 1878d).

Several arrivals and passages were noted for the 1879 season. On 3 June 1879, the *America* arrived at the Kingston & Montreal Forwarding Co. wharf in Kingston, Ontario, with 14,000 bushels of wheat from Chicago. The corn was not unloaded and she departed the same day for Montreal (*British Whig* 1879). In early June there was fair wind and good weather that allowed the *America* to make a rapid trip back to Chicago to take on another cargo of corn. On 11 June

she passed downbound at Port Colborne, Ontario, through the Welland Canal on her way to Kingston. It took one day to pass through the canal, and she cleared Port Dalhousie, Ontario, on 12 June (*Daily News* 1879a; 1879b). After discharging her cargo at Kingston, she took on coal at Charlotte (Port of Rochester), New York, and passed through the canal again on 25 June bound for Michigan City, Indiana (*Daily News* 1879c).

On the evening of 28 September 1880 the tugs *A.W. Lawrence* and *M.A. Gagnon*, with two loaded stone scows in tow, were en route from Two Rivers, Wisconsin, to Ahnapee (Algoma), Wisconsin. The scows belonged to George O. Spear of Sturgeon Bay and were carrying stone to build the government pier at Ahnapee. The *M.A. Gagnon* was in the lead with a line running to the *A.W. Lawrence*; the scows were towed approximately two hundred feet behind the *A.W. Lawrence* and did not have navigation lights. The *America* was running light from Chicago to Escanaba where she was to load iron ore bound for Michigan City. She was under the command of Captain Fred Gunderson. The *America's* Mate was on watch when the tugs were sighted around 11:00 PM. The tugs' navigational lights were seen, as well as sparks emanating from the smokestacks, and the Mate concluded that they were fishing because no towing lights were displayed (*Door County Advocate* 1880a; 1880b; Hall 1880; Hirthe and Hirthe 1986; *Manitowoc Pilot* 1880).

The Captain of the *A.W. Lawrence* saw the *America* approaching and sounded two sharp whistles to keep the vessel away, but the warning was not heard by the *America's* crew. The *A.W. Lawrence* altered her course to pass to leeward of the *America*, but the altered course brought the scows directly into the *America's* path. A lookout on the *America's* jibboom called out that there was an object dead ahead, and just before midnight the *America* struck the first scow of the tow with such force that a large hole was torn in her starboard bow. The tow line between the tugs and scows parted, and the *America* began settling in the water. The *America's* crew quickly launched the yawl and scrambled aboard, and while no lives were lost, Captain Fred Gunderson was said to have lost a great sum of money and the crew lost all of their personal effects. The *America's* crew began rowing for shore, leaving the *America* completely submerged with her head down and stern up with only the main and mizzen topmasts above the water. The *America's* crew arrived at Two Rivers Point on the morning of 29 September and a telegram was sent to Thomas Hood, the vessel's owner, in Chicago (*Door County Advocate* 1880a; 1880b; Hall 1880; Hirthe and Hirthe 1986; *Manitowoc Pilot* 1880).

A contract was made with Stephen B. Grummond of Detroit, owner of the tug *Winslow*, to drag the *America* to shallow water, send a diver down to patch the hole, and then raise her and pump her dry. Grummond would receive \$3,500 for a successful job, or nothing if he failed. The *Winslow* left Detroit on 3 October, and along with the tug *Gagnon*, arrived at the wreck of the *America* on the morning of 6 October. A diver descended 50 feet to the *America's* main crosstree where he unfurled the gaff topsail and made a tow line fast to the mainmast. The tugs pulled on the *America* for some time, but only succeeding in turning the *America's* stern toward shore before the tow line broke. The *Winslow* then departed for Manitowoc to hire lighters and find another hawser. On the morning of 7 October, however, Grummond telegraphed the Chicago insurance underwriters to inform them he had abandoned the *America* in deep water and the

Winslow departed a few days later (*Door County Advocate* 1880a; 1880b; Hall 1880; Hirthe and Hirthe 1986; *Manitowoc Pilot* 1880).

Acting on behalf of the underwriters, Captain John Prindiville Jr. visited the *America* on the afternoon of 13 October to find that the wreck had now completely settled to the bottom. Prindiville surmised that the *America*'s centerboard was down when she was struck, and that was the reason the *Winslow* and *Gagnon* were unable to move her toward shore. Captain Prindiville stated, "She is gone for good, there is no doubt of that. Any further effort to recover the vessel would be by outside parties." The underwriters were unwilling to continue the effort, and the *America* would not be raised (*Door County Advocate* 1880b; Hirthe and Hirthe 1986).

At the time of her loss, the *America* was rated at B1, valued at \$12,000, and insured for \$10,000 - \$2,500 at Lloyds of New York, \$2,500 at Manhattan, \$2,000 at St. Paul Fire & Marine Insurance Co., \$1,000 at Union of Philadelphia, and \$2,000 at Great Western of New York. An accident investigation determined the *A.W. Lawrence* was at fault in the collision, and Captain Hood, owner of the *America*, received \$6,500 from the insurance companies and \$4,500 from the *A.W. Lawrence*'s owner. Considered an obstruction to navigation, the *America*'s spars were removed in June 1881. The following year, in June 1882, one last attempt was made to raise the *America*, but was ultimately unsuccessful (*Door County Advocate* 1881a; 1881b; 1882; *Cleveland Herald* 1881; Hirthe and Hirthe 1986; *Manitowoc Pilot* 1881).

America Site Description

The *America* site lies in 120 feet of water 8 miles south southeast of the Kewaunee River outlet on Lake Michigan (Figure 1). Lying on a heading of 130 degrees, the deck has collapsed and both the port and starboard sides have broken at the turn of the bilge and fallen to starboard. Despite its broken condition, however, nearly all of the vessel's hull structure and standing rigging is extant, but scattered around the site (Figure 2).



Figure 1. Location of the *America* site.



Figure 2. Photo mosaic of the *America* site.

The centerboard trunk remains upright and both the stem and stern posts are partially upright, but both list to starboard. The stem assembly is 1.1 feet sided by 2.8 feet molded and leans 2 degrees forward of vertical and lists 26 degrees to starboard. The keelson is 1.5 feet square with no sister or rider keelsons present. The rudder, fashion timber, and deadwood remain attached to the stern post, and the entire structure rests on the starboard side of the fashion timber.

Outer hull planks vary in width between 0.5 to 0.6 feet wide, but all are 0.3 feet thick. Ceiling planks are also 0.3 feet thick, but vary in width between 0.8 to 1.0 feet. The double frames amidship are constructed from futtocks 0.4 feet sided by 0.9 feet molded, with a space of 1.4 feet between frame sets. Frame futtocks near the port quarter are 0.4 feet sided by 0.85 feet molded, with a space of 1.0 feet between frame sets. Cant frames are also doubled, constructed of futtocks 0.4 feet sided by 0.85 feet molded, with a space of 1.2 feet between frame sets. Futtock lengths are 8.5 feet throughout the vessel.

The samson post has fallen toward the starboard quarter with the collapse of the deck, but remains somewhat upright with the top of the post located 14.7 feet aft of the stem. The samson post is 17.1 feet tall, 1.5 feet square, and protruded 6.7 feet above the weather deck. An iron crosshead, 3.0 feet in length, is fastened to the front of the samson post 1.0 feet below the top of the post. The mortise for the bowsprit is 1.5 feet tall, 0.5 feet wide, and 0.8 feet deep; there is a space of 3.4 feet between the top of the samson post and the mortise.

The windlass barrel remains attached to the aft side of the samson post and is 12.8 feet in length (Figure 3). A norman pin protrudes from the windlass barrel on the starboard side, and a straight iron bolt protrudes 1.5 feet from the same location on the port side. Additionally, a chain stopper is fastened to the starboard side of the deck immediately aft of the starboard hawse pipe. A port-side chain stopper is not extant.

A large wooden bitt lies within the hull aft of the windlass on the starboard side. An iron norman pin penetrates the bitt near the top, and there is visible wear on the bitt from lines being tied to it and the norman pin. This bitt originally protruded from the weather deck aft of the windlass. The forecabin scuttle is intact, but has collapsed with the deck and now lies beneath the windlass. A quantity of anchor chain is piled on the weather deck aft and to starboard of the windlass.

The weather deck has collapsed within the hull, and most of the deck is broken up with the exception of an area between the center and aft cargo hatches. The center cargo hatch has become disarticulated from the deck section and lies inverted to starboard of the centerboard trunk (Figure 4). An iron capstan remains attached to the forward end of these beams and rests upside down within the hull, holding the deck section off the floor of the hull.

An intact deck section, from forward of the mainmast to aft the aftmost cargo hatch, lies within the hull aft of the centerboard trunk and to starboard of the keelson (Figure 5). The aft cargo hatch is 6.7 feet square on the outside of the coaming. The headledges are 1.9 feet tall by 0.3 feet wide and rise 1.3 feet above deck level. The coamings are notched on either side to produce a shoulder that extends 0.2 feet downward from the upper, inside edge of the coaming. Deck planks on this section are 0.35 feet wide by 0.2 feet thick. Deck beams are 0.9 feet sided by 0.6 feet molded, and have a space of 2.7 feet between beams. A double-acting bilge pump lies in the hull aft of the aft cargo hatch.



Figure 3. Windlass with norman pins. Base of foremast lies on floors aft of windlass.



Figure 4. The center cargo hatch lies inverted along the starboard side of the centerboard trunk.



Figure 5. Section of intact deck from between mainmast partners to aft cargo hatch.

The vessel's rail is 1.0 feet wide by 0.3 feet thick and is supported by bulwark stanchions 1.6 feet in length from the covering board to underside of rail. The bulwark stanchions are extended top timbers of the frames. Each frame futtock is 0.45 feet sided by 0.55 feet molded where they abut the top timbers. Above the covering board, the bulwark stanchions are 0.4 feet sided by 0.5 feet molded, and have a space of 1.4 feet between stanchions. The bulwark has a single plank fastened on the inside, directly underneath the rail, that is 0.8 feet tall. An identical plank is also fastened beneath the rail on the outside of the bulwark; beneath this plank are five additional planks that are 0.3 feet wide by 0.05 feet thick. At the bottom of the bulwark planks is a freeing port, 0.05 feet high that runs the length of the bulwark between the lower bulwark plank and the covering board.

The covering board is 1.3 feet wide by 0.4 feet thick. There is a space of 0.45 feet between the covering board and the deck shelf. The deck shelf is 1.4 feet wide by 0.4 feet thick, and is notched for the deck beams with each notch measuring 0.2 feet deep by 0.8 feet wide. The deck shelf is supported by hanging knees that are fastened directly below the beam notches in the shelf. The space between hanging knees varies between 2.2 and 3.0 feet, depending on the location in the hull.

The centerboard trunk begins 47.1 feet aft of the stem. The trunk is 28.0 feet long, 9.1 feet tall and 1.6 feet wide. Nine longitudinal planks cover each side of the trunk, and all are 1.0 feet in height. The center of the centerboard's kingpin is 6.3 feet aft of the trunk's forward edge and 8.4 feet from top of trunk. An unusual reinforcing timber is fastened atop the keelson on either end of the trunk (Figure 6). Forward of the trunk, this timber is fastened on the port side of the keelson;

aft of the trunk. It is fastened to the starboard side of the keelson. Each of the timbers is 6.0 feet long, 1.1 feet tall, and 0.5 feet thick with a radiused end. They are fastened to the keelson with iron bolts.



Figure 6. Reinforcing timber fastened atop the starboard side of keelson, aft of the centerboard trunk. A similar timber is fastened forward of the trunk on the port side of the keelson.

The sternpost lists 42 degrees to starboard and leans 26 degrees aft. The stern post is 1.1 feet sided, 0.8 feet molded, and 13.4 feet in length. The rudder blade is 10.3 feet tall and 3.0 feet in length at its widest point, curving forward near the bottom of the blade. The rudder is dislodged at the bottom gudgeon. The fashion timber is 23.3 feet in overall length port to starboard, and constructed from a timber that is 1.45 feet molded by 1.55 feet sided. The vertical timbers fastened to the ends of the fashion timber are 4.0 feet tall by 0.4 feet square.

The transom remains connected to the fashion timber on the starboard side, but the port side of the transom has separated from the fashion timber and has fallen away from the vessel (Figure 7). The transom is 22.4 feet in width and has a camber of 1.7 feet, measured at the transom's centerline. Four planks are extant on both the inside and outside of the transom. Individual planks on both the inside and outside are 0.7 feet wide by 0.15 feet thick. The vertical stern timbers within the transom are 3.4 feet tall. The traveler for the mizzen sheet block is 1.2 feet in length and 0.2 feet in diameter, and the double sheave block remains attached to the traveler. The transom rail is 0.6 feet wide by 0.3 feet thick. There are two iron fairleads fastened to the top of the rail on either side of the transom, 1.2 feet inboard from either quarter. Each of the fairleads is 1.8 long, 0.4 feet wide, 0.3 feet high and has a 0.2-foot opening for lines.



Figure 7. The *America*'s stern, viewed from off the port quarter.

One of the most unique features of the *America* site is the removable bowsprit that was designed to be unstepped and raised while transiting the Welland Canal locks. This feature was unique to canallers, and the *America* site is particularly significant for this feature and its bowsprit that has come unstepped and allowed otherwise hidden features to be readily visible.

The bowsprit has unstepped from the samson post and pivoted forward at the top of the stem; the head of the bowsprit now rests on the lakebed at an angle to stem (Figure 8). The bowsprit is 29.8 feet in length; its housing is square in section at 1.4 feet sided by 1.2 feet molded. The bowsprit's hounded length is 20.0 feet, and a plank is fastened to the top of the bowsprit that is 2.0 feet wide by 0.3 feet thick. Beneath the plank the bowsprit is round in section with the exception of the upper surface that is planed flat to accept the plank. The tenon on the base of the bowsprit is 0.45 feet wide, 0.55 feet tall, and 1.3 feet in length. The tenon is rounded on its upper edge to allow the bowsprit to be raised vertically while the tenon remains stepped within the samson post.

To allow quick raising of the bowsprit, a removable iron clamp held the bowsprit to the top of the stem (Figure 9). The clamp consisted of an iron bar placed over the top of the bowsprit that was secured with an iron bolt on either side of the stem. Each bolt is 2.2 feet in length, and the top of each bar is threaded to accept a square iron nut. The two nuts allowed tightening of the clamping bar to hold the bowsprit securely to the top of the stem assembly. To raise the bowsprit for canal lock passage, the bowsprit's standing rigging was disconnected, the stem clamp loosened and removed, and the head of the bowsprit was then hoisted upward until the bowsprit stood nearly vertically from the front of the samson post.



Figure 8. The *America*'s bowsprit, viewed from forward of the bow, looking aft.

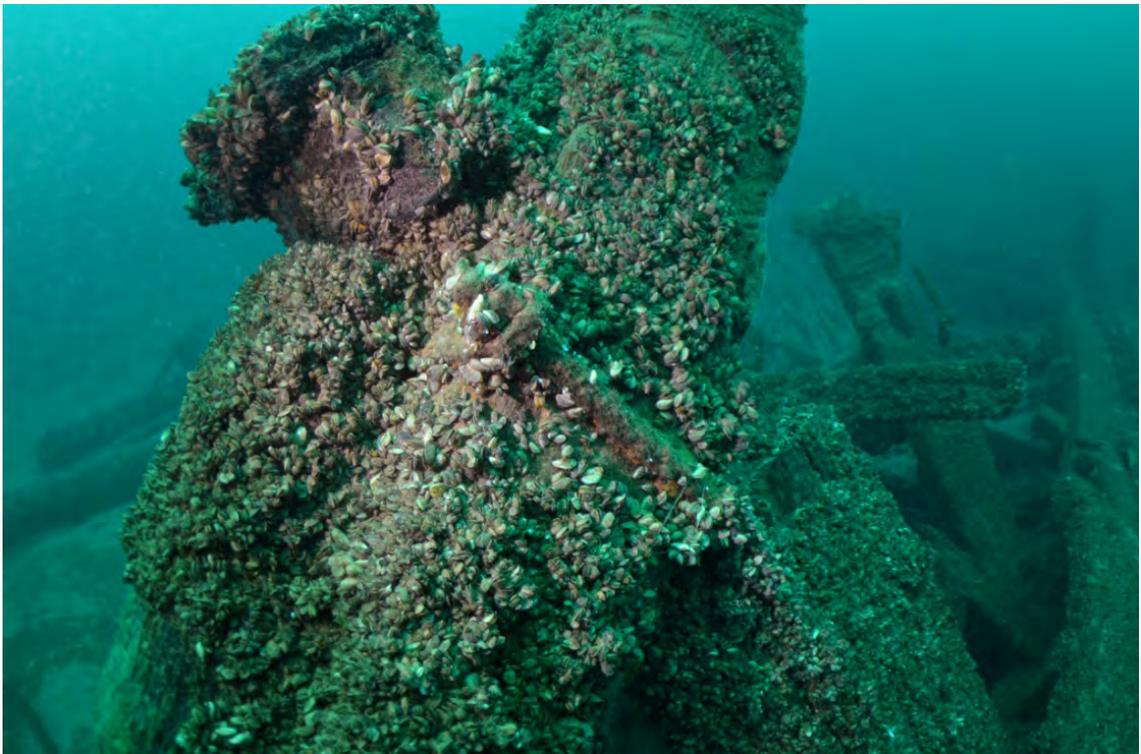


Figure 9. The bowsprit was fastened to the stem with a removable iron clamp.

Immediately forward of the stem clamp is the mounting base for the jibboom. Constructed from a wooden block 2.2 feet long and a diameter of 0.9 feet, the front of the block is mortised to accept the base of the jibboom. The jibboom, 49.5 feet in length, lies on the lakebed off the bow with its head nearest the hull and the base farthest away. The iron bowsprit cap remains attached to the jibboom.

Aft of the stem clamp, where the bowsprit passed between the stem and the rail, a timber is fastened to the top of the bowsprit that has identical dimensions to the rail and is the same width as the bowsprit, or 1.3 feet in width, 0.8 feet in length, and 0.2 feet thick. This timber is designed to make the rail continuous when the bowsprit is stepped in place, and allows the bowsprit to be easily removed when needed. This rail timber is fastened atop a wooden block fastened to the bowsprit that is 1.3 feet long by 0.5 feet tall; the purpose of this block is to provide an appropriate spacer that raises the rail timber to the appropriate height above the bowsprit.

Two bobstays remain connected to the underside of the bowsprit. The outer bobstay is fastened 4.0 from the head of the bowsprit, and the inner bobstay is fastened 8.0 feet from the head of the bowsprit. A wire rope bowsprit guy remains attached to either side of the bowsprit.

All three of the *America's* masts are extant and lie next to one another on the lake bed south of the vessel's starboard side. All three masts are broken at approximately deck level, and a topmast lies beneath the two southernmost masts. The housing of the mizzenmast remains within the hull beneath where the stern cabin formerly stood, and the housing of the mainmast lies beneath the port side hull alongside the centerboard trunk. The foremast partners and the housing of the foremast lie within the hull between the windlass and the centerboard trunk, and several wooden cleats remain attached to the foremast, which broke several feet above deck level.

The mizzenmast is the southernmost of the masts and lies parallel with the hull with its masthead facing west (Figure 10). This mast is 1.2 feet in diameter at the break, and 63.3 feet in length from the break to the masthead. The mast's top is located 53.0 feet above the break and is constructed from two swept cross trees that meet at each end to form an oval-shaped top with sharp ends. The topmast remains stepped to the mast, but is broken just above the masthead level. A number of wire shrouds remain connected to the masthead and extend toward the wreck's starboard quarter.

The mainmast lies parallel to the mizzenmast, but closer to the hull with its masthead toward the east. The mainmast is 72.5 feet in length from the break to the masthead, and is 1.7 feet in diameter at the break. The mainmast has nearly straight cross trees, with only a very slight sweep aft. Several wire shrouds remain attached to the mast head, and several wooden sail hoops are intact around the mast just below the cheeks. A boom lies nearly parallel to this mast near its break that is 42.3 feet in length from the jaws to a break in the aft end of the boom.



Figure 10. View of the mizzen- and mainmasts, looking forward from off the starboard quarter. The mizzenmast is on the right.

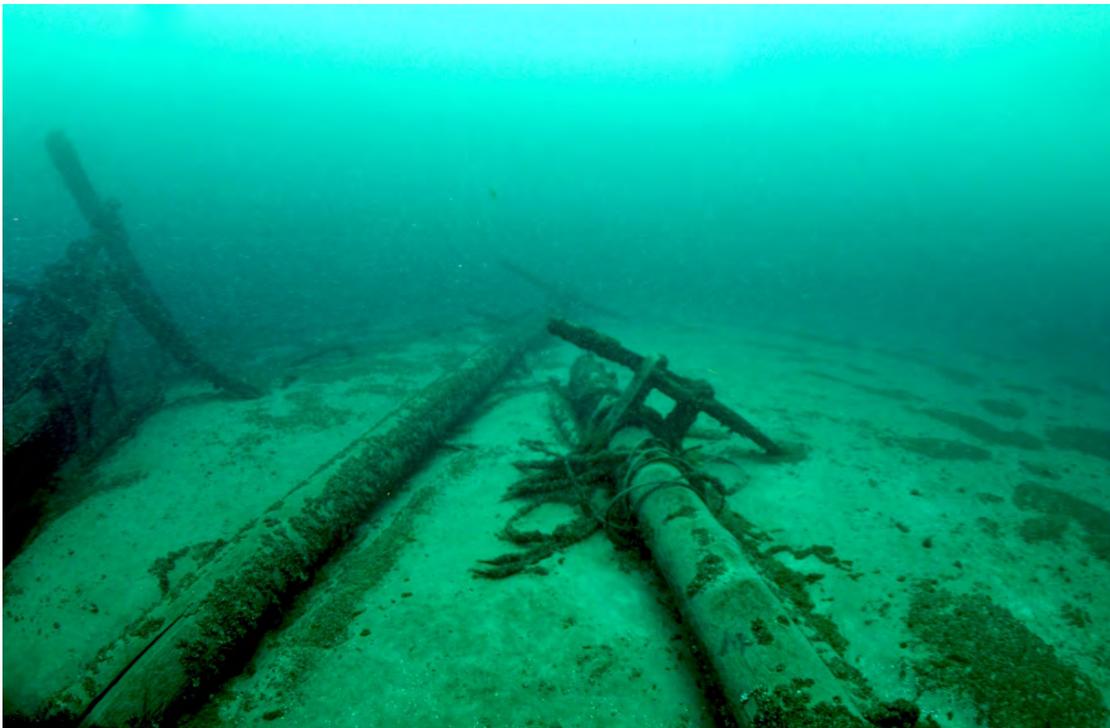


Figure 11. Fore- and mainmasts, looking forward from approximately amidship. The mainmast is on the right, and the bow is visible on the left. Wooden sail hoops are visible on the mainmast beneath the hounds.

The foremast lies between the hull and the other two masts, but somewhat eastward of the other spars (Figure 11). The foremast is 67.3 feet in length from the break to the masthead, and 2.5 feet in diameter at the break. The fore topmast remains stepped to the foremast, but has broken above the foremast's masthead and the upper portion now lies beneath the foremast. Both of the top's crosstrees remain attached to the trestle trees, and both are nearly straight with only a slight sweep aft. Several wooden sail hoops remain extant around the mast below the cheeks. A second boom is located off the port bow that is 43.9 feet in length.

The masts were supported via wire shrouds connected to chainplates that were 4.85 feet in length, 0.3 feet wide and 0.05 feet thick, and topped with deadeyes that are 0.55 feet in diameter by 0.35 feet thick. Four chainplates supported the foremast on either side. On the port side, there is a space of 2.3 feet between the first and second chainplates, followed by a space of 3.4 feet between the second and third, and 2.3 feet between the aft two chainplates. The mainmast was likewise supported by four chainplates on either side with spacing equal to the foremast chainplates. Mizzenmast chainplates could not be located due to the broken nature of the hull in the stern area.

CHAPTER THREE

THE SELF-UNLOADING BARGE *EMBA*

The self-unloading barge *EMBA* began her Great Lakes career as the three-masted schooner barge *A.C. Tuxbury* (Figure 12). The *A.C. Tuxbury* was launched on 18 March 1890 from F.W. Wheeler & Co.'s West Bay City, Michigan, shipyard. She was the 62nd vessel launched from the Wheeler yard, and the second vessel launched in 1890. The *A.C. Tuxbury* was the product of Master shipbuilder George F. Williams. She was 181 feet long, 35 feet in beam, and 13 feet in depth of hold with a capacity of 645.54 net tons of bulk cargo. Designed as a tow barge, she was rigged as a schooner with three masts, one deck, a plain head and square stern. Although she carried masts and sails, her sails would only be raised to stabilize the boat in a heavy sea or as propulsion in emergencies situations only. Under normal conditions she was towed behind a steamer, either singularly, or most often in consort with another schooner barge, the *C.E. Redfern*. The *C.E. Redfern* was a sister ship to the *A.C. Tuxbury*. She was of equal tonnage and was launched from the F.W. Wheeler yard ten days after the *A.C. Tuxbury* on 28 March 1890. Shortly thereafter, the 747-ton wooden steamer *W.H. Sawyer* came down the ways. The *W.H. Sawyer* would be the primary tow vessel for the *A.C. Tuxbury* and the *C.E. Redfern* for the next thirty-three years (Figure 13) (Bureau of Navigation 1890; Mansfield 1899b; *Port Huron Daily Times* 1890a; 1890b).



Figure 12. The *A.C. Tuxbury* loaded with wood. Image taken after her 1905 conversion from three masts to two. University of Michigan Library.



Figure 13. From left to right, the *W.H. Sawyer*, *C.E. Redfern*, and *A.C. Tuxbury*.
University of Michigan Library.

The *A.C. Tuxbury* was built for parties involved with the W.H. Sawyer Lumber Company of Wheatfield, New York. Alfred C. Tuxbury, the vessel's namesake, lived in Tonawanda, New York, and served as the managing owner for the *W.H. Sawyer*, *A.C. Tuxbury*, and the *C.E. Redfern*. A lumber baron in his own right, Alfred C. Tuxbury was an executive on the board of the W.H. Sawyer Lumber Company and later became president of the Northern Lumber Company of North Tonawanda, New York. Alfred C. Tuxbury owned 2/24 of the *A.C. Tuxbury*; other owners included: W.H. Sawyer of Worchster, Massachusetts, who owned 18/24 - the bulk of the vessel; P.W. Wood of Worchster, Massachusetts, who owned 1/24; George A. Sawyer of Worchester, Massachusetts, who owned 1/24; and the vessel's Master, R.E. Gaiu of Port Huron, Michigan, who owned 2/24. The *A.C. Tuxbury* was enrolled on 16 April 1890 at the port of Suspension Bridge, New York, near Niagara Falls. She was assigned the official number 106706 and her homeport was listed as Tonawanda, New York (Beeson 1891; Bureau of Navigation 1890; *Buffalo Morning Express* 1905d; 1905f; Mansfield 1899b).

During their inaugural season, the *W.H. Sawyer*, *A.C. Tuxbury* and *C.E. Redfern* primarily carried westbound coal to Milwaukee and Chicago, and returned with grain bound for Buffalo. Occasionally, the trio would unload their coal and run light to Sturgeon Bay, Wisconsin, Menominee, Michigan, or Escanaba, Michigan, to load lumber consigned to Tonawanda. Each of the schooner barges could carry approximately 900,000 feet of dry lumber or 800,000 feet of

green lumber, and the loading of these vessels to capacity took about twenty-four hours and the labor of seventy men. The consort made eight round trips during the 1890 season (*Buffalo Morning Express* 1890a; 1890b; 1890c; 1890d; 1890e; 1890f; 1890g; 1890h; 1890i; 1890j; 1890k; 1890l; 1890n; 1890m; 1890o; 1890p; *Door County Advocate* 1890).

On 4 March 1891, the enrollments for all three vessels were surrendered at the Port of Boston, Massachusetts, for a change of owners and homeport. It's uncertain which owners changed, as the *A.C. Tuxbury's* new enrollment, No. 187, has not been located. What is known, however, is that W.H. Sawyer became the managing owner of all three vessels and that all other registered owners were from Worcester, Massachusetts (ADGNFPL 2005a; 2005b; 2005c; Bureau of Navigation 1890). Although the new enrollments were entered at the ocean port of Boston, the *W.H. Sawyer*, *A.C. Tuxbury*, and *C.E. Redfern* continued sailing the Great Lakes and made seven round trips during the 1891 season. During this season coal was carried to Milwaukee and Chicago on Lake Michigan, as well as Marquette, Michigan, and Ashland, Wisconsin, on Lake Superior. Corn and wheat were carried eastbound to Buffalo and Tonawanda, New York. On 19 November 1891, the *A.C. Tuxbury* experienced problems with her steering gear and was forced to put in at Tawas City, Michigan. The shipyard at Bay City was telegraphed and a new wheel was sent (*Buffalo Morning Express* 1891a; 1891b; 1891c; 1891d; 1891e; 1891f; 1891g; 1891h; 1891i; 1891j; *Oswego Daily Times* 1891a; 1891b; 1891c).

An incomplete record exists for the 1892 shipping season. The trio is reported arriving at Tonawanda, New York, and Marquette, Michigan, with trips in July and September, as well as two in October. There is no information on cargoes (*Buffalo Morning Express* 1892a; 1892b; 1892c; 1892d).

Disaster struck on the first trip of the 1893 season. The *W.H. Sawyer*, *A.C. Tuxbury*, and *C.E. Redfern* departed Toledo, Ohio, on 19 April 1893 loaded with coal bound for the upper lakes. A gale was blowing as they departed, and the trio grounded near Turtle Island soon after departing. The *W.H. Sawyer* suffered damage as waves began breaking over her, and the *C.E. Redfern's* steering gear was carried away. The *A.C. Tuxbury* suffered the most damage; however, as she quickly swamped and sank until her decks were even with the water. The *W.H. Sawyer* and *C.E. Redfern* were easily freed, and a pump was sent from Toledo on 22 April to refloat the *A.C. Tuxbury*. Once again on the surface, she was taken to Detroit for repairs (*Buffalo Morning Express* 1893a; 1893b; *Mansfield* 1899a; *New York Daily Tribune* 1893). As a result of this and other accidents and losses near Turtle Island, mariners petitioned for the establishment of a Life-Saving Station at the island. For unknown reasons, the station never came to fruition (*Buffalo Morning Express* 1895a).

All three vessels were back on their regular routes by mid-May 1893. The 1893 shipping season had arrivals at Tonawanda, Cleveland, Milwaukee, Green Bay, and Marquette. On 24 October, a northwest gale with 42 mile per hour winds blew across Lake Superior and caused the *W.H. Sawyer*, *A.C. Tuxbury*, and *C.E. Redfern* to seek shelter at Marquette. When the trio came into port, the *A.C. Tuxbury* was reported to be leaking badly (*Buffalo Morning Express* 1893c; 1893d; 1893e; 1893f; 1893g; *Oswego Daily Palladium* 1893).

For the 1894 shipping season, arrivals were reported at Tonawanda, Oswego, Ashtabula, and Milwaukee, with round trips between the upper and lower lakes in May, June, August, and November with cargoes of coal and lumber (*Buffalo Morning Express* 1894a; 1894b; 1894c; *Door County Advocate* 1894; *Oswego Daily Times* 1894).

By July 1895, the *A.C. Tuxbury's* deck needed recalcing. The repair was performed at the J.B. Bates & Co. Shipyard in Chicago upon her second arrival there that season from Cleveland (*Marine Record* 1895). For the remainder of the 1895 season, the *W.H. Sawyer*, *A.C. Tuxbury*, and *C.E. Redfern* moved cargoes of coal and iron ore between the ports of Buffalo, Chicago, Ashland, Marquette, Detroit and Milwaukee (*Buffalo Morning Express* 1895b; 1895c; 1895d; 1895e; 1895f; 1895g; 1895h; 1895i; 1895j).

Captain J.C. Angell took command of the *A.C. Tuxbury* at the beginning of the 1896 season (*Marine Review* 1896a). The three vessels called on the ports of Ashland, Marquette, Milwaukee, Buffalo, and Ashtabula, with trips reported in May, June, August and November. It is uncertain if this is a complete listing of arrivals and clearings that season (*Buffalo Morning Express* 1896a; 1896b; 1896c; 1896d; 1896e; 1896f). At the end of the season, the *A.C. Tuxbury* overwintered at Marine City, Michigan (*Marine Record* 1896).

Little is known of the 1897 shipping season. The *A.C. Tuxbury* was only mentioned twice in newsprint. One article recorded her down bound passage at Sault Ste. Marie in June, and another marked a departure from Marquette bound for Tonawanda in early September (*Buffalo Morning Express* 1897a; 1897b).

In February 1898, the W.H. Sawyer Lumber Company announced that season's appointments for Masters. There was only one change about the *A.C. Tuxbury's* trio, with Captain Wyman Powers replacing Captain Angell aboard the *C.E. Redfern* (*Marine Review* 1898). Similar to the previous year, only two mentions of the *A.C. Tuxbury* appeared in newsprint for the 1898 season. One recorded a departure from Duluth in late May, and another acknowledged an upbound passage at Sault Ste. Marie in early November (*Buffalo Morning Express* 1898a; 1898b).

For the 1899 season, the three vessels kept a regular schedule between Tonawanda and Duluth, making the round trip once a month in May, June, July, August and September (*Buffalo Morning Express* 1899a; 1899b; 1899c; 1899d; 1899e; 1899f). On 3 December 1899, the *W.H. Sawyer* experienced machinery problems while downbound and was forced to drop her consorts at Marine City. The steamer then sailed on to Tonawanda for repairs and later returned for her consorts (*Buffalo Morning Express* 1899g).

At the beginning of the 1900 season, Captain J.C. Angell returned to the *A.C. Tuxbury* and Captain Powers went back to the *C.E. Redfern* (*Marine Review* 1900; 1901). Only three early-season passages are known for the three vessels in 1900. An arrival at Cleveland was recorded on 19 April, and on 22 May the vessels cleared Marquette with the *C.E. Redfern* and *A.C. Tuxbury* bound for Lorain, Ohio, and the *W.H. Sawyer* bound for Cleveland. The third arrival was reported at Ashland on 20 June (*Buffalo Morning Express* 1900a; 1900b; 1900c).

In 1901, the trio arrived at Ashland and Duluth with coal, and both times returned to Tonawanda with lumber. Trips were reported in May, June, and October, which is likely an incomplete sailing history for that season (*Buffalo Morning Express* 1901a; 1901b; 1901c).

The 1902 season began with a mid-April trip to Lake Superior. On 21 April, the *C.E. Redfern* and *A.C. Tuxbury* both took on iron ore at Ashland while the *W.H. Sawyer* loaded lumber at Duluth; all three cargoes were bound for Tonawanda (*Buffalo Morning Express* 1902a; 1902b). On the upbound return on 8 May, the trio was forced to seek shelter at Harbor Beach, Michigan, from a strong westerly gale. Additional trips to Lake Superior were made in late May and mid-June to load iron ore bound for Toledo and Tonawanda (*Buffalo Morning Express* 1902c; 1902d; 1902e). In July, August, September and October of 1902, lumber was loaded at Menominee, and lumber and iron ore at Escanaba, all bound for Tonawanda and consigned to either the W.H. Sawyer Lumber Company or the Tonawanda Iron Company. On their upbound passage in October, the ships were again forced to seek shelter along with sixteen other vessels at Harbor Beach (*Buffalo Morning Express* 1902f; 1902g; 1902h; 1902i; 1902j; 1902k; 1902l; 1902m). The October trip was the last of the season for the *A.C. Tuxbury*, and she went into winter quarters at the W.H. Sawyer Lumber Company's dock in North Tonawanda on 8 November. The *W.H. Sawyer* and *C.E. Redfern* stayed in service for one more trip, tying up for the winter on 26 November (*Buffalo Morning Express* 1902n; 1902o; 1902p; *The Evening News* 1902a; 1902b; 1902c).

At the start of the 1903 season, Captain Peter Ward was appointed Master of the *A.C. Tuxbury* (*Oswego Daily Times* 1903). The only known voyage of the three vessels during that season was to Duluth with a return to Tonawanda loaded with lumber for their owners in May of that year (*Buffalo Morning Express* 1903; *The Evening News* 1903). Nothing is known of her sailing history for the 1904 season.

In the spring of 1905, the Edward Hines Lumber Company of Chicago chartered the W.H. Sawyer fleet for the season (*The Evening News* 1905a; 1905b). In April and May, the vessels loaded lumber for Tonawanda at Ashland and Duluth (*Buffalo Morning Express* 1905a; 1905b; 1905c; 1905e). On 31 May, Edward Hines secured an option on the fleet with the intention of purchasing the vessels at the end of the season. For the remainder of that season, the vessels carried lumber from Manistee, Michigan, to North Tonawanda. The last run of the season was to Duluth in late October (*Buffalo Morning Express* 1905f; 1905g; *Door County Advocate* 1905). Following this trip, the *W.H. Sawyer*, *A.C. Tuxbury*, and *C.E. Redfern* sailed for Chicago. On 27 October 1905, a new enrollment was issued for the *A.C. Tuxbury* at Chicago for a change in owner, Master, homeport, and rigging (Bureau of Navigation 1905). Edward Hines, President of the Edward Hines Lumber Company, registered the vessel as sole owner. Her homeport was changed to Chicago, Illinois, and C.F. Wicke became her new Master. The new enrollment also indicated that the *A.C. Tuxbury* had been cut down from three masts to two into what was commonly called a Grand Haven rig. By removing the main, or middle mast, the vessel could operate with less maintenance and cost, and allowed more room for loading and handling deck cargoes. Similar ownership and homeport changes occurred for the *W.H. Sawyer* and *C.E. Redfern* (Bureau of Navigation 1905; *Door County Advocate* 1906b). Captain Wicke only remained at the helm of the *A.C. Tuxbury* for one week. On 6 November, Captain Ward was

returned to command when the vessel reached Superior, Wisconsin, on her final trip of 1905 (Bureau of Navigation 1905).

Edward Hines' entire fleet, the steamers *W.H. Sawyer*, *Cormorant*, and *L.L. Barth*, and schooners *C.E. Redfern*, *A.C. Tuxbury*, *Helvetia*, and *Foster*, all overwintered at Tonawanda. There, they were thoroughly gone over and rebuilt as needed. Captain W.D. Hamilton was placed in charge of the *A.C. Tuxbury* throughout the rebuilding (Bureau of Navigation 1905; *Door County Advocate* 1906a). With repairs complete, Captain Peter Ward resumed command of the *A.C. Tuxbury* at Tonawanda on 16 April and prepared for the 1906 shipping season (*Buffalo Morning Express* 1906a; Bureau of Navigation 1905). The *A.C. Tuxbury* continued sailing with the *W.H. Sawyer* and *C.E. Redfern*, but their arrivals/clearances appeared in newsprint only twice during the 1906 season. An arrival at Duluth was recorded on 28 September, along with an arrival at Tonawanda on 19 October with lumber; the three quickly unloaded at Tonawanda and cleared that same day for Superior (*Buffalo Morning Express* 1906b; 1906c).

The vessels again overwintered at North Tonawanda during the winter of 1906/1907, and were amongst the first vessels to leave port on 24 April 1907. Captain Peter Ward remained at the *A.C. Tuxbury*'s helm (*Buffalo Morning Express* 1907a; Bureau of Navigation 1905). Little is known of the 1907 season. The *W.H. Sawyer*, *C.E. Redfern*, and *A.C. Tuxbury* were recorded passing upbound at Sault Ste. Marie on 1 July. On 14 September, while in tow of the *W.H. Sawyer*, the *A.C. Tuxbury* ran hard aground at the head of Tonawanda Island while attempting to enter Tonawanda. After two hours of work, she was released by tugs and towed to the Wilson Box & Lumber Company's dock for inspection. It is unknown if she was damaged or if any time was lost due to repairs (*Buffalo Morning Express* 1907b; 1907c).

The *A.C. Tuxbury* got underway for the 1908 season on 2 May with Captain Peter Ward at the helm (Bureau of Navigation 1905). For the majority of the season, the *W.H. Sawyer*, *C.E. Redfern* and *A.C. Tuxbury* were again employed in carrying lumber to North Tonawanda for both the Northern Lumber Company and the Eastern Lumber Company (*The Evening News* 1908a; 1908b; 1908c; 1908d; 1908e).

The vessels practically disappeared from the historical record in 1909, 1910, and 1911. Their only mention was the last week of November 1910 when the *A.C. Tuxbury* was brought into Duluth to stop a bad leak in her hull that was caused by ice (*Door County Advocate* 1910).

By 1912, the Edward Hines Lumber Company had grown their fleet to seven steamers (*W.H. Sawyer*, *Edward L. Hines*, *C.F. Curtis*, *Oscoda*, *L.L. Barth*, *Louis Pahlow*, and the *Nikko*), twelve schooner barges (*C.E. Redfern*, *A.C. Tuxbury*, *J.I. Case*, *Ashland*, *Helvetia*, *Selden E. Marvin*, *Annie M. Peterson*, *Alice Norris*, *Delta*, *S.J. Tilden*, *D.L. Filer*, and the *Emma C. Hutchinson*), and chartered the steamer *P.J. Ralph* with consorts *Harold* and *Connelly Bros.*, the steamer *James Fowlett* with barge *Grace Holland*, and steamer *Alaska* with barge *Melvin S. Bacon*. Most of the cargoes carried were owned directly by the Edward Hines Lumber Company, which still owned vast tracts of timber. Additionally, the company was buying lumber products from other lumber companies. The bulk of their trade in 1912 was between Lake Superior and Georgian Bay ports to points on Lake Erie (*Door County Advocate* 1912; *The Evening News* 1912b). Captain Peter Ward remained in command of the *A.C. Tuxbury* for much of the season, with Captain William

Smith replacing Captain Ward for one late season trip (Bureau of Navigation 1905). On 29 August 1912, while in the rapids of the St. Claire River, the towline parted between the *W.H. Sawyer* and her consorts *C.E. Redfern* and *A.C. Tuxbury*, leaving the barges adrift. The tug *Pallister*, which had been assisting in their navigation through the rapids, got a line to the barges and anchored them below the middle ground (*The Evening News* 1912a).

On 15 March 1913, the *A.C. Tuxbury*'s enrollment was surrendered at Chicago. A new enrollment was issued the same day indicating a new form was required because the vessel's licenses had expired. The new enrollment listed C.R. Diamond as the vessel's Master, but all other information remained the same (Bureau of Navigation 1913). The *W.H. Sawyer*, *C.E. Redfern* and *A.C. Tuxbury*, which had overwintered at Tonawanda, departed on their first trip of the season at the beginning of April. Captain Peter Ward took command of the vessel for the duration of the 1913 season. The 1913 season proved uneventful, and the *A.C. Tuxbury*'s yearly license was renewed at Chicago on 15 March 1914 (Bureau of Navigation 1913; *Door County Advocate* 1913).

Captain Charles Fournier was named Master of the *A.C. Tuxbury* for the 1914 season (*The Evening News* 1914a). On 15 May 1914, the *W.H. Sawyer*, *C.E. Redfern* and *A.C. Tuxbury* stopped at the shipyard in Sturgeon Bay on their way north from Chicago to Duluth. The *A.C. Tuxbury* waited while the *W.H. Sawyer* had a new after-spar installed and the *C.E. Redfern* received bottom caulking (*Door County Advocate* 1914a). On the return trip from Duluth, the trio was downbound of Sault Ste. Marie and passing through the cut on the western side of Neebish Island when the *C.E. Redfern* struck a crib. She hit with such force that a large hole was torn in her bow. An effort was made to keep her afloat with her pumps, but the barge filled so quickly the *W.H. Sawyer* was unable to reach her before she settled to the bottom in twenty-six feet of water. Luckily, the top of her cabins remained out of water, and the crew was not forced to abandon the boat. The lumber aboard the *C.E. Redfern* was lightered onto the *W.H. Sawyer* on 26 May, and the *A.C. Tuxbury* was left tied alongside the sunken craft.

The *W.H. Sawyer* proceeded to Detroit where Captain Michael Carnakery called Fleet Captain W.D. Hamilton at Chicago. Orders were issued to repair the hole in the *C.E. Redfern* and to proceed to raise her (*The Evening News* 1914b). The *W.H. Sawyer* quickly discharged her cargo at Tonawanda, loaded coal and returned to the upper lakes to pick up the *A.C. Tuxbury*. Having picked up the barge, the two proceeded to Green Bay to offload the coal. The *W.H. Sawyer* and *A.C. Tuxbury* then sailed to the Sturgeon Bay shipyard where the *A.C. Tuxbury* was to be temporarily placed in ordinary. The *W.H. Sawyer* deposited the *A.C. Tuxbury* alongside the wharf about 10:00 PM and was attempting to turn around when she grounded on the north end of Dunlap Reef. The fishing tugs *Sylvia* and *Coates* attempted to pull the steamer free without success. The *A.C. Tuxbury* was then brought alongside to lighten the *W.H. Sawyer*'s coal bunkers in order to lighten the steamer and aid in her removal from the reef.

The tug *Hunsader* arrived in Sturgeon Bay at 3:30 PM on 14 June and was immediately summoned to assist the *W.H. Sawyer*. Several tons lighter, the *W.H. Sawyer* was easily pulled into deep water and suffered no damage, as she had grounded on the gravelly part of the reef under slow speed. Following her inspection at the shipyard, the *W.H. Sawyer* left port that evening,

having only lost a day to the accident (*Door County Advocate* 1914b). While in ordinary at the shipyard, the *A.C. Tuxbury* received a bottom caulking and other repairs as they were found necessary. Although the *A.C. Tuxbury* remained in Sturgeon Bay for at least a month, it is uncertain exactly how long she remained there (*Door County Advocate* 1914c).

The next record of the *A.C. Tuxbury* in contemporary newsprint was in November 1914 in association with the loss of the steamer *Oscoda*, also of the Edward Hines Lumber Company fleet (*The Evening News* 1914c). On 6 November 1914, the schooner barges *A.C. Tuxbury* and *Alice B. Norris* were in tow of the steamer *Oscoda* as they departed Georgian Bay loaded with lumber for Chicago. They were forced to put in at St. Ignace, Michigan, on 7 November to seek shelter from a southwest gale. Early on the morning of 8 November, the wind had shifted to the northwest and the seas were relatively calm close to shore, so the three vessels departed St. Ignace for Chicago. The *Alice B. Norris* was leaking, so the captain of the *Oscoda* hugged the shoreline to keep the vessel from rolling and pounding in the heavy seas of the open lake. Entering Naubinway Bay, an area dotted with reefs and shoals, the Captain of the *Oscoda* had his crew take regular soundings and keep a sharp lookout to avoid grounding. By late afternoon a fog settled in, and flurries further obscured visibility.

At 3:00 PM, the *Oscoda* struck Pelkie Reef, a rock spire that rises from thirty feet of water to within four feet of the surface two miles off Epoufette Point. The *Oscoda* grounded hard, and with darkness coming on the two barges set their anchors to wait for daylight the next day. At daybreak the *A.C. Tuxbury*, the lead barge, came alongside the *Oscoda* to begin lightering the steamer's deck load. The previous night, however, the wind had again shifted to the southwest and the heavy sea made for difficult and dangerous work as waves washed over the deck and the vessels violently pounded against one another.

At 5:30 PM on 8 November, the *Oscoda* was still hard aground when she heeled over to starboard against the *A.C. Tuxbury* and lost her funnel overboard. The *Oscoda*'s crew quickly abandoned ship, and the Captain had to be picked out of the water. With both crews aboard the *A.C. Tuxbury*, she now began leaking badly due to the severe pounding, and soon a foot of water was washing over her deck. Helpless, both crews waited and huddled together in an attempted to outlast the storm.

At 3:00 AM on 10 November, a portion of the crew attempted to launch the yawl in an effort to reach shore. Shortly after the yawl was launched, however, the effort was abandoned and all crewmen were forced back onto the *A.C. Tuxbury*. At the first hint of daylight, the crew hoisted a tablecloth into the rigging in an attempt to signal assistance from the fishermen at Epoufette Point. With no assistance coming from shore and the barge settling deeper into the water, at 9:00 AM the crew fashioned a raft from the lumber cargo and bits of rope. Several of the men, doubtful the ship would survive the gale, lashed their clothing and possessions to lumber and cast it overboard, hoping to gather the items once they got ashore. Of the twenty-one crewmen aboard, six climbed aboard the makeshift raft and pushed off from the *A.C. Tuxbury* in an attempt to float through the breakers and over the reef to the *Alice B. Norris*, which lay at anchor inside the reef. Luckily, they made it. A second raft was built that carried six more of the crew to safety, and

finally the yawl was launched with the remaining crewmen. All made it safely to the *Alice B. Norris*.

On the morning of 11 November, a fisherman arrived in a gas boat to carry a portion of the crew ashore to seek shelter. When the crew made shore, they learned that the fishermen had collected their belongings and demanded \$200 in compensation for its “safe keeping”. That afternoon, the tug *Schenk* arrived from Sault Ste. Marie and took the *Alice B. Norris* back to St. Ignace. The next morning, the tug *Gifford* and the steamer *Robert Holland* arrived. The crews of the *Oscoda* and *A.C. Tuxbury* were taken aboard and the *A.C. Tuxbury* was taken in tow. The *Oscoda* was declared a total loss.

At 9:00 PM on 12 November the crews from the *Oscoda* and the *A.C. Tuxbury* arrived at Seul Croix Point, but the journey had not been without its problems. The gale had continued from the east with a driving snow, parting the towline to the *A.C. Tuxbury*. The *A.C. Tuxbury* was left adrift, but was eventually picked up the following afternoon near Barque Point by the tugs *Anabel* and *Burger* of the Coffey Line. She was unloaded at Manistique and towed to Sturgeon Bay where repairs were to be made over the winter at the shipyard of Rieboldt & Wolter (*Door County Advocate* 1914d; 1914e; *The Evening News* 1914c).

On 8 December 1914, however, the Hines Lumber Company sent the steamer *L.L. Barth* to Sturgeon Bay to bring the *A.C. Tuxbury* back to Chicago for repairs. Missing her rudder and with several four-foot-long holes at her waterline, the *A.C. Tuxbury* was placed between the *L.L. Barth* and another consort to keep her upright on the long, slow sail to Chicago (*Door County Advocate* 1914e). The trip was made in three segments, sailing from Sturgeon Bay to Kenosha, from Kenosha to Waukegan, and finally from Waukegan to Chicago. Upon their arrival on 30 December, the *A.C. Tuxbury* was inspected by divers Gunderson and Anderson, who discovered another ten-foot square hole in her bottom and significant damage to her sternpost and shoe. The divers put a temporary patch on the hull and the vessel was pumped free of water. Once clear of water, the remaining lumber was removed from her hold and she went into drydock where the total extent of her damage was revealed: her keel and deadwood were nearly torn off from the stem aft, her forefoot was gone, butts sprung, and her stern post, shoe and garboard strake were missing for about twenty feet forward of the stern post (*Door County Advocate* 1914f; 1915a).

Repairs on the *A.C. Tuxbury* were completed by early May 1915. A new enrollment was issued at Chicago on 4 May 1915, as her original paperwork was lost during the stranding (Bureau of Navigation 1913; 1915). On 6 May, the steamer *L.L. Barth*, with the barges *A.C. Tuxbury* and *S.J. Tilden* in tow, arrived at Sturgeon Bay to have the barges caulked before being recommissioned for the season (*Door County Advocate* 1915b).

The *A.C. Tuxbury*'s luck didn't hold out for the entire season. On 3 October 1915, the *W.H. Sawyer* and *A.C. Tuxbury* were battling a storm on Lake Superior for several hours while trying to make the lee of the Apostle Islands for shelter. Just short of their destination, the *A.C. Tuxbury*'s towline parted and the vessel was left adrift in the nighttime storm. The *W.H. Sawyer* searched throughout the night for the adrift schooner and nearly gave up hope, but eventually found her the next morning. During the night, the *A.C. Tuxbury* lost part of her deck load of lumber that was

consigned to the Eastern Lumber Company of Tonawanda (*Door County Advocate* 1915c; *The Evening Express* 1915a).

A little over a month later, at 7:00 AM on 6 November 1915, the *W.H. Sawyer* was downbound in a fog on the Niagara River with the *C.E. Redfern* and the *A.C. Tuxbury* in tow. The *C.E. Redfern*, laden with 720,000 feet of lumber for Smith, Fassett & Co. of Tonawanda, ran out of the channel and went hard aground on the rocky shore just off Riverside Park in Buffalo. Fearing that the *A.C. Tuxbury*, which was first in the tow, would also become unmanageable and strike bottom in the seven-mile-an-hour current, the Captain of the *W.H. Sawyer* ordered the tow line cut between the two barges and the stranded *C.E. Redfern* was left grounded. The *C.E. Redfern* remained 200 feet off shore and was reported to be out of the water at least four inches fore and aft. Two canal boats owned by Seymour Lord of Tonawanda, and a gang of longshoremen working for Joseph Jordan, were sent to lighten the vessel. Following several attempts, she was finally pulled free the following day. Although the damage was initially thought to be minor, it is unknown what happened to the *C.E. Redfern* following her release, as she did not rejoin her tow. On 20 November, the *W.H. Sawyer* arrived at Tonawanda with the *A.C. Tuxbury* and *Alice B. Norris* in tow. Upon arrival and unloading their lumber cargos, all vessels went into winter quarters (*The Evening Express* 1915b; *The Evening News* 1915).

Little is known of the *A.C. Tuxbury*'s history between 1916 and 1921. Edward Hines sold the *C.E. Redfern* to the Hamilton Transportation Company of Chicago in 1917 (ADGNFPL 2005b). In October 1919, the *A.C. Tuxbury* took on a load of 900,000 feet of lumber at Houghton, Michigan (ADGNFPL 2005a). On 26 October 1921, the *W.H. Sawyer* passed through Sturgeon Bay with the *A.C. Tuxbury* and the *Interlaken* in tow. All three vessels were southbound and loaded with lumber, but were forced to wait in the canal for favorable weather on the lake. The *Door County Advocate* (1921) fancied their passing with some nostalgia and noted that theirs was the first string of lumber barges to have passed through the bay all season.

On 1 July 1923 the *A.C. Tuxbury* was towed from Racine to Milwaukee. She had been purchased by the Milwaukee Electric Company for service carrying coal from the docks at the mouth of the Milwaukee River to the company's generating plants upriver. By November 1923, the Milwaukee Electric Company had converted the *A.C. Tuxbury* to a self-unloading barge and renamed the vessel *EMBA* (*Door County Advocate* 1923a; 1923b).

Self-unloading vessels originated on the Great Lakes, and at the time of the *A.C. Tuxbury*'s conversion this vessel type was still quite new, but rapidly gaining in popularity and technological advancement (Bodden 2011). The first Great Lakes self-unloader was the wooden barge *Hennepin*, converted from a wooden steamer to a self-unloading barge at the Milwaukee Dry Dock Company in 1902. The 208-foot *Hennepin* was retrofitted with two longitudinal hoppers that took up all the space between the forward and after bulkheads. Beneath each hopper, a belt conveyor carried cargo aft to where it was discharged into a common hopper that then discharged onto another belt conveyor that ran up through the deck. This conveyor then discharged onto a boom conveyor suspended from a four-legged derrick located amidships. The boom could then be swung over the vessel's side to deposit cargo ashore. The entire apparatus was powered by a 40-horsepower steam engine, and was capable of discharging cargo at a rate of

over 400 tons per hour, or able to discharge the vessel's entire cargo in about three hours with no labor except opening the hopper's trap doors (ADGNFPL 2005c; *Marine Review* 1902; Thompson 1991).

Early critics of self-unloaders pointed out the large amount of cargo space that was sacrificed for the installation of the self-unloading equipment, but despite a reduced cargo space the *Hennepin*'s owners were quite pleased with the vessel's operation. With no need for shore-based unloading machinery, the *Hennepin* could quickly and efficiently discharge cargo anywhere there was water deep enough to tow the vessel, which opened many new markets that previously did not exist (Thompson 1994).

Six years following the *Hennepin*'s conversion, the first purpose-built self-unloader was constructed, the 364-foot steel-hulled *Wyandotte*. Originally constructed with a series of belt conveyors like the *Hennepin*, in 1910, only two years following her launch, the *Wyandotte* had the belt conveyor that carried cargo topside replaced by a more vertical and compact bucket tower. The bucket tower could carry cargo at a much steeper angle than a belt conveyor, which took up much less room and allowed a greater cargo capacity (Lafferty and VanHeest 2009).

The earliest self-unloaders were considered specialized vessels that operated primarily in niche markets outside the mainstream of the Great Lakes bulk cargo trade. Slowly, however, the self-unloader gained in popularity until the 1920s, when their numbers began increasing significantly (Thompson 1991). The *A.C. Tuxbury*'s conversion was on the cusp of this popularity, and like many of her predecessors her conversion was designed to fill a very singular role in moving coal up the Milwaukee River. Her conversion did take advantage of the latest developments in self-unloader technology, however, in that she was fitted with a nearly upright bucket tower rather than the earlier low-angle belt conveyor to bring the cargo topside.

Little of the *A.C. Tuxbury*'s hull structure was altered in the vessel's conversion to a self-unloader. With the exception of the bucket tower and unloading boom that replaced her stern cabin and masts, the newly-converted *EMBA* remained easily recognizable as the large wooden schooner barge she was built upon. Even her cargo changed little, as the vessel had often carried coal as the *A.C. Tuxbury*, except now her travels were limited to the Milwaukee River and she was now able to self-discharge her cargo with little effort.

Because the *EMBA* would remain within the confines of the Milwaukee River, she was declared "exempt" from registration in 1924 (Milwaukee Public Library 1959). This also allowed another modification that both increased her loading efficiency as well as increased her cargo capacity – the removal of the weather deck above the cargo hold. The removal of the hatches, planks, and several deck beams allowed faster loading, as the cargo did not have to be loaded into the hold through cargo hatches and then moved forward or aft within the hold below deck. Instead, the cargo could be evenly loaded throughout the hold with no additional below deck handling. The lack of a planked deck also allowed a greater cargo capacity by allowing coal to be piled higher than deck level. As the coal was discharged onto the conveyors beneath the hoppers, the upper coal would settle through the deck beams and into the cargo hoppers. In this manner some of the vessel's cargo capacity that was lost to the unloading mechanism was regained.

The *EMBA* only remained in service on the Milwaukee River for nine years. By 1932, she had outlived her usefulness. Her unloading boom and some of her belt conveyors were removed, and she was quietly towed out onto Lake Michigan one last time where she was cut loose and scuttled northeast of the Milwaukee River (Milwaukee Public Library 1959).

***EMBA* Site Description**

The *EMBA* lies upright and mostly intact in 168 feet of water five miles east of Milwaukee's North Point on a heading of 005 degrees with a five degree port list (Figure 14). The weather deck lies at a water depth of 156 feet, and the top of the unloading tower rises to a water depth of 136 feet. The vessel was stripped and intentionally scuttled in 1932, but the hull and much of her self-unloading gear are extant with the exception of the unloading boom, which was removed prior to scuttling. The hull struck the bottom bow first, which resulted in the only damage to the hull in a broken upper stem and cant frames that caused the windlass deck to collapse and the windlass to fall into the forecastle area (Figure 15).

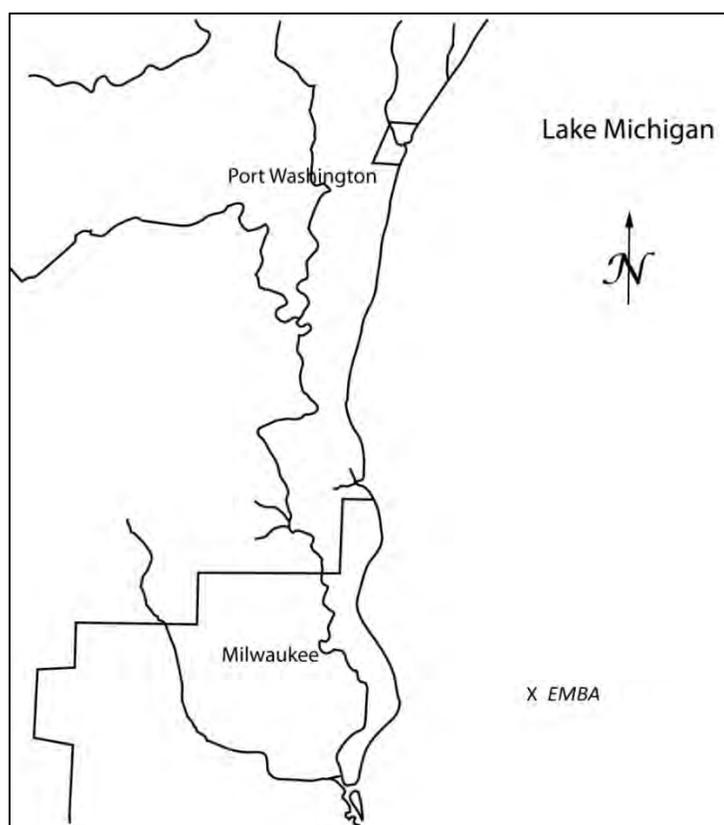


Figure 14. Location of the *EMBA* site.

The hull's overall length is 190.0 feet with a beam of 34.6 feet. Invasive mussels cover nearly all exposed hull surfaces, but enclosed areas within the hull exhibit less mussel colonization. The hull is deeply filled with silt, which rises nearly to the bottom of the cargo hoppers and obscures much of the lower cargo conveyor system.



Figure 15. Photo mosaic of the *EMBA* site. Note diver off port bow.

A number of large rocks lie within the cargo hoppers beneath the deck beams (Figure 16). These rocks are much too large to be handled by the self-unloading gear, which was designed to handle small diameter bulk cargoes such as coal, sand, or gravel. These rocks were most likely added as ballast to ensure a proper scuttling of the abandoned hull.



Figure 16. Large rocks now fill much of the cargo hoppers.

Little of the *A.C. Tuxbury*'s hull structure was altered in the vessel's conversion to a self-unloader. With the exception of the bucket tower that rises from her deck, her hull is easily recognized from the outside as one of the many large wooden schooner barges common to the Great Lakes during the latter half of the nineteenth-century. The only alteration to her hull was the removal of hull components that were unnecessary as a self-unloader whose use was limited to within the protective confines of the Milwaukee harbor break wall. This included the removal of her standing and running rigging, the aft cabin and living quarters, and components of her deck that included the cargo hatches, deck planks, and several deck beams above the cargo hold. Once these items were removed, the unloading mechanism was built within the existing hull and constructed to fit the *A. C. Tuxbury*'s dimensions.

Although removal of the weather deck made the vessel vulnerable to swamping in large waves, this vulnerability was of no concern as she was to remain within protective confines of the Milwaukee River and harbor area in her new role. Instead, the removal of the hatches, planks, and deck beams facilitated loading efficiency as well as allowed a greater cargo capacity to replace

the capacity lost in building hoppers and a conveyor system within the hold. An increased cargo capacity could be achieved by piling cargo above the deck level, which would then settle into the cargo hoppers and onto the conveyor system as the vessel was unloaded.

The bow is the only part of the hull that exhibits structural damage (Figure 17). The collision with the bottom broke the stem and cant frames at the waterline, dislodging a section of hull on either side of the bow. A large steam-powered windlass was fastened to the forecastle deck for handling ground tackle, but the forecastle deck has collapsed and the windlass has fallen into the forecabin and now lies on its end in the port side of the bow.



Figure 17. Broken bow with collapsed windlass deck.

A vertical steam pump rises from the vessel's floor within the forecabin, mounted to starboard of the keelson. A large, steel ventilation funnel lies below deck immediately aft of the collapsed windlass (Figure 18). The hawse pipes lie within the bow wreckage, but the anchors are not extant and were presumably removed prior to scuttling.

The outer hull planking is intact throughout the vessel, with the exception of either side of the bow. Outer hull planks are 0.25 feet thick. A whale strake is located at the sheer and is constructed of two planks; the upper plank is 0.4 feet in width and the lower plank is 0.75 feet in width. The outer hull was sheathed with iron or steel plates below the waterline for the length of the hull. The sheathing begins 14.0 feet from the top of the rail and continues below the turn of the bilge, where it disappears into the lake bed. The sheathing is constructed from panels 2.0 feet wide by 8.0 feet in length. Several panels are bent outward from the hull at 90 degree angles so they resemble bilge keelsons, but are actually sheathing panels that were not well fastened and bent outward as the vessel descended to the bottom, or possibly pried upward for access to the hull planks in order to breach the hull for scuttling.



Figure 18. Large ventilation funnel lies below deck aft of the windlass, visible in the background.

The main rail is intact for the vessel's perimeter and is 1.35 feet wide by 0.4 feet thick. The top of the rail is 4.1 feet above the deck, and the bulwarks are planked both inside and out. A monkey rail is fastened atop the main rail at both the bow and stern. Both the bow and stern monkey rails are 0.55 feet wide by 0.15 feet thick, and rise 0.75 feet above the main rail. At the bow, the monkey rail terminates at 26.3 feet aft of the stem (measured on the baseline), and the stern monkey rail terminates at 36.0 feet forward of the transom.

The deck beams remain intact, but several have been removed (Figure 19). The locations of the removed deck beams are not consistent, as some areas have two adjacent beams removed while in other areas every other beam has been removed. Deck beams are 0.8 feet square, and due to the removal of some beams, vary in spacing at 4.0, 5.0, and 6.5 feet between beams. Deck stanchions are 0.55 feet square, and some have a strongback fastened between the stanchion and deck beam to provide reinforcement. These strongbacks are 7.5 feet long and 0.55 feet square. Not all stanchions are reinforced with strongbacks, and some of the stanchions are fastened directly to the underside of the deck beams.

Areas of the weather deck not over the cargo hold have their deck planks intact, including the bow forward of the hold and the stern aft of the unloading tower. Individual deck planks are 0.5 feet wide by 0.2 feet thick.



Figure 19. Deck beams have been removed throughout the hull. Looking to port at approximately amidship.

The hull's port side has four sets of mooring bitts fastened to the inside of the bulwarks. All bitts are 0.8 feet square, and the double bitt sets have a space of 1.4 feet between bitts. The forwardmost is a set of double bitts whose center is located at 26.3 feet on the baseline. A single bitt is located approximately amidships, its center located at 81.2 feet on the baseline. The raised quarterdeck has a set of double bitts on either end of the deck; the center of the forward set is located at 156.5 feet on the baseline and the center of the aft set is located just forward of the transom at 183.7 feet on the baseline.

The mooring bitts on the starboard side are somewhat different. The bitts nearest the bow are a set of double bitts whose center is located at 26.5 feet on the baseline. The next is a single bitt approximately amidship, centered at 82.2 feet on the baseline. The next, on the forward end of the quarter deck, is not a mooring bitt but a single iron bollard that is fastened at 155.5 feet on the baseline. The starboard quarter bitts are likewise absent, and instead, replaced with a single wooden bitt that is not fastened to the bulwark but protrudes from the quarter deck between the steering gear and the bulwark.

The deck shelf is supported by hanging knees that are 0.4 feet square at the toe, 2.5 feet in length on the body, 2.2 feet in length on the arm, and 0.9 feet from the toe to the bosom. The hanging knees support a deck shelf that is 0.8 feet wide and 0.4 feet thick. The deck beams are fastened atop the deck shelf, with a waterway fastened atop the deck beams that is 0.08 feet wide by 0.02 feet thick.

Much of the self-unloading apparatus was left in place with the exception of the unloading boom, which was removed prior to scuttling. The self-unloading gear was designed to handle small diameter bulk cargoes that could pass through the doors at the bottom of the gravity-fed hoppers. The hoppers limited the vessel's cargo carrying capacity to the upper half of the cargo hold, but the removal of the deck planking also allowed a deck load to be carried that would pass through the deck beams as the cargo settled during unloading.

The hold was divided into two longitudinal hoppers, one on the port side and one on starboard. The hoppers ran from 32.2 feet on the baseline to the base of the unloading tower. The top of each hopper spanned the width between the side hull and the deck stanchions – 15.6 feet wide at the top of each hopper. The sides of the hopper are angled at 45 degrees and extend below the deck beams in a V-shape to a depth of 8.8 feet from the top of the deck beams (Figure 20). The sides of the hopper are constructed from vertical planks 10.0 feet in length that vary in width between 0.4 to 0.8 feet wide and are 0.15 feet thick. The hopper walls were then covered with sacrificial planking of slightly smaller dimensions that vary in width between 0.2 feet to 0.8 feet and are 0.08 feet thick. The sacrificial planks were also fastened vertically.

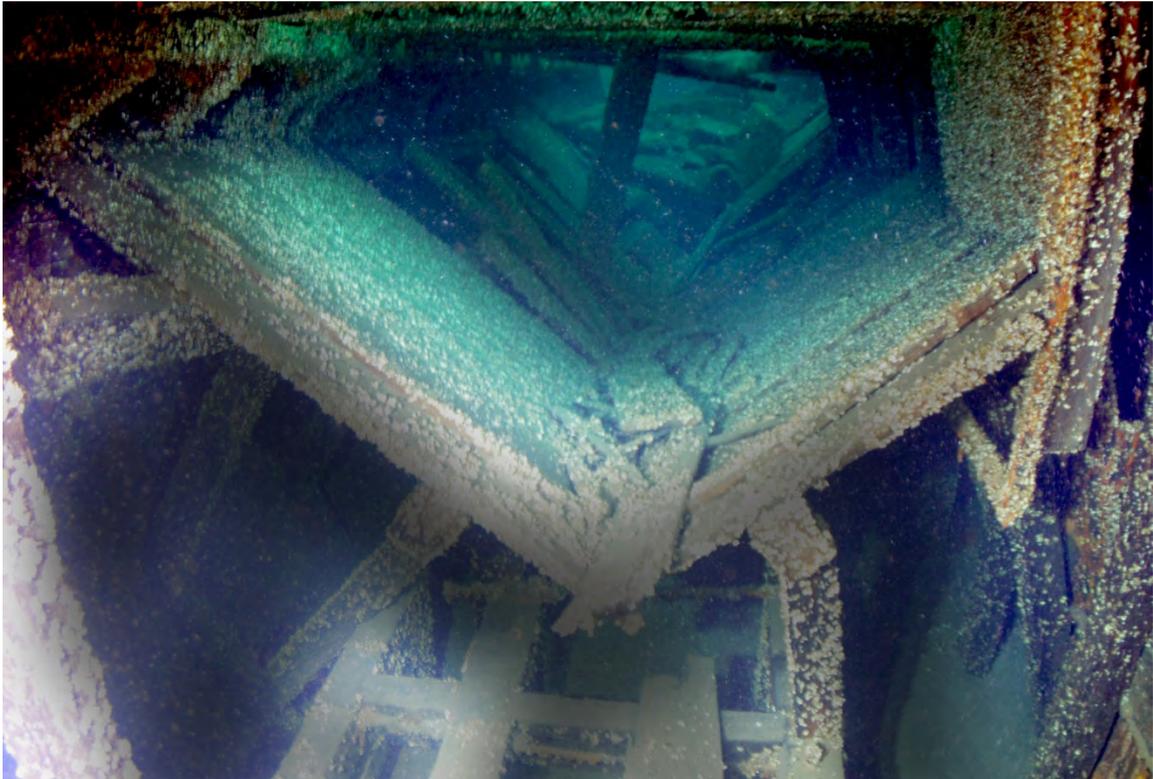


Figure 20. Aft end of port side hopper, looking forward. Frame for conveyor is visible beneath the V-shaped hopper. Deck beams are visible at top of image.

The top the hopper wall planks are fastened to a longitudinal timber that is 0.65 feet square. This timber is fastened to the deck stanchions 1.1 feet below the top of the stanchions (Figure 21). Where the hopper wall planks are fastened to this beam, the beam's upper, outboard corner is chamfered to the angle of the hopper wall. An identical timber, fastened to the ceiling planking of

the outer hull, supports the top of the opposite hopper walls. At the bottom of the hopper, a similar longitudinal timber supports the bottom of the wall. This lower timber is also 0.65 feet square and is held in position by strongbacks, 3.8 feet in length, that are fastened to the bottom of the deck stanchion at angle of 50 degrees.



Figure 21. Collapsed section of port side hopper showing longitudinal timbers fastened to deck stanchions. Approximately amidship on port side, looking forward.

The hoppers were emptied through iron doors located on bottom of the hopper's inner wall. The doors constructed of iron or steel plate and slide upward in a steel track that is fastened to the hopper wall on either side of the door. The hopper doors are 1.5 feet wide with a space of several inches between doors. Crew members would have walked along either side of the vessel's keelson to manually open and close the hopper doors.

The doors emptied the hoppers onto two longitudinal conveyers that were located directly beneath either hopper. The belts of these conveyers have been removed, but the wooden framing remains extant. The longitudinal conveyers moved the cargo aft to where they emptied onto two lower, athwartship conveyers that moved the cargo to the center of the vessel behind the bucket tower (Figure 22). There, each of the athwartship conveyers emptied into the tower's buckets to be carried up onto the deck. The framing for the athwartship conveyers remains in place, but it is uncertain if the conveyor belts themselves are extant, as these conveyers are quite low within the hull and thus deeply buried in the silt that has accumulated within the hull. Any disturbance of this silt quickly eliminates any visibility within the hull.



Figure 22. Intersection of port side longitudinal and athwartship conveyors.

The bucket tower is angled forward as it protrudes from the weather deck and rises 20 feet vertically above the deck (Figure 23). The tower is supported by four legs and four guy wires. The guy wires connect the top of the tower with the vessel's rail on either side. The four support legs are tied to one another via an A-shaped base. This base is constructed of I-beams and connects the unloading tower with the weather deck and provides a wide footprint for resistance to leveraging the deck. The A-shape of the base is wider at the forward end than aft. Each leg of the base is 25.5 feet in length, beginning at 132.8 feet on the baseline and ending at 157.6 feet on the baseline. The base is constructed of I-beams 0.9 feet tall by 0.35 feet wide. The forward leg is fastened to the base 4.4 feet from the forward edge of the I-beam, and the aft leg is fastened 4.0 feet from the aft edge of the I-beam. Athwartship I-beams are fastened between the forward legs, as well as between the aft legs.

The A-shaped base is clamped to the deck beams with 1.8 foot-long iron rods that connect two iron plates – one plate is atop the I-beam and the other is beneath the deck beam. There are two clamps on either side forward of the forward legs, two on either side between the forward and aft legs, and two on the athwartship I-beam that forms the bottom of the “A”.



Figure 23. View of bucket tower's port and aft sides.

The tower's two forward support legs are constructed from doubled iron I-beams that are fastened to the top of the A-shaped base. The aft legs are constructed from a wood timber, 0.85 feet by 0.2 feet that are reinforced on each edge with an iron strap that is 0.25 feet wide by 0.025 feet thick to form a composite I-beam.

The top of the tower has a wooden platform that is 4.6 feet long, 8.0 feet wide and 0.2 feet thick. This platform holds the winch that raised and lowered the unloading boom. The winch is driven via a drive chain which passes through the upper deck to a drive gear located on the port side of the tower's conveyor system, beneath the conveyor belt's upper drum. The boom winch consists of two gear shafts that provide a significant gear reduction for the cable drum, which is located on the forward gear shaft. The boom cable ran from the winch drum over a pivoting pulley on the forward edge of the platform. This pulley would swing port to starboard as the unloading boom was moved. The winch drum is 1.6 feet in diameter and 1.3 feet wide.

Cargo was carried up the tower in conveyor buckets with mouths 2.25 feet wide by 1.15 feet long and 1.05 feet deep. There are 36 buckets fastened to the conveyor that ran in a circular route up the backside of the tower and down the forward side. The buckets were connected to one another with a chain on either end and driven by the upper drum with a drive gear 2.8 feet in diameter and 0.2 feet wide located on the starboard side of the unloading tower.

As the buckets came over the top of the conveyor, they dumped cargo into a large iron hopper that is 6.0 feet wide by 2.4 feet long at the top (Figure 24). The bottom of the hopper is formed into a funnel with an opening diameter of 1.4 feet, which deposited the cargo onto the unloading boom.



Figure 24. View of hopper and funnel on forward side of unloading tower.

The unloading boom was fastened to the deck beams forward of the unloading tower. Although the boom was removed, its pivoting mount is extant on the deck (Figure 25). The mount allowed the boom to be swung over either rail to unload cargo onto the shoreline. Both the bottom of the funnel and the center of the pivoting base are located at 134.0 feet on the baseline.

The base of the unloading boom is constructed of four longitudinal timbers, 0.7 feet wide, 1.0 foot tall and 7.3 feet long, that are fastened directly to the deck beams with a space of 1.0 foot between timbers. Four athwartship timbers, 0.7 feet wide, 1.0 foot tall, and 6.0 feet long, are fastened atop the lower timbers with a space of 0.4 feet between timbers. The pivoting base of the unloading boom is fastened atop the athwartship timbers. The pivoting base consists of two iron plates with 8 bearings between them that allowed the boom to swing. Each bearing is 0.9 feet in diameter by 0.3 feet wide, and is connected to an axle attached to a center hub. The top plate is 4.8 feet in diameter and 0.3 feet thick, and with the bearings and lower plate the mount is 1.0 foot tall. Atop the uppermost plate, two boom hinges are extant into which the axle of the unloading boom attached.

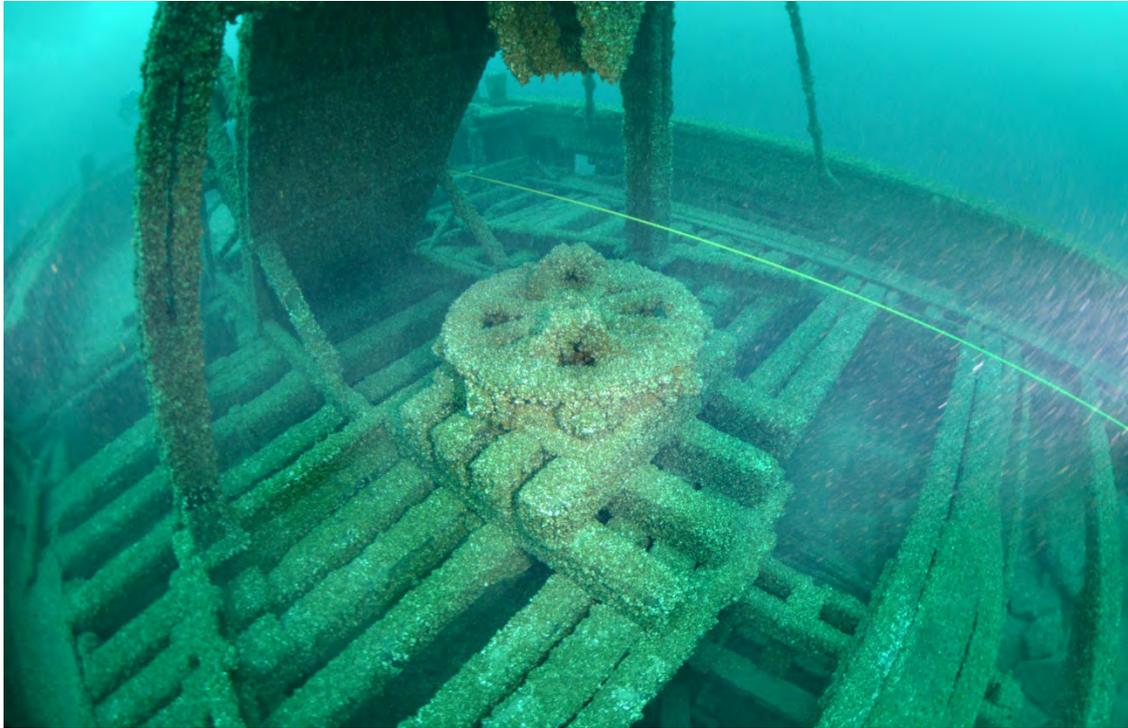


Figure 25. The mount for the unloading boom is extant on deck. The bottom of the hopper funnel is visible at top of image.

The stern cabin was removed during the vessel's conversion, but the cabin's coaming was left in place around the perimeter of the quarter deck (Figure 26). This coaming is 0.35 feet thick and is constructed of two timbers that are fastened back to back – the inner timber is 0.20 feet thick and the outer timber is 0.15 feet thick. The three extant sides of the coaming are 1.3 feet tall and rise 0.55 feet above the quarter deck. On the port side only, the upper, inside edge of the coaming is mortised for some type of frame or strongback. The three sides of the coaming vary somewhat in their height above the cabin sole, with the top of the coaming rising 4.85 feet on the starboard side, 5.15 feet on the port side, and 5.6 feet on the aft coaming.

The entire forward bulkhead of the cabin was removed, and the self-unloading tower extends into the cabin's former footprint. The cabin's aft bulkhead was 19.2 feet wide and 12.7 feet forward of the transom. The cabin was 25.5 feet in length, as measured by the cabin opening. There was 3.3 feet between the cabin's port bulkhead and the bulwark, and 3.5 feet between the cabin's starboard bulkhead and the bulwark.

There is a rectangular scuttle in the cabin sole with a staircase leading below deck located near the port quarter of the cabin sole. The center of the scuttle is located at 169.55 feet on the baseline, and the scuttle dimensions are 3.7 feet long by 1.5 feet wide. The staircase descends towards the center of the vessel.



Figure 26. Looking aft from the starboard side of the unloading tower.

On the quarterdeck aft of the cabin, the center of the rudder post is located 6.8 feet forward of the transom rail, with 4.9 feet between the steering gear box and the transom and 2.0 feet between the steering gear and the cabin's aft bulkhead. Beneath the steering gear, there is a height of 4.3 feet between the quarter deck and the cabin sole. The rudder box is visible between decks, and is 3.5 feet long by 1.8 feet wide and constructed of planks that are 0.6 feet wide by 0.15 foot thick. An iron auger lies on the cabin sole between decks on the port side. The auger shaft has an outside diameter of 0.5 feet and the auger blade's diameter is 1.5 feet.

The transom is 21.3 feet wide and 10.6 feet tall (Figure 27). Two port lights were located in the transom, but only the port side light is extant. The port light is non-opening, with a 0.35 foot diameter glass housed in a brass ring with a 0.5 foot outside diameter. The rudder is completely exposed and reaches a water depth of 170. The rudder blade is 13.0 feet tall, 5.0 feet long at its widest point, and 1.2 feet wide.



Figure 27. The *EMBA*'s stern, viewed from off the starboard quarter.

CHAPTER FOUR THE WOODEN BULK CARRIER *AUSTRALASIA*

The *Australasia* was launched on 17 September 1884 from the James Davidson shipyard in West Bay City, Michigan. She was the ninth hull launched from the yard, and her construction was accomplished with a crew of 150 men at a cost of \$150,000. At that time she was the largest wooden ship ever built, and her launch was accompanied by much fanfare (*BGSU* 2003; *British Whig* 1884; *Detroit Tribune* 1886; *Marine Record* 1884b).

Built for Captain James Corrigan of Cleveland, Ohio, the *Australasia*'s keel was laid on 1 November 1883. Her official length was 285 feet with a 40-foot beam. She carried two decks with a 22-foot depth of hold divided between a 12-foot deep lower hold and 10 feet between decks. Seven hatchways provided access to her cargo hold, which had a capacity of 3,000 net tons; this capacity allowed a cargo of 600,000 bushels of corn or 2,000,000 feet of lumber (Figure 28). Captain James Davidson took command of his newest vessel for her inaugural trip to Milwaukee loaded with 3,150 tons of salt - the largest cargo ever carried by a Great Lakes vessel (*ADGNFPL* 2005; *British Whig* 1884; Bureau of Navigation 1891).



Figure 28. The *Australasia* awaits loading. Historical Collections of the Great Lakes, Bowling Green State University.

Due to the flexibility of wooden hulls, it was impossible to construct a seaworthy hull of the *Australasia*'s size from wood alone. In order to attain the longitudinal strength necessary for a vessel of her size, a skeleton of iron - hidden within the vessel's planking - was employed. The *Australasia*'s iron reinforcements were described in the local newsprint:

A belt or girt of iron ten inches wide extends from stem to stern on the outside near the top of frames, and on the inside is another band of the same dimensions. To this the outside cord is thoroughly riveted. The latter are riveted straps five inches wide and half an inch thick, which take a diagonal course to the turn of the bilge, where they take hold of the long floor timbers. These diagonal straps commence at every opening of the frame cross twice, and are firmly riveted at each crossing" (*British Whig* 1884; *The Evening Press* 1884).

The *Australasia* was powered by the largest engine on the lakes - a fore-and-aft compound engine with a 30-inch high-pressure cylinder, 54-inch low pressure cylinder, and a 45-inch stroke. The engine was powered by two Otis steel boilers that measured 8 feet tall and 27 feet long that were fastened to the lower deck. An 11-inch propeller shaft turned a propeller that was 12.5 feet in diameter and has a 14-foot pitch (*British Whig* 1884). The vessel's ground tackle was handled by an improved bead plate steam windlass and capstan built by the American Ship Windlass Company of Providence, Rhode Island. Additionally, a second steam windlass and capstan were installed at the vessel's stern, an innovation that was new to lake steamers. This windlass was described as capable of "doing the work of twenty men in heaving around the docks". The windlasses also had automatic lubricators, also an innovation for lake steamers (*Marine Record* 1884a; 1884b). The pilothouse, captain's quarters, and officers' quarters were located forward. The crew's quarters were between decks aft, and the engineers' and steward's quarters were aft. All accommodations were "large and commodious, conveniently arranged and handsomely furnished" (*British Whig* 1884).

The *Australasia*'s salt record on her maiden trip was the first of several records set during her first season. At Duluth, she broke the record for wheat that was previously held by the steamer *Adams* at 74,040 bushels. After unloading 1,500 tons of coal at South Duluth on 27 October 1884, she loaded 80,000 bushels of wheat to set the new record before departing for the lower lakes (*Marine Record* 1884c).

Like other Davidson steamers, the *Australasia* generally towed a large wooden schooner barge as a consort, which gave the wooden vessels a competitive edge over the larger steel bulk carriers that were appearing on the Great Lakes. Working in tandem, a wooden steamer towing a consort could carry between 7,500 and 8,000 tons - significantly more cargo than the larger steel bulk carriers, but without a significant increase in operating costs. Continuing advances in boiler and engine technology gave the bulk carriers enough power to efficiently tow one or more consorts, effectively doubling or tripling the amount of cargo per trip (Devendorf 1995). The consort system also had an advantage in initial construction costs. The cost of constructing a wooden steamer and consort was 50 - 70% of the cost of constructing a single steel vessel with a cargo capacity comparable to the two wooden vessels (Jensen 1994; Oldham 1897). The consort

system did have one significant drawback; however. The ability to safely maneuvering two vessels connected by a single tow line often proved challenging— and sometimes impossible (Jensen 1994; Oldham 1897). It was not uncommon to lose a consort in a storm.

On 29 May 1885, the *Australasia* took in tow the newly launched schooner *Homer D. Alverson* at Port Huron, Michigan. The 195-foot *Alverson* carried 50,200 bushels of wheat for her maiden voyage. The pair proceeded downbound and at 5:00 PM, as they approached Southeast Bend on the St. Clair River, the *Alverson* was struck on her starboard side by the steamer *A. L. Hopkins*. The *Alverson*'s cathead was carried away, her main and monkey rails were split, two tinker-heads were twisted off; and her large stock anchor was badly wrenched with one of the flukes nearly torn off. The weather was clear when the accident occurred, and although the consort had limited maneuverability in the channel it was determined that the *A. L. Hopkins* was at fault. The *Australasia* and *Alverson* continued on their way, and repairs were made at Buffalo (Bureau of Navigation 1886; 1911; *Port Huron Daily Times* 1885).

In April 1885, James Corrigan contracted with Northwestern Fuel Company to carry 75,000 tons of coal from Buffalo, Erie, and Ashtabula to ports on Lake Superior ports - primarily Duluth. For these trips the *Australasia* towed two consorts, the schooner *David Vance* and the *Homer D. Alverson*. Together, the trio would load up to 180,000 bushels of wheat at Duluth for each downbound trip (ADGNFPL 2005; *Marine Record* 1885).

The *Alverson* continued as the *Australasia*'s regular consort for the 1886 season. In mid-June 1886, while in the Chicago River, the *Australasia* damaged her propeller by shearing off all but one of the blades. The captain telegraphed the Union Dry Dock Company in Buffalo to arrange for an immediate repair upon arrival at that city, and amazingly, the *Australasia* limped all the way back to Buffalo with the *Alverson* in tow. A new propeller was installed at Buffalo, and the two vessels loaded coal before departing for Lake Superior (*Marine Record* 1886). In September 1886, the owners of the *Homer D. Alverson* sold the year-old schooner to the Gilchrist Company of Cleveland. James Corrigan remained managing owner of the *Australasia*, but took on a partner, N.P. Huntington, in its ownership. Despite these ownership changes, however, the *Alverson* remained in tow of the *Australasia* through the end of the 1886 season (ADGNFPL 2005; *Port Huron Daily Times* 1886).

At the end of the 1886 season, Captain Reed departed the *Australasia* to take command of the newly built Davidson steamer *Roumania* (*Marine Record* 1887a). An unknown captain took command *Australasia* for the 1887 season, and bad luck seemed to accompany the change. In April that year, with early season ice persisting in the Straits, the *Australasia* was beached near Mackinaw City while attempting to avoid an ice floe (ADGNFPL 2005). Fortunately, the vessel received little damage in the grounding and was released unscathed.

On 19 May 1887, the *Australasia* and her consorts were passing the Grosse Point Lightship on Lake St. Clair when the schooner *Minnehaha*, in tow of the steamer *Hiawatha*, veered off course and struck the *Australasia* just aft of the steamer's mainmast. The collision carried away eighty-five feet of rail and bulwarks, thirty-four stanchions, and broke the covering board and some of the outer hull planks. The *Minnehaha* lost her headgear and bulwarks broke her stem. The *Australasia* stopped at Marine City, Michigan, to acquire oak planks before continuing on to

Duluth where they made repairs. Damage to the *Australasia* was estimated at \$3,000 (*Marine Record* 1887b).

On 5 September 1887, the *Australasia* departed Ashland, Wisconsin, bound for Ashtabula, Ohio, loaded with iron ore and with the 726-ton schooner *Niagara* in tow. From the time they passed Keweenaw Point at midday on 6 September until 11:00 AM on 7 September, the wind steadily increased into a ferocious northwest gale. The storm swept down Lake Superior and caught the *Australasia* and the *Niagara* along a lee shore west of Whitefish Point. The *Niagara* was laboring heavily in the seas with her load of 1,400 tons of ore - a bit overloaded for a vessel of her size - when her towline parted ten miles from Whitefish Point. Adrift, the *Niagara's* crew attempted to raise her canvas in order to steady the vessel but the strong wind carried the mainsail and foresail overboard. Without canvas, the *Niagara* was helpless and began wallowing in the wave troughs, rolling farther and farther over onto her starboard side until her lee rail was submerged. She slowly righted herself, but a large wave toppled her spars, which crushed her deck and bulwarks. The *Australasia's* crew was unable to render any assistance in the heavy seas, and helplessly watched as the *Niagara* broke as Captain Clements and his crew tried to chop away rigging and ready the yawl aboard the *Niagara*. The *Niagara's* crew managed to board the small boat, but as soon as it was launched it capsized and the entire crew drowned, including Captain Clements, First Mate John McBeath, Second Mate William Quinn, Steward Thomas Prince, and crewmembers A.L. Hishler, J. Conners, John Martin, Charles Anderson, Steven McMannkins, Robert Rayne, and John Martin (who was said to have been a cousin of Captain Clements). At the time of her loss, the *Niagara* was valued at \$30,000 and her cargo at \$9,000. She was insured for \$25,000, and was owned by Captain James Corrigan. The *Australasia* reported the *Niagara's* loss at the Sault before continuing on to Ashtabula (*British Whig* 1887; *Marine Record* 1887c; 1887d; 1887e; *Port Huron Daily Times* 1887).

In March 1888, the *Australasia* received a No. 117 steam steerer from the Williamson Brothers Company of Philadelphia. The device cost \$1,600 and was said to allow one man to guide a ship the size of the *Australasia* with "quickness and precision, and with less effort than would be required to steer a sloop yacht" (ADGNFPL 2005; McQuill 1884; Weiss and Leonard 1920).

The 1889 season started badly for the *Australasia*. On 26 April 1889, she stranded on Gull Rock in the Apostle Islands on Lake Superior. She was pulled free by the tug *Record* from the Great Lakes Towing Company in Duluth, but her bottom sustained severe damage. Temporary repairs were made and on 8 May the tug *Mocking Bird* towed the *Australasia* to Cleveland for repairs. Following three weeks in dry dock and \$11,000 in repairs, the *Australasia* returned to service and sailed without incident through the 1890 season (ADGNFPL 2005; BGSU 2003).

On 23 March 1891, all three of her spars were replaced at Toledo, Ohio, prior to entering the 1891 shipping season (ADGNFPL 2005). It was not until late 1891 that the *Australasia* was again mentioned in the newspapers.

On 31 October 1891, the *Australasia* was downbound on Lake Michigan for Escanaba, Michigan. A brisk westerly wind was blowing, and the *Australasia* kept close to the shoreline for protection from the wind. She kept a bit too close, however, and ran aground near Clay Banks, Wisconsin. Unable to free herself, she lay grounded until the following morning when she hailed assistance

from a passing steamer, which happened to be another of Captain Corrigan's vessels, the *Bulgaria*. As no good deed goes unpunished, the *Bulgaria* also became grounded while trying to assist the *Australasia*. The two steamers lay helpless on the reef until the steamer *Huron City* and the tug *Spalding* were summoned to help free them. This time both steamers were pulled free, and neither vessel had sustained damage (*Door County Advocate* 1891).

It is uncertain if the 1891 grounding resulted in the dismissal of the *Australasia*'s captain, but a new Master, Captain A.H. Gains, was appointed for the 1892 season (*Detroit Free Press* 1892). The *Australasia* continued sailing without incident until 15 November 1892, when her steering gear gave out near Duluth (ADGNFPL 2005).

In 1893, the Corrigan Transit Company was organized and ownership of all Captain Corrigan's vessels was transferred to the new company, including the *Australasia* on 1 August 1893 (ADGNFPL 2005). Under the new corporation, James Corrigan operated the steamers *Australasia*, *Bulgaria*, *Caledonia*, and *Italia*, in addition to the schooner *Northwest* during the 1894 season. Captain J. W. Morgan took command of the *Australasia* (*Marine Record* 1894; Ohio Secretary of State 1905).

The 1894 season proved difficult for the Corrigan Transit Company. The *Australasia*, *Bulgaria*, *Northwest*, and *Tasmania* never left the pier at Cleveland during what should have been the height of the shipping season. Corrigan refused to move his vessels due to a dispute over freight rates. The *Marine Record* (1894) quoted Captain Corrigan: "I have ore contracts for those boats at 85 cents [per ton]—not 60 cents, but if other vessel owners are willing to carry the stuff at 60 cents and allow me to make 25 cents a ton of it. I am satisfied that they should do so. I have figured the thing pretty fine, however, and I am at a loss to understand how they can do it". Corrigan eventually did resolve the dispute and released his vessels, but following the slow start and less than profitable season, the *Australasia* collided with the steamer *Majestic* in the Chicago River on 1 November 1894. In the collision the *Australasia*'s deck was shoved up, her cabin pushed over, and many strakes of outer hull planking were broken. Estimates for repair exceeded \$2,000 and a lengthy investigation and ensued (*Cleveland Leader* 1894). It was not until 16 March 1896 that the Illinois Northern District Court in Chicago reached a ruling that the *Majestic* was at fault in the collision. Both vessels sustained significant damage in the accident, but since the damages had already been paid to the vessel owners, and the fact that both vessels were underwritten by the same insurance companies, the libel claim for the collision was dismissed (*Marine Record* 1896a).

Prior to the opening of the 1895 season, E. S. Ludlow, the Cleveland agent for the Buffalo Forge Company, contracted with James Corrigan to equip his four steamers *Australasia*, *Bulgaria*, *Italia*, and *Caledonia* with their new forced draft blower system (*Marine Record* 1895a). The vessels were outfitted in early March, and Captain William Patterson took command of the *Australasia* for the 1895 season (*Marine Record* 1895b). The *Australasia*'s engine received a new crankshaft in August 1895 at the Cleveland Shipbuilding Company (*Marine Record* 1895c).

Soon after the engine repair in Cleveland, Captain J. Dunn, formerly of the Menominee Transit Company, relieved Captain Patterson of command of the *Australasia* (*Marine Record* 1895c). Captain Patterson's relief of duty resulted from an incident in mid-July with a U.S. Revenue

Cutter that happened to have the U.S. Secretary of War, Daniel S. Lamont, aboard at the time of the incident. As the *Australasia* and the Revenue Cutter were meeting in a narrow channel on Lake Erie, Captain Patterson failed to return passing signals with the Revenue Cutter and was observed to operate the *Australasia* too fast through narrow channels, ignoring navigation regulations and impeding the rights of other vessels (*Marine Record* 1895d).

It is uncertain how long Captain Dunn was in command of the *Australasia*, as newspaper reports indicated that in October 1895 Captain Robert Pringle was now the *Australasia*'s Master. By the end of October, however, Captain Pringle resigned to take command of the steamer *P. P. Pratt*. His father, Captain John Pringle, took command of the *Australasia* (*Oswego Daily Times* 1895).

Captain Robert Pringle returned to the *Australasia* for the 1896 season. On the night of 22 June 1896, while in the Canadian canal at Sault Ste. Marie, the *Australasia* was down bound with a load of ore when she was struck by the *Helvetia*, who as up bound and light. The collision tore a hole twelve feet long by four feet wide in the *Australasia*'s side, stove in her bulwarks, and tore away half her bridge (*Oswego Daily Times* 1896a).

Early on the morning of 17 October 1896, the *Australasia* passed through the Straits of Mackinac on her way from Cleveland to Milwaukee with 2,200 tons of soft coal. After clearing the Manitou Islands, she headed across the lake to seek shelter from a strong northwest wind along Wisconsin's shoreline. The steamer was running alone and not towing a consort (*Door County Advocate* 1896a; *Oswego Daily Times* 1896b).

At 6:00 PM that evening, the *Australasia*'s crew spotted the Wisconsin shoreline near Baileys Harbor, Wisconsin. The vessel, in turn, was spotted by the lookout at the Baileys Harbor Life Saving Station, including flames that were coming from the vessel. The lifesavers quickly launched their boat, raised canvas, and began pursuit of the burning vessel. Aboard the *Australasia*, a portion of the crew was sitting down for dinner when the fire was discovered. The fire alarm was sounded, but only one fire hose was deployed and, according to one of the crewmen, there was a rather long delay before that fire hose was used to begin dousing the flames. The half-hearted effort to extinguish the fire allowed the flames to climb up the bulkhead that separated the cargo hold from the engineering spaces, and the flames eventually made their way forward to the Texas deck and down into the coal bunkers (*Door County Advocate* 1896a; *Milwaukee Journal* 1896a; *Oswego Daily Times* 1896b; *Port Huron Daily Times* 1896). The engineer threw the engine throttle wide open, and the fireman filled the furnaces of the two boilers with coal in hopes of holding a good head of steam as long as possible. It was not long, however, before the steam and heat from the flames made the fire hold uninhabitable and the boiler furnaces had to be abandoned. (*Door County Advocate* 1896a; *Milwaukee Journal* 1896a; *Oswego Daily Times* 1896b).

Captain Pringle steered the burning vessel for shore in an attempt to beach her, and the *Australasia* soon struck bottom south of Jacksonport near Cave Point. The seventeen men aboard the vessel gathered forward and prepared to abandoned ship. Before giving the order to abandon ship, however, Captain Pringle ordered the crew to bore holes through the forward hull to fill the vessel with water, causing it to settle deeper into the water and potentially save the bulk of the cargo. The crew then lowered the jollyboat and took whatever they had time to save, including

the turkey that had been prepared for dinner. The captain prohibited the crew from taking any baggage ashore, although several of the men managed to save their belongings by smuggling it aboard the jollyboat. The ship was finally abandoned about 8:00 PM, and the crew rowed to Jacksonport where a local farmer had started a fire on the beach to receive the shipwrecked sailors (*Door County Advocate* 1896a; *Oswego Daily Times* 1896b). When the shipwrecked sailors landed their jollyboat at Jacksonport, they were greeted with food and spirits from the local farmers. Several of the men drank until they were “three sheets to the wind” while watching their steamer ablaze in the distance (*Door County Advocate* 1896a).

While the crew was abandoning the *Australasia*, Captain James Tufts was summoned from Sturgeon Bay via telephone, and he and his tug, *John Leathem*, arrived on the scene around 10:30 PM. When the *John Leathem* arrived, Captain Pringle and the mate rowed out from Jacksonport to meet the tug. The *John Leathem* arrived at the *Australasia* four miles off Jacksonport with no one aboard. The *John Leathem*'s crew boarded the abandoned steamer and promptly found the galley with the dinner table still set. Not wanting good food to go to waste, they ate a quick meal before inspecting the fire damage. The fire extended aft of the stem to the mizzenmast, consuming much of the forward deck and part of the aft cabin. The foremast had toppled overboard. The tugs crew then inspected the boilers to find they still held a large amount of pressure, and so determined the best action was to pull away from the burning wreck in case of explosion (*Door County Advocate* 1896a; *Milwaukee Journal* 1896a; *Oswego Daily Times* 1896b).

Around midnight, a line was fastened to the *Australasia* in order to tow her towards the Sturgeon Bay Canal. With her rudder hard to port the vessel did not tow well, and the tow line burned through or broke eight times. With the vessel still burning, a line of water was directed at the steamer from the tug to keep the fire away from the tow line. Around 1:00 AM, the steamer's mizzenmast fell and carried the two smokestacks with it. The mainmast fell between 5:00 and 6:00 AM (*Door County Advocate* 1896a; *Milwaukee Journal* 1896a; *Oswego Daily Times* 1896b).

Captain James Tufts feared the *Australasia* would founder before they could reach port, so he instead dragged the hulk onto the beach south of Cave Point around 9:00 AM on 18 October. The *Australasia* was left in fifteen feet of water an eighth mile from shore, and two miles below the north point of Whitefish Bay, laying on a northwest by west heading (*Door County Advocate* 1896a; *Marine Review* 1896b).

After abandoning the recovery effort, the *John Leathem* returned to Jacksonport to pick up the *Australasia*'s crew and take them to Sturgeon Bay. Several of the men were so drunk that a fistfight broke out on the tug during the trip, and second fight broke out on the wharf in Sturgeon Bay. On Monday, 19 October 1896, the men were taken to Escanaba where they transferred to another vessel bound for Cleveland (*Door County Advocate* 1896a).

After delivering the inebriated crew to Sturgeon Bay, the tug *Wright* joined the *John Leathem* and the pair returned to the *Australasia* and were finally able to extinguish the fire the afternoon of 18 October. Her sides had burned down to the water, but her steel arches stuck out of the water about five feet amidships. Her boilers had toppled to starboard and her stacks lay crossways of each

other. Nothing but the stem stuck out of the water forward, and only the rudderpost and steering quadrant stood aft. On Tuesday, 20 October 1896, Captain C. H. Sinclair took pictures of the wreck for the C. A. McDonald agency with a Kodak camera obtained especially for the purpose. The *Australasia* was determined to be a total loss (*Door County Advocate* 1896a).

The *Australasia* had an A1½ insurance rating and was valued at \$85,000 at the time of her loss. She was fully insured by the Chicago agency of C. A. McDonald & Co., who represented the Sea Marine Reliance and Chicago insurance company. The same company also carried insurance on the coal cargo (*Door County Advocate* 1896a).

The owners of the tug *John Leathem*, who held a claim on the *Australasia* for assistance rendered, were placed in charge of salvage operations by the underwriters, but the wreck and her cargo was eventually sold to the Leathem & Smith Towing & Wrecking Company (*Door County Advocate* 1896a). Divers were immediately hired from Sault Ste. Marie, and the salvage work commenced. The smokestacks were recovered first, followed by the engine head, anchors, chains and other ironwork. Most of the coal cargo was sucked from the wreckage with a steam pump and hauled away on barges, but despite this effort, an estimated 140 tons of coal washed ashore during the winter months and was collected by the local farmers. The following spring, the wrecking company repossessed from the farmers what hadn't been used to heat their homes. During the summer of 1897, the boilers and any other remaining equipment were removed. All salvage was completed by September 1897 (*Buffalo Morning Express* 1896; *Door County Advocate* 1896a; 1896b; 1896c; 1896d; 1896e; 1896f; 1897a; 1897b; 1897c; 1897d; 1897e; 1897f; 1897g; 1897h; 1905; 1906 1907; *Milwaukee Journal* 1896a; 1896b; 1896c).

***Australasia* Site Description**

The *Australasia* lies 350 yards off Whitefish Dunes State Park's beach in Door County, Wisconsin (Figure 29). The lower hull lies on a sand bottom in 20 feet of water on a heading of 345 degrees. It is probable that the entire lower hull is intact beneath the lakebed, but only the ends of the vessel visibly protrude from the sand bottom. Due to its shallow nature and proximity to shore, the *Australasia* site is subject to longshore sand transport. Significantly more hull structure was visible during the 2012 archaeological survey than during reconnaissance dives conducted in the fall of 2009. Wreck site components that are recently exposed are readily identified by a notable absence of aquatic mussels and algae growth, whereas wreck components that have been exposed for longer periods of time are heavily covered with mussels and algae. Additionally gill and trawl nets are entangled on the wreck in various locations, along with several large tangles of stainless steel downrigger cable.

No evidence of the coal cargo is extant on site. It is possible that remnants of the cargo remain buried beneath the sand, but much of the cargo was commercially salvaged or washed ashore in the years following the vessel's abandonment. Even today, it is not uncommon to find coal intermixed with the sand on the State Park beach.

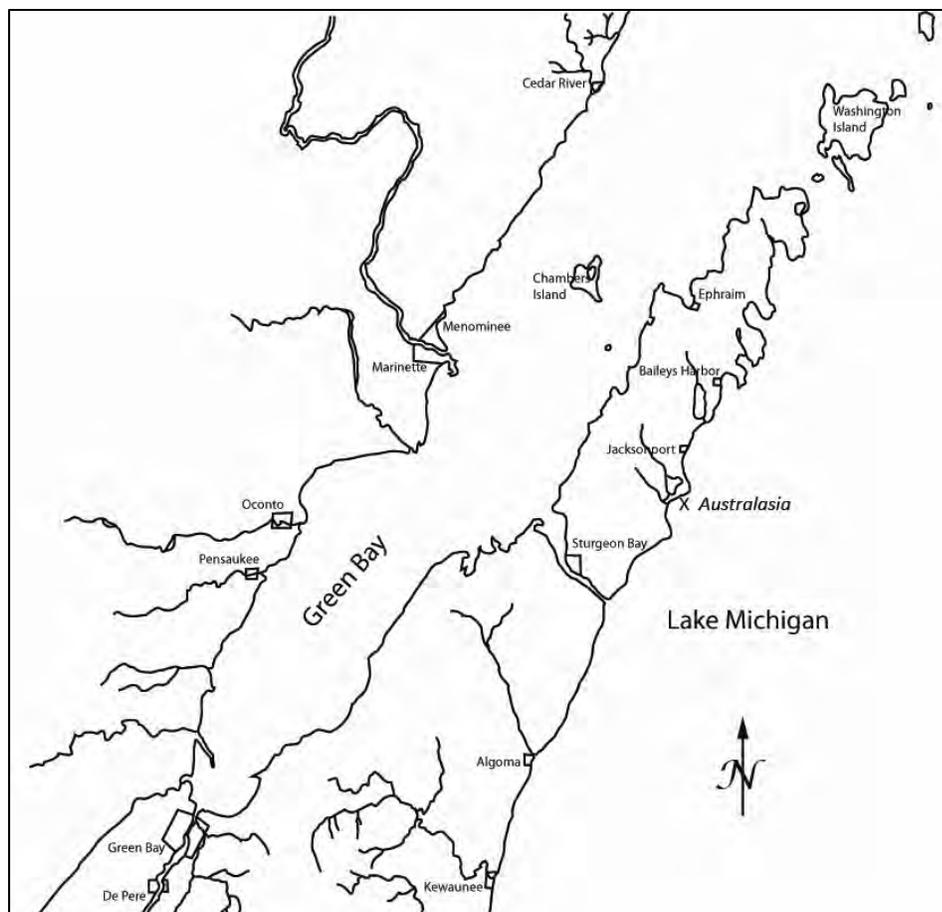


Figure 29. Location of the *Australasia* site.

A Phase II archaeological survey was conducted over 21-27 June 2012 to identify and record in plan view the overall underwater site while recording wreckage details for archaeological interpretation (Figure 30). Due to poor visibility at the time of the survey and the great distance between the bow and stern sections, two separate, temporary baselines were installed over either hull section to which all hull measurements were referenced. The two baselines were then referenced to one another in order to place each hull section on the overall site plan with proper placement and orientation.

Just over 40 feet of the vessel's bow is exposed from the stem aft (Figure 31). The bow section possesses the greatest relief of all the site's features, as the stem rises to within 5 feet of the water's surface. A little over one foot of sand had vacated the bow section prior to the archaeological survey, which exposed the myriad of pipes, cables, and burned or melted ship parts lying within the hull structure.

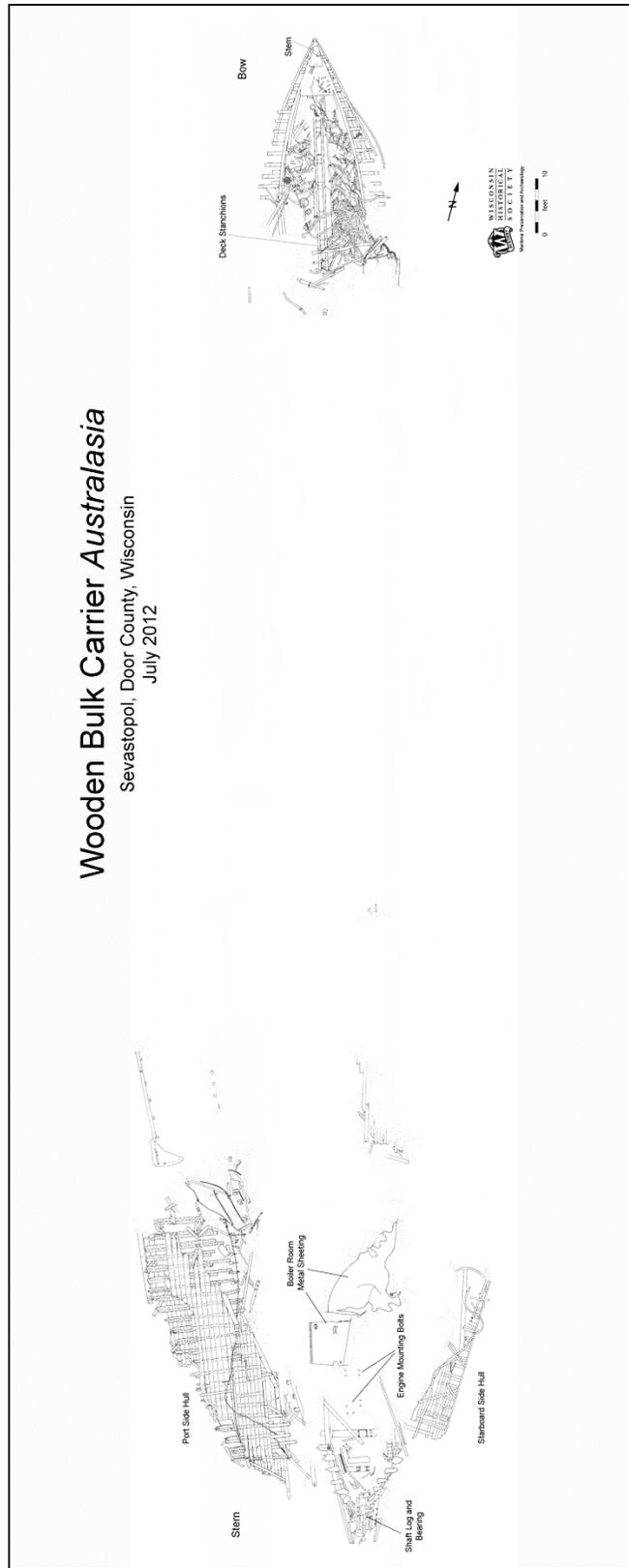


Figure 30. *Australasia* site plan.



Figure 31. Exposed bow section, looking forward along keelson.

Aft of the stem, several deck stanchions remain intact and rise to varying heights, the tallest of which rises 4.0 feet above the keelson. The forward deck stanchions are variably spaced at between 3.75 feet and 4.4 feet between stanchions. The deck stanchions are constructed from two vertical timbers that are each 0.7 feet square and are fastened to one another fore and aft. The stanchions are fastened between two vertical stringers that are each 0.4 feet wide, and wooden chocks fill the space between the stringers and the stanchions.

On the bow section, the outer hull planks are 0.3 feet thick but vary in width between 0.55 and 0.65 feet. The bow planking was protected by iron sheathing that consists of plates one quarter inch thick that are fastened to the outer hull to just above the waterline. The bow is double framed, with each frame futtock measuring 1.0 foot molded by 0.5 feet sided. Ceiling planks vary in width between 0.75 and 1.0 feet wide and 0.35 feet thick. All hull components, with the exception of the sheathing, are fastened together with iron bolts that pass through all hull timbers and fastened on either end with roves. A large amount of melted brass is dispersed throughout the bow structure (Figure 32).



Figure 32. A large amount of melted brass lies within the bow section.

Approximately 75 feet of the stern is exposed from the sternpost forward, with portions of both the port and starboard sides visible (Figure 33). To port, the hull side is extant to nearly the weather deck, but has broken at the turn of the bilge and fallen outward. The starboard side remains attached and upright, but is burned away to approximately the waterline. None of the keelson assembly is visible on the stern section, and only the shaft log, main bearing, and engine mounts protrude from the lakebed. The vessel's propulsion machinery was thoroughly salvaged, including the engine, thrust bearing, propeller shaft and wheel, pumps, condensers, and associated plumbing of the engine room. The machinery spaces are now filled with sand and various parts including small pipes, fittings, and fasteners that fell loose as the surrounding wood was burned away. The former location of the boiler room is readily identified by sections of iron plate that lined the boiler room and protected the hull from the heat of the boilers. Forward of the boiler area, very little of the hull is visible with the exception of a very small section of the starboard side and a few feet of the port side deck shelf.



Figure 33. Exposed stern section, viewed from port side. Diver is above boiler room floor on vessel's centerline.

Both the stern post and the inner sternpost are extant below where the propeller shaft formerly passed through them, and both timbers are 1.6 feet molded (Figure 34). A lead packing is extant between the sternpost and inner sternpost. The bottom half of the shaft log is extant forward of the inner sternpost and is 5.9 feet long and 1.9 feet wide. The shaft log was constructed from two horizontal timbers, an upper and lower, that were fastened together. The upper timber was removed from the lower half, but it remains within the hull and lies next to lower half of the shaft log on the port side. The shaft log was lined with a bronze bearing, and fragments of bearing remain in and around the shaft log. The lower half of the shaft log is bolted to the timber below it with iron bolts and clinch rings on either side of the shaft bearing. The main bearing is extant forward of the shaft long and is 1.0 foot in length and secured to the hull by four threaded bolts that are each 1-3/8 inches in diameter and fastened with octagonal nuts that are 2.5 inches between lands. The upper half of the main bearing was unbolted by salvors in order to remove the propeller shaft, and neither the upper half of the bearing nor the propeller shaft is extant. Measured from the main bearing, the propeller shaft was 0.9 feet in diameter.



Figure 34. Vessel's stern, looking forward. Stern post is obscured by sand and algae, but shaft log is readily visible.

Forward of main bearing, the engine mounts protrude from the bottom. The engine and thrust bearing was simply unbolted and removed by salvors, as the bolt threads are intact and exhibit no evidence of cutting. Forward of the engine mounting bolts is evidence of the boiler room (Figure 35). Although the boilers were salvaged, the boiler mounts remain attached to a 3/16-inch thick iron plate that lined the floor of the boiler room. A second, larger piece of twisted iron plate lies forward of the floor plate. This second iron plate is 1/4-inch thick and has a 90 degree edge riveted to its perimeter that rises 0.8 feet above the steel plate. This plate is likely the remains of an iron bulkhead or overhead from the boiler room that protected the wooden hull from the boilers' heat and flame.

Few frames are intact on either side of the shaft log, but several outer hull planks are extant to where they once fitted into the sternpost rabbet. These outer hull planks are 0.3 feet thick and vary in width between 0.6 and 0.85 feet wide. Frames are more intact further forward, and frames on the port side hull sections are double frames constructed of futtocks that are 0.8 feet molded by 0.45 feet sided with a space of 1.0 foot between frames sets.



Figure 35. Remains of the boiler room bulkheads and floor. Section of upright starboard hull is visible in background.

The hull sides were 2.0 feet thick and were a layered construction utilizing traditional wooden hull construction techniques reinforced with iron hogging arches and an iron basket truss (Figure 36). Three iron hogging trusses are visible on the port side hull section - two are fastened inside the outer hull planks and the third is fastened to the inside of the ceiling planks. From the outside in, the layered hull construction consists of outer hull planks, iron hogging truss, iron basket truss, frames, ceiling planks, and another iron hogging truss fastened to the inside of the ceiling planks. This layered construction is held together with 2.0 foot-long, 7/8-inch diameter iron bolts that pass through the entire hull and are secured both inside and out with roves. The hogging trusses are constructed from iron plate that is 0.85 feet wide by 0.06 feet thick. Individual strakes of the hogging trusses are fastened together by lap joints that overlap 1.05 feet and are riveted together. The hogging truss is then fastened to each frame futtock with two bolts, or four bolts for each frame set.

The basket truss is constructed from iron flat stock that is 0.43 feet wide by 0.04 feet thick. The basket trusses cross one another at 90 degree angles, and every crossing is fastened with one of the iron through bolts hold the hull sides together. There is a space of 5.35 feet between each individual truss of the basket, and wherever the basket truss crosses a hogging arch the two are fastened to one another with a single rivet.

In most places on the port side hull section, the inner surface of the ceiling planks have burned away to leave only a very thin remnant of the original plank. This reduction in thickness leaves a large number of iron bolts protruding several inches from the hull side.



Figure 36. Port side hull has fallen outward. Hogging arch and basket truss system are visible between frames and outer hull planks. Note burned away ceiling and frames that have exposed iron bolts.

A deck shelf protrudes vertically from the sand forward of the port side section, and is most likely the main deck shelf. The shelf is constructed from two planks 0.7 feet wide by 0.4 feet thick and edge-bolted together with $\frac{3}{4}$ inch iron bolts. Adjoining shelf planks are fastened together with hook scarphs. The shelf was supported by large hanging knees that have mostly eroded away, but were spaced at 3.4 feet on center. There are no extant fasteners for deck beams.

The starboard side section has also burned away to a large degree, but as it remains upright the fire consumed the starboard side from the top down to exposing the basket trusses, which curled downward into the hull as they were heated by the fire. Ceiling planks on the starboard side also exhibit burning, but nearly as much as on the port side. The starboard ceiling planks have, however, burned away enough to reveal the iron edge-bolts that fastened the ceiling planks together (Figure 37). These edge bolts are aligned vertically – one directly atop another - to create vertical lines of edge bolts that nearly touch end to end. These vertical lines of edge bolts are variably spaced at 1.75, 2.3, and 1.75 feet between. A few of the lower ceiling planks that escaped the flames are 0.6 feet wide by 0.43 feet thick. The inner hogging truss on the starboard side terminates immediately forward of the engine's main bearing.

A small section hull protrudes from the sand forward of the boiler room bulkhead. Sections of basket truss that are visible indicate this is a section of the starboard side hull that has fallen inward. There is no evidence of burning on the outer hull planks that are visible.



Figure 37. Starboard side hull remains upright, but has burned away to reveal edge-bolts within the ceiling planks.

CHAPTER FIVE CONCLUSIONS AND RECOMMENDATIONS

This report is one component of ongoing research to document Wisconsin's collection of historic shipwreck sites, specifically nineteenth-century wooden watercraft. Combined with earlier fieldwork conducted by the Wisconsin Historical Society, this document adds to an ever-increasing body of knowledge on Wisconsin's historical Great Lakes vessels. Archaeological surveys of shipwreck sites conducted by the Wisconsin Historical Society are designed to document the sites according to the standards and guidelines established by the National Park Service for submerged cultural resources. A primary goal of the surveys is to evaluate a site to determine its eligibility for listing on the National Register of Historic Places. As a result, all three sites included in this report have been listed on the State Register of Historic Places, and at the time of publication all three sites are being evaluated for listing on the National Register of Historic Places.

The *America* survey was designed to answer several questions as part of an overall research design. The first objective was to document Great Lakes canaller construction; the second objective was to provide positive vessel identification through identifying marks or artifacts. The first objective, to document Great Lakes canal schooner construction, was achieved within the scope of this work. The primary goal of the Society's archaeological surveys of submerged wreck sites is to document the sites to the level necessary for evaluation and nomination to the National Register of Historic Places. This includes defining the cultural context in which the site is significant, evaluating the site's potential for research, and documenting the site's structures and integrity. The level of documentation achieved during this project fulfilled these requirements and serve as the source document for the sites' nomination to the National Register of Historic Places. Additionally, the archaeological data gathered will provide the basis for outreach and educational materials such as shore side interpretive signage, waterproof dive guides that interpret the site to visitors, website entries describing the vessel's operational career and current disposition, as well as public multimedia presentations.

Despite achieving the above objective, however, many opportunities remain for further research that could significantly add to our understanding of Great Lakes sailing vessels in general, and to canallers specifically. While it is common knowledge that canallers were boxy vessels compared to the sleeker clipper-type schooners, little comparative work has been conducted between the archaeological remains of the two vessels types to detail specific differences in hull shape and construction. Additionally, due to their boxy hull shape, it has been suggested that canallers were notoriously poor sailers in heavy weather; the fact that a single Great Lakes storm claimed six Oswego canallers and crew lends credibility to this claim¹. With no historical documentation surviving that details the canallers' hull lines, only archaeological sites like the *America* can answer the question of whether or not the canaller was an inherently dangerous craft.

The second objective, to provide positive vessel identification through identifying marks or artifacts, was not achieved. Although the *America* site is not as heavily visited as other Wisconsin

¹ A raging storm over 27-28 October 1873 claimed six canallers from Oswego, along with their crews: *Albion*, *Roman*, *Opeeche*, *Hastings*, *Persian* and *Gilbert Mollison* (*Oswego Daily Palladium* 1873).

shipwreck sites, many artifacts were recovered by recreational divers following her discovery. Cultural artifacts that were not removed from the site are now hidden by invasive mussel colonization. The vessel's size, location, construction, and collision evidence all support the identification as the *America*, however.

Due to its distance from other shipwreck sites, as well as the broken nature of its hull, the *America* is infrequently visited by divers. This is unfortunate, as the *America* is an excellent location to study and observe the construction techniques used to build nineteenth-century Great Lakes schooners. Although the hull is broken up, nearly all of the *America*'s hull components and rigging are extant. To many divers, a broken hull such as the *America* holds less appeal compared to more intact vessels - even vessels that are entirely stripped of rigging, gear, and artifacts. To an analytical eye, however, the *America* site presents a prime opportunity to study and learn about wooden vessel construction. The advantage of broken hulls like the *America*'s is that they offer a of view many construction details that are hidden in more intact vessels. For this reason the *America* site is the best of both worlds – she is intact enough to have nearly all hull sections represented, but is opened up enough to allow a thorough examination of the many intricate details that would be hidden were the *America* completely intact, such as stem and stern construction, inner framing techniques, and more hidden workings such as the construction and operation of the centerboard.

As the *America* site is somewhat remote and lightly visited by divers, a state-sponsored mooring buoy is not planned for the site at this time. If visitation by divers increases in future years, however, and there is sufficient support from the diving community, the need for a mooring buoy may be revisited. If a mooring buoy is installed at the site, the anchor should be an offsite deadweight or helix-type screw anchor, as any mooring anchored to the wreck itself could cause significant damage to the site.

Like the *America*, the *EMBA* survey was designed to document Great Lakes self-unloader technology and its adaptation to repurposed vessels. This objective was achieved, and the *EMBA* site has been documented to the level necessary for nomination to the National Register of Historic Places. Listing on the National Register of Historic places is particularly appropriate for this site, as the *EMBA* is one of two known wooden-hulled self-unloaders in Wisconsin waters. Compared to the *Adriatic*, the other self-unloading barge that was abandoned in Sturgeon Bay, Wisconsin, the *EMBA* is significantly more intact.

While historical documentation of early self-unloading machinery is available, archaeological sites like the *EMBA* are particularly significant as they can provide documentation of the actual design, construction, and use of the machinery; the *EMBA* site can be used to document any design changes or alterations that were necessary in implementation of self-unloading machinery. Additionally, the archaeological data gathered will provide the basis for outreach and educational materials such as shore side interpretive signage, waterproof dive guides that interpret the site to visitors, website entries describing the vessel's operational career and current disposition, as well as public multimedia presentations.

The *EMBA* site is rather unique in Wisconsin waters, as it represents a largely intact example of early self-unloading technology. Self-unloading vessels originated on the Great Lakes, but very

little effort has gone into documenting the innovation and development of self-unloading technology. Self-unloaders first appeared on the Great Lakes until well into the twentieth century, and compared to other vessel types there is more historical documentation of self-unloader engineering and construction. Due to their recency compared with most other vessel types found on the Great Lakes bottomland, however, few archaeological examples of early self-unloaders exist. Self-unloaders with wooden hulls are exceedingly rare, and it seems that most wooden-hulled self-unloaders were converted vessels that had unloading equipment installed in what were typically aging wooden hulls. The *EMBA*'s conversion to a self-unloader left much of her original hull intact, and she remains readily identifiable as the large wooden schooner barge that was common in the late nineteenth century. The addition of unloading machinery was made within her original hull dimensions with little alteration to her hull; the only exception was the removal of deck structures unnecessary to her operation as barge within the confines of a protected harbor.

Before the *EMBA* was scuttled and abandoned, she was stripped of anything useful or valuable. That did not include a large portion of her unloading machinery, including the unloading tower, the framing for much of the below-deck conveyors, and her cargo hoppers and doors. These remaining components make the *EMBA* an excellent site to study the mechanization of bulk cargo handling, which greatly increased the efficiency with which bulk cargoes were moved throughout the Great Lakes.

The *EMBA*'s close proximity to Milwaukee, as well as her significant relief, makes the site popular with divers. The *EMBA*'s unloading tower rises to a water depth of 135 feet, and with a maximum depth of 170 feet, the *EMBA* is a popular site for technical dive training and for those technical divers who are gaining experience in diving to deeper depths. The *EMBA* would be a good candidate for a state-sponsored mooring buoy, but it has received little support by the diving community.

The *Australasia* survey is part of an ongoing study of James Davidson's vessels that were lost or abandoned in Wisconsin waters. The archaeological study of Davidson's vessels began in 1990 with the survey of the *Frank O'Connor*, which lies approximately 15 miles north of the *Australasia*. Since 1990, several other Davidson vessels have been documented including the *Pretoria*, *City of Glasgow*, and *Appomattox*. The *Adriatic* will be surveyed in June 2013, and the *Polynesia*'s resting place has yet to be discovered somewhere far offshore of Sheboygan.

James Davidson is known in Great Lakes history as a shipbuilder that continually pushed the accepted limits of wooden vessel size and constructed several of the largest wooden vessels ever to sail. Furthermore, he did so at a time when iron and steel shipbuilding had become the accepted norm for most Great Lakes shipyards. With the innovative use of iron reinforcement, however, James Davidson built large, light, and strong wooden vessels that proved not only economical to build but also to operate, earning Davidson a fortune from Great Lakes bulk shipping.

Like the above surveys, the *Australasia* survey was designed to document Great Lakes wooden bulk carrier technology and the use of iron reinforcements to strengthen large wooden hulls. This objective was achieved, and the *Australasia* site has been nominated for listing on the National Register of Historic Places. Listing on the National Register of Historic places is particularly

appropriate for the *Australasia*, which will join three other Davidson vessels already listed on the National Register, the *Frank O'Connor*, *Pretoria*, and *Appomattox*.

Archaeological documentation of all Davidson vessels within Wisconsin waters can provide particularly significant information on the evolution of wooden bulk carrier construction on the Great Lakes. With each successive launch, Davidson pushed the size and length of his vessels ever larger. Beginning with the *Australasia* in 1884 and ending with the *Pretoria* in 1900, the archaeological survey of Davidson's vessels within Wisconsin will document the evolutionary changes developed by the Davidson yard that allowed his vessels to continually break records for wooden vessel size. Documentation of the evolution of construction techniques will provide a better understanding of what was, and was not, successful in allowing wooden bulk carriers to become the largest and most advanced wooden commercial craft the world has ever known. In addition to providing a better understanding of how the use of iron allowed Great Lakes wooden vessels to surpass the accepted limits of wooden hull construction, the archaeological data gathered will provide the basis for outreach and educational materials such as shore side interpretive signage, waterproof dive guides that interpret the site to visitors, website entries describing the vessel's operational career and current disposition, as well as public multimedia presentations.

The complete archaeological documentation of the *Australasia* site will be an ongoing process for years to come. Today, much of the *Australasia*'s remaining hull structure is deeply buried by sand. Due to the site's shallow nature, however, a large quantity of sand moves through the area with each passing storm. As the sand moves, there is great potential for previously undocumented hull structure and artifacts to be uncovered and exposed. For this reason the site should be closely monitored and any newly exposed structure or artifacts should be documented and added to the site plan.

The *Australasia* site is easily accessible via boat or kayak, and is located only a few hundred yards from one of Door County's most popular beaches at Whitefish Dunes State Park. Although the *Australasia*'s hull burned to the waterline and was subsequently salvaged of anything valuable, a large amount of hull structure and artifacts remain. A rather unique feature is the large amount of melted brass that lies beneath where the wheelhouse formerly stood. Although the melted brass may tempt many divers to remove it as a memento or keepsake, the site is easily monitored by State Park employees, making it a good candidate for increased visitation and the placement of a state-sponsored shipwreck mooring buoy. Due to its shallow nature and adjacent location to the beach, site conditions can be challenging when waves and surf produce poor visibility and heavy surge. The site is best explored during prolonged periods of calm weather, as the significant distance between visible bow and stern structure can make for challenging underwater navigation in poor conditions.

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