Wheat Chaff and Coal Dust:
Underwater Archaeological Investigations of the Grain Schooners *Daniel Lyons* and *Kate Kelly*

State Archaeology and Maritime Preservation Program
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The *Daniel Lyons* was listed on the National Register of Historic Places on 3 October 2007. The *Kate Kelly* was listed on the National Register of Historic Places on 21 November 2007.

Cover photo: The *Daniel Lyons*' bow in 110 feet of water, nine miles northeast of Algoma, Wisconsin. Photo by Tamara Thomsen.

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CHAPTER ONE
INTRODUCTION

The Wisconsin Historical Society's Lake Michigan grain schooner survey was a joint effort between the Wisconsin Historical Society (WHS), University of Wisconsin Sea Grant Institute, Wisconsin Coastal Management Program, Wisconsin Department of Transportation, Wisconsin Maritime Museum, University of Wisconsin - Milwaukee's Great Lakes WATER Institute, Wisconsin Underwater Archaeology Association (WUAA), and the Great Lakes Shipwreck Research Foundation, Inc. (GLSRF). The surveys were funded by grants from the University of Wisconsin Sea Grant Institute, Wisconsin Coastal Management Program, and the Wisconsin Department of Transportation. Additional equipment, personnel, and logistical support were supplied by other participating organizations. The surveys were organized by the WHS's State Maritime Preservation and Archaeology (SMPA) program staff and principally staffed by WUAA, GLSRF, and WHS volunteers. Survey work was conducted between 6 June 2003 and 5 August 2005.

The WHS is the State of Wisconsin's principal historic preservation agency and is 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 WHS 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 values 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 WHS 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 WHS's SMPA 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; Jensen 1992, 1993). The SMPA program is within the WHS 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 SMPA program began the Wisconsin's Maritime Trails initiative in July 2001.

Winding above and below the waves, the Maritime Trails encompass four stretches of Wisconsin coastline and link 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 link them within the overall context of Wisconsin's, as well as the Great Lakes region's, maritime heritage (Green and Green 2004).

The Maritime Trails initiative has become the WHS'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 divers and non-divers alike to consider each unique maritime property within the broader context of Wisconsin's maritime heritage. Through websites, interpretive materials, and public presentations, the Maritime Trails initiative integrates archaeological research and public education to encourage responsible visitation of 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 WHS maintains permanent moorings on 21 historic shipwrecks statewide. The moorings facilitate recreational access, provide a means of interpreting wreck sites to visitors, provide a safe point of ascent and descent for divers, and eliminate anchor damage from recreational boaters anchoring into sites.

Dive Guides. Designed with divers, boaters, and kayakers in mind, these rugged, waterproof guides place each vessel within its historical context and highlight unique site features that might otherwise go unnoticed. In partnership with the University of Wisconsin Sea Grant Institute, the WHS has produced guides to thirty-two Wisconsin shipwrecks.

Public Presentations. Given at a variety of venues throughout the state, public presentations provide a direct, personal connection between the WHS and the general public. WHS underwater archaeologists and volunteers have reached over 19,463 people via public presentations since the Wisconsin's Maritime Trails inception.

Interpretive signage and kiosks. As of March 2006, the WHS has installed shore-side informational markers for fourteen 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 highlighting Wisconsin's historic shipwrecks are installed at the WHS's Museum on the Square, the Wisconsin Maritime Museum, the Kenosha Public Museum, the Door County Maritime Museum, and the WHS's Madeline

Island Museum. These kiosks reach an estimated 368,000 museum visitors yearly 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 heritage 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 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, hyperlinks, and maps for historic maritime venues, as well as location and historic data for shipwrecks. Wisconsin's Great Lakes Shipwrecks (www.wisconsinshipwrecks.org) is a collaborative effort between the WHS and the University of Wisconsin's 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 Wisconsin's Maritime Trails program partners with federal, state, and local agencies, chambers of commerce, private businesses, 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

Little is known about Great Lakes grain schooners. Participating in the grain trade between Lake Michigan and Lake Ontario, the grain fleet sailed some of the Great Lakes' longest voyages. During their brief heyday, however, advancements in steam technology received the lion's share of contemporary interest in Great Lakes shipping, and sailing vessels received dwindling attention as the nineteenth century progressed. As a result, much of what we will ever know about Great Lakes schooner construction is contained within the archaeological record of vessels that lay on the Great Lakes' bottomlands.

Field survey methods included both a traditional baseline survey on the *Kate Kelly* and a photo mosaic-assisted survey on the *Daniel Lyons*. Survey work was conducted along guidelines established by the National Park Service for submerged cultural resources survey and evaluation in determining site eligibility for the National Register of Historic Places. Survey research design was directed towards formulating site descriptions and archaeological assessments. Sites were approached with a package of management questions, some specific to the site itself (location, environment, parameters, integrity, extant features, artifacts), and some general questions that place the site in its broader context as a resource (historical significance, archaeological potential, recreational potential, management requirements). Research objectives had the following intents:

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 or using an offsite (surface) datum, transit and electronic distance meter.
3. Document using still photos, underwater video, and measured sketches of those architectural and archaeological elements which are diagnostic of a) vessel type, b) vessel age, c) vessel construction style and method, d) vessel propulsion, e) vessel use, f) vessel identification, 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 historical 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 SCUBA technology. Documentation included measured sketches, construction schematics, digital still and video imagery, and 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 will serve as a source for site description, analysis, interpretation, and management recommendations for use in cultural resource management planning, recreational development, and public education. It also serves as the source document for eligibility determination and nomination for listing in the National Register of Historic Places. Inclusion of these sites onto the National Register and state resource management plans is an important step in achieving long-term site preservation. Suggested plans for management include mooring buoys to facilitate recreational access 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.

The Great Lakes Grain Trade

Discussion of Wisconsin's maritime economy often requires the inclusion of the eastern Great Lakes of Huron, Erie, and Ontario. Many of Wisconsin's commodities were shipped beyond Lakes Michigan and Superior to eastern Great Lakes ports such as Buffalo, New York, and Kingston, Ontario. These distant ports returned goods, supplies, and immigrants to Wisconsin, creating a diverse regional economic universe. Separating Wisconsin from the eastern Great Lakes frequently results in a fragmented understanding of Wisconsin's maritime heritage as a whole.

Wisconsin's first encounter with a European sailing vessel occurred in 1679 when LaSalle's ill-fated *Le Griffon* landed on the Door County peninsula. LaSalle continued southward to explore the Mississippi valley. *Le Griffon*, loaded with furs bound for the European market, departed Washington Island on 18 September 1679, never to be seen again. Following *Le Griffon*, it was nearly 100 years before a sailing vessel again entered Lake Michigan. It is probable that ventures onto Lake Michigan were made by King George's Royal Navy in the 1760s, but the next confirmed sailing ship to enter the lake was John Askin's *Archange* in 1778, which sailed to Chicago and Green Bay in search of corn to supply Canadian fur traders (Quaife 1944:100). From the *Archange* to 1815, most sailing vessels on Lake Michigan supported military outposts such as Fort St. Joseph and Fort Dearborn (present day Chicago). In 1818, the *Walk-in-the-Water* was the first steamer constructed on the upper lakes. It entered Lake Michigan one year later to sail to Green Bay (Mansfield 1899:184, 596; Mills 1910:92).

By 1836, regularly scheduled steamship lines connected western Lake Michigan with eastern cities, and steam vessels were under construction at Milwaukee (Quaife 1944:150; *Milwaukee Advertiser* 1836). These steamers quickly pulled passenger traffic and high-dollar cargo from the schooners. On 21 May 1853 the Michigan Central Railway made the first rail connection with Chicago, and in 1855 the first all-rail connection between Buffalo and Chicago was established (Quaife 1944:155; Mills 1910:155). These railroads quickly stole the steamers' passenger and high-dollar cargo trade, resulting in even stiffer competition for sailing vessels. Unlike lake vessels, the rail lines could provide regularly scheduled shipments that were unaffected by weather, as well as year-round transportation unaffected by ice-covered water. Despite increasing competition, however, lake sail did not die easily. Sail's advantages were lower construction and operation costs, adaptability to many different trades, and the fact that sail technology was already at its zenith, having benefited from centuries of technological development. Sail required less capital investment, its propulsion cost nothing, and the smaller crews were inexpensive relative to steamers.

A unique vessel type developed on the Great Lakes that was designed to transit the Welland Canal locks while carrying the largest possible amount of cargo; these box-shaped vessels were called "canallers." Designed to carry the maximum amount of cargo through the canal locks with only inches to spare, canallers had bluff bows, flat bottoms and sterns, short bowsprits, and highly-canted jib booms. Some canallers were rigged with a hinged or shortened jib boom 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 stern. 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 2000:32-34; *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, reducing the physical labor of towing ships from lock to lock (Aitken 1997; Mansfield 1899:229-239; St. Lawrence Seaway Management Corporation 2003:2-5).

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 1899:529).

It wasn't until the 1840s, however, that the Great Lake grain trade began in earnest. Chicago grain exports between 1834 and 1840 totaled 13,765 bushels (Mills 1910:116). 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 2000:60). 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 was 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 steamers. During the 1860s, rates dropped to between 4 and 7 cents

per bushel. From 1874 onward, rates began a constant decline, reaching 1.53 cents per bushel by 1898 (Cooper 1988:44; Mansfield 1899:535; Mills 1910:116).

The Lake Michigan 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 1988:41). Buffalo and Oswego were early rivals for Lake Michigan 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 1899:526).

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 Lake Michigan grain, and in 1880 rail tonnage finally exceeded lake tonnage (Mansfield 1899:530).

CHAPTER TWO
DANIEL LYONS

Historical Background

The *Daniel Lyons*, official number 6780, slid down the ways at 4:45 P.M. on Monday, 3 February 1873 (Figure 1). Originally scheduled for three o'clock, the launch was a much-anticipated break from the long Oswego winter and the extra hour and forty-five minute wait was worthwhile. The large amount of pageantry and celebration that accompanied the *Daniel Lyons'* launch marked the height of Oswego's shipbuilding era. The twenty-fifth of thirty-four ships built by George D. Goble, Jr., the *Daniel Lyons* was Oswego's first three-masted schooner (*Oswego Daily Palladium* 1873a, 1906). Built by the Goble & MacFarlane Shipyard for owners Daniel Lyons and George Goble, she was 142.5 feet in length, 26 feet in beam, 11 feet deep, and 318 gross tons (*Daily News* 1873a). The *Lyons*' hull lines were based on Goble's previous two-masted schooners *Nassau* and *Madeira*, but built to larger dimensions with an additional mast. Her construction cost was $27,000, and her insurance rating was A1 (*Oswego Daily Palladium* 1873a).

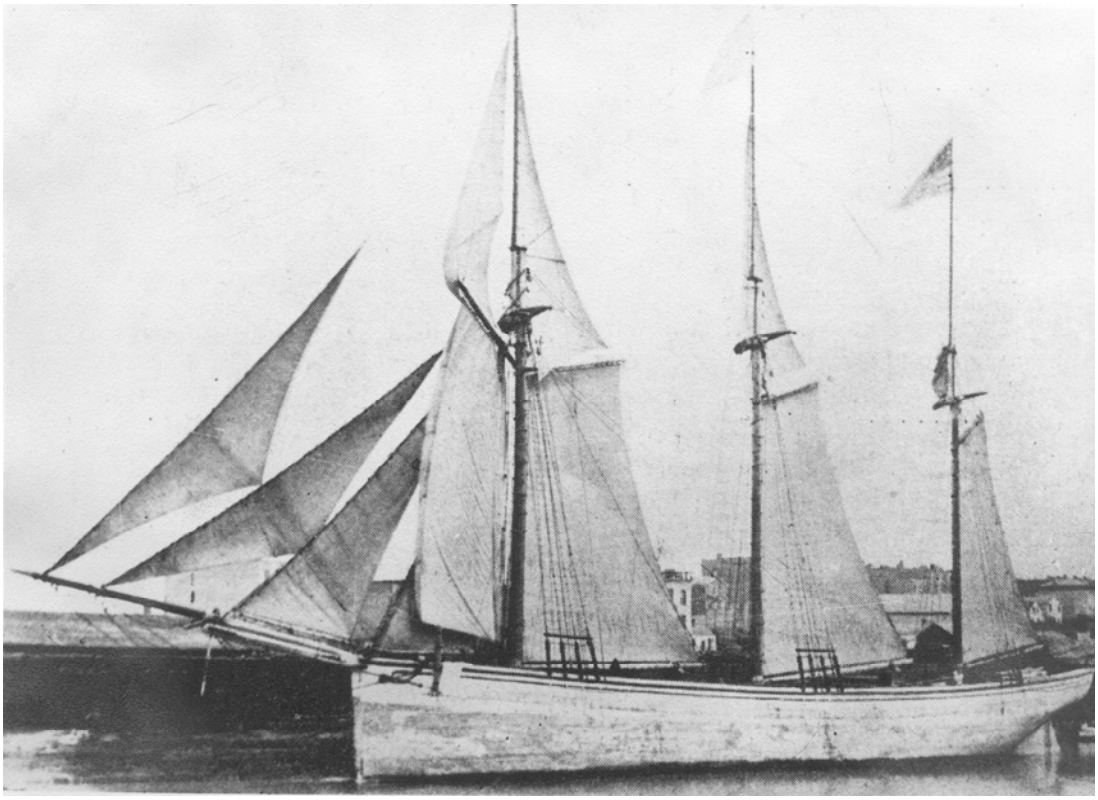

Figure 1. The *M. J. Cummings*, built by George Goble following the *Daniel Lyons*. The two vessels were nearly identical. Historical Collections of the Great Lakes, Bowling Green State University.

The *Lyons*' launch was such a grand occasion that the *Oswego Daily Palladium* (1873a) captured the excitement in a poem:

> "And at the word,
> Loud and sudden there was heard,
> All around them and below,
> Knocking away the shores and spurs.
> And see! She stirs!
> She starts, -she moves, -she seems to feel
> The feel of life along her keel,
> And spurning with her foot the ground,
> With one exalting joyous bound,
> She leaps into the ocean's arms!
> And lo! From the assembled crowd
> There rose a shout prolonged and loud,
> That to the ocean seemed to say,
> Take her, bridegroom, old and gray,
> Take her to thy protecting arms,
> With all her youth and all her charms."

George D. Goble, Jr. was a prominent Oswego businessman. Born on 1 August 1819 in Cork, Ireland, Goble learned the shipbuilding trade from his father in Ireland before immigrating to Oswego, New York at the age of eighteen (*Oswego Daily Times* 1906; Steen 2002). In 1844, the twenty-five-year-old Goble married Sara Collins, an eighteen-year-old Irish immigrant who bore him seven children: George William (1844), Nicholas C. (1847), Joseph Heron (1849), Thomas C. (1851), Frederick (1855), Hioniasy (Bella) (1858), and Catherine E. (Nellie) (1862).

Goble worked in the Oswego shipyards for nineteen years before he began his own shipyard at the foot of West Fourth Street, where he launched his first schooner, *Titan,* on 6 May 1856. Goble's sons George III, Nicholas, and Thomas followed in their father's footsteps and became shipbuilders in their father's shipyard. Joseph Goble went away to school, but later returned to work in the Goble shipyard office (Oswego Maritime Foundation 2004; Steen 2003). The Goble yard operated at the Fourth Street yard for twelve years before moving to the foot of West First Street. At the new location Goble leased property from the Ontario Dry Dock Company and reestablished the Goble shipyard and dry dock there in 1868 (Oswego Maritime Foundation 2004). When Goble launched the *Daniel Lyons* in 1873, Oswego was at its height as a shipping port with 684 vessels enrolled at the Oswego Customs House. By 1896, however, only 27 vessels remained on the Oswego rolls (*Oswego Daily Palladium* 1897). By the time George Goble passed away on 14 October 1906, Oswego's heyday as a grain port was long past. The Goble shipyard continued operating for another six years following George Goble's death, but finally closed its doors for good in 1912 (Palmer 1991; Oswego Maritime Foundation 2004).

Daniel Lyons was proprietor of the distinguished Daniel Lyons & Son chandlery (formerly Lyons & Finney) of Oswego. Daniel Lyons & Son furnished rigging and supplies for many of the Oswego shipyards, including Goble's (*Oswego Daily Palladium* 1874a, 1874b, 1874c, 1878, 1897). The Lyons / Goble partnership

included joint ownership of several Goble-built vessels, including the *Daniel Lyons*, *Westside*, *M.J. Cummings*, and *Montauk* (*Oswego Daily Palladium* 1863, 1874d, 1896). Daniel Lyons was active in Oswego County's Democratic Party and a delegate to the First Assembly District Democratic Convention in 1871. Ironically, partner George D. Goble was active in the Republican Party (*Oswego Daily Journal* 1853, 1871; *Oswego Daily Times* 1906).

The *Daniel Lyons* was a canaller, built to the maximum allowable dimensions to transit the Welland Canal, and became the standard for a series of Goble-built canal schooners (*Buffalo Evening Post* 1873). Five additional canallers quickly followed the *Lyons*: the *Atlanta* built for Thomas S. Mott in May 1873, the *Sam Cook* built for A.G. Cook in September 1873, the *M.J. Cummings* launched in January 1874, and the *J. Maria Scott* and *Bolivia*, both launched in May 1874. Together with the *Daniel Lyons*, these schooners became signature vessels for Oswego and the Goble yard. All six vessels were 143 feet in length; 26 feet, 3 inches in beam, and 11 feet, 3 inches in depth of hold. The largest vessels that could transit the Welland Canal, they could carry 18,500 bushels of wheat through the canal locks. Their full lake capacity was 22,500 bushels, suggesting that a portion of the cargo was unloaded before entering the locks (*Oswego Daily Times* 1873). The *Daniel Lyons*' initial enrollment was entered on 8 April 1873 at the Port of Oswego. Ironically, she was registered as having only two masts, a clerical error that would be repeated on all of her enrollments (Bureau of Navigation 1873a, 1874a, 1874b).

Captain John Blackburn was the *Daniel Lyons*' first master (Bureau of Navigation 1873a). Born in Londonderry, Ireland, on 15 June 1832, Blackburn began sailing with his uncle at the age of ten in the Irish coasting trade. At age fourteen, Blackburn immigrated to United States and soon after shipped out as a lamp boy on the propeller *Hibernia*. He then sailed aboard the schooner *Royalist* before moving to Oswego, New York, where he took up residence in December 1854. At Oswego, Blackburn continued working as a sailor aboard the schooners *Mary*, *Caroline*, and *Jessie Drummond* until the Civil War, when he joined the Union Navy to serve aboard the supply steamer *Vanderbilt* and later the gun boat *Albatross* (*Oswego Daily Palladium* 1886). Following the war, Blackburn returned to the lakes as master of the schooner *Traveler* and later the *Glad Tidings.* From 1871 to 1873, Blackburn was master of the Goble and Lyons' schooner *Westside* before taking command of the *Daniel Lyons* (*Daily News* 1873b; *Oswego Daily Palladium* 1886).

Blackburn commanded the *Daniel Lyons* from her launch through the 1876 shipping season. Under Blackburn's command, the *Daniel Lyons*' appears to have led a rather uneventful career as a grain trader, with the possible exception of surviving the raging storm of 27-28 October 1873 that claimed six Oswego vessels and crew: *Albion*, *Roman*, *Opeeche*, *Hastings*, *Persian* and *Gilbert Mollison* (*Oswego Daily Palladium* 1873b). A search of contemporary newspapers uncovers only the occasional mention of her passage on the Welland Canal.

Blackburn became the Port of Oswego's harbormaster at the start of the 1877 season, a position he held for less than one season. Later that year, on 14 October 1877, the United States Life Saving Service chartered a station at Oswego and Blackburn left his harbormaster position to take command of the new station (*Oswego Daily Palladium* 1886, 1873b). It appears that Captain Michael M. Holland took command of the *Daniel Lyons* at the start of the 1877 shipping season, although this is not reflected in the *Lyons'* enrollments (Bureau of Navigation 1874a; *Oswego Daily Palladium* 1866).

Contemporary newspaper accounts list a nearly complete record of the *Daniel Lyons*' 1877 season, documenting her transits up and down the Welland Canal (Table 1). It is uncertain where the *Daniel Lyons* wintered over between the 1877 and 1878 seasons, but it appears that Capt. Holland was again in command for the 1878 season.

Date	**Reporting Location**	**Direction**	**Route**	**Cargo**
5 June 1877	Port Colburne	Down	Chicago-Kingston	Barley
21 June 1877	Port Colburne	Up	Fairhaven-Chicago	Coal
26 July 1877	Port Colburne	Down	Chicago-Kingston	Corn
15 August 1877	Port Colburne	Up	Oswego-Chicago	Coal
4 September 1877	Port Colburne	Down	Chicago-Kingston	Corn
18 September 1877	Port Colburne	Up	Oswego-Chicago	Light
16 October 1877	Port Colburne	Down	Chicago-Kingston	Wheat

Table 1. List of dates, routes, and cargoes for nearly all of the *Daniel Lyons*'1877 season (*Daily News* 1877a, 1877b, 1877c, 1877d, 1877e, 1877f, 1877g)

As with previous seasons, the 1878 season appeared to be drawing to a close as another happily uneventful year. Around one o'clock in the morning on Thursday, 17 October 1878, the *Daniel Lyons* departed Chicago with 20,000 bushels of wheat consigned to J.B. Griffin & Company of Black Rock (Buffalo), New York, from Chicago's D.W. Irwin & Company. Captain Holland was in command, with First Mate Owen Madden, Second Mate Daniel Gunn, Cook W.H. Barder, and four unnamed seamen (*Milwaukee Sentinel* 1878). The trip north along Wisconsin's shoreline was unremarkable in the light westerly wind and clear skies. With a bright waxing moon around three o'clock in the morning on 18 October, the wind veered to the northwest just after the *Daniel Lyons* passed Ahnapee (Algoma). First Mate Madden was at the helm, and he swung the *Daniel Lyons'* course to the northeast to accommodate the shift in wind (*Chicago Inter-Ocean* 1878; *Detroit Post & Tribune* 1878b).

Aboard the *Lyons*, Madden saw the red and green running lights of the schooner *Kate Gillett* (Figure 2) about a mile north of the *Lyons*. The *Kate Gillett* was a two-masted schooner 129 feet in length, 30.16 feet in beam, and 9.66 feet in depth. Built in 1867 by J.J. Miller in Conneaut, Ohio, the *Kate Gillett* was heavily laden with fence posts from Cedar River, Michigan, bound for Chicago (Board of Marine Inspectors 1871). The *Kate Gillett*'s mate was also at the helm as the two vessels converged.

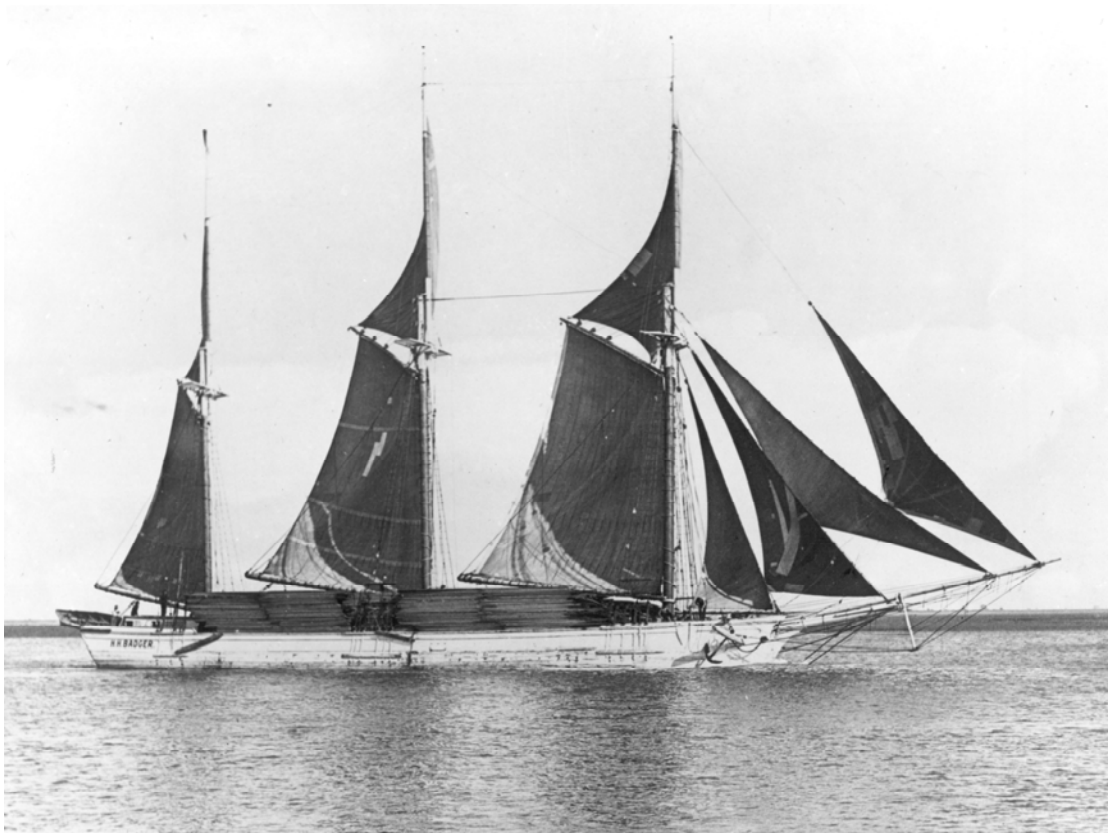

Figure 2. The *Kate Gillett* after her 1882 rig change from two to three masts, and name change to *Horace H. Badger*. Historical Collections of the Great Lakes, Bowling Green State University.

With the wind off her head, the *Daniel Lyons* had the right-of-way. As the two vessels approached one another, Madden lost sight of the *Kate Gillett*'s red running light, indicating the *Kate Gillett* altered her course to port so the two vessels would safely pass starboard to starboard. Minutes later, however, the *Gillett*'s green light disappeared and only the red light was visible, indicating the *Kate Gillett* had turned to starboard and a collision was imminent (*Chicago Inter-Ocean* 1878; *Detroit Post & Tribune* 1878b). Madden swung the helm in a desperate attempt to avoid the collision, but the *Kate Gillett*, traveling at 9 knots, struck the *Daniel Lyons'* starboard side between the main- and mizzenmast, pushing her stem nearly halfway through the *Lyon*'s hull. The collision's force threw the *Daniel Lyons'* cook from his bunk (*Milwaukee Sentinel* 1878). Lodging together, much of the *Kate Gillett*'s broken head gear crashed onto the *Daniel Lyons*' deck. Suffering damage to her starboard bow, the *Kate Gillett* quickly began leaking (*Detroit Post & Tribune* 1878a; *Manitowoc Pilot* 1878; *Port Huron Daily Times* 1878).

With the *Kate Gillett*'s bow cutting the *Daniel Lyons* nearly in two, there was no question the *Daniel Lyons* was mortally wounded. The *Kate Gillett*'s Captain, Jerry McCarthy, worked to keep the *Gillett's* bow deep in the *Lyons* in an effort to keep her from flooding until her crew could escape onto the *Gillett*. The two vessels remained locked together for 15 minutes while the *Daniel Lyons*' crew scrambled to save their

possessions. Captain Holland saved some of his clothing and the ship's books; the crew saved a portion of their belongings, the small boat, and a few lines before the two vessels separated around four o'clock in the morning. The *Daniel Lyons* settled quickly at the stern, rolled onto her port side, and sank bow first[1] (*Chicago-Inter Ocean* 1878; *Detroit Post & Tribune* 1878b).

Leaking badly, the *Kate Gillett* continued toward Chicago. Both the *Gillett*'s and the *Lyons*' crew worked continuously at the pumps to keep her afloat. Capt. McCarthy kept the *Gillett* close to shore as she sailed towards Chicago as a safety precaution should the water in the hold begin gaining on the pumps (Boyd and Defnet 2002). The *Gillett* safely made Chicago at five o'clock in the afternoon on Saturday, 19 October (*Chicago Inter-Ocean* 1878).

The day following the accident, the schooner *Skylark* encountered the *Lyons*' wreckage while en route to Racine. Eight miles north of Ahnapee and about five miles from shore, the *Skylark*'s Captain Councer reported that the *Daniel Lyons*' white topmasts were protruding from the water, still topped with gilt balls and flying her new red and blue pennant. Her cross trees were submerged and the fore-mast had been carried away. Dispatches went out announcing the navigation hazard (*Chicago Inter-Ocean* 1878; *Detroit Post & Tribune* 1878b).

At Chicago, Capt. McCarthy refused to accept responsibility for the accident and blamed Madden's actions in causing the collision. Capt. McCarthy stated that upon seeing the *Daniel Lyons'* lights, the *Gillett* changed course one point (11 degrees) to the west. In turn, Madden adjusted the *Lyons*' course and lost the wind, preventing the *Gillett* from safely crossing the *Lyons'* bow. The *Gillett* then maneuvered to clear the *Lyons*' stern, but was too late and collided with her starboard side (*Chicago Inter-Ocean* 1878).

Captain Holland made no public rebuttal, but the *Lyons*' crew related that the *Gillett*'s captain was in error in attempting to cross the *Daniel Lyons*' bow as the *Lyon*'s had the right-of-way. The *Gillett* was legally required to keep clear of the *Lyons*. If the *Gillett* had altered her course to port rather than starboard, a clear starboard to starboard passage would have been achieved (Boyd and Defnet 2002; *Chicago Inter-Ocean* 1878; *Chicago Tribune* 1878).

The *Kate Gillett* was owned two-thirds by J.V. Taylor of Taylor, Bush & Company, and one-third by Captain Jerry McCarthy, both of Chicago. Eleven years old at the time of the collision, the *Gillett* was an aging vessel and carried no insurance. A lawsuit taken out against the *Gillett* by the *Lyons* could only recover the *Gillett* herself, whose value was one-seventh that of the *Daniel Lyons* and her cargo. The *Daniel Lyons*' cargo was insured by the Chicago Marine Insurance Pool for $10,500 (*Chicago Inter-Ocean* 1878). Her hull was valued at $15,300, and insured by both the Orient Mutual Insurance Company and Detroit Fire and Marine Company for $4,000 each (*Detroit Post & Tribune* 1878b). It is uncertain if a lawsuit was ever filed against the *Gillett*.

[1] The *Milwaukee Sentinel* (1878) published a somewhat different account that described the crew's bags and the captain's trunk and papers loaded into the small boat. The boat was lowered and the crew pulled away before the *Lyons* sank. Only then did the *Kate Gillett* come about to pick up the destitute mariners.

The *Daniel Lyons*' final enrollment was surrendered at the Port of Oswego on 31 December 1878 (Bureau of Navigation 1874a). Capt. Holland went on to captain several other Oswego vessels, including the schooner *Sage*, before accepting the office of Inspector of Hulls for the Oswego District in 1888 (British Whig 1880, 1888a).

The *Daniel Lyons* was quickly forgotten and her remains lay undisturbed for 107 years until 1985, when Kent Bellrichard relocated the *Daniel Lyons* using local fishermen's tips. Andy LaFond, an Algoma commercial fisherman, assisted the divers in recovering the *Daniel Lyons*' two wooden stock anchors and assorted rigging. The anchors were placed outside LaFond's Algoma fish house (Milwaukee Public Library n.d.).

Description of Field Research and Findings

On 27 June 2003, with the aid of the Neptune's Nimrods dive club, a permanent mooring was emplaced at the *Daniel Lyons* site. A screw anchor system, in use on several Wisconsin wrecks, was installed over the course of several dives. Three six-foot screw anchors were turned into the lakebed by divers approximately 40 feet off the vessel's starboard bow. The anchors were turned into the sand bottom to a depth of approximately four feet by placing a pipe through the anchor's eye with a diver (with fins removed) on each end of the pipe. The divers would then walk a circle around the anchor, turning it four inches into the bottom with each revolution, much like sailors turning a capstan. When all three anchors were embedded in a triangular pattern four feet apart, a swiveled, 5/16 in. galvanized mooring chain was attached to the anchors with a three-leg, 5/16 in. galvanized chain bridle. The mooring chain runs from the anchors up to an 14 in. diameter submerged buoy at a depth of 60 feet, and then on to an 18 in. diameter mooring buoy at the surface. The submerged buoy acts as a shock absorber for the mooring anchors when dive boats are attached in rough seas.

The *Daniel Lyons* survey was designed as a Phase II predisturbance archaeological survey of the shipwreck nine miles northeast of Algoma in Kewaunee County (Figure 3) (44° 40.241' N, 087° 17.712' W). Predisturbance surveys involve the documentation of the site as it lays, with no excavation or artifact retrieval. Diagnostic artifacts that may indicate the site's age or identification are measured, sketched, photographed, and left in place. Predisturbance surveys have very little impact on a site, and are relatively inexpensive compared to Phase III excavations. The *Daniel Lyons* was selected for survey for the information it could provide on Great Lakes schooners and the grain trade.

The *Daniel Lyons* lays in 110 feet of water, somewhat broken up, but with nearly all hull structure and rigging represented. Bottom temperatures ranged from 40-42° Fahrenheit, with visibility varying from 40 to 100 feet. To maximize both bottom time and safety, all dives were conducted using 34% Nitrox as a bottom gas and 100% oxygen as a decompression gas. All divers utilized redundant SCUBA systems with manifolded tanks with an isolation manifold.

Figure 3. *Daniel Lyons* wreck site northeast of Algoma, Wisconsin.

On 21 June 2005, WHS archaeologists and volunteers video-recorded the site to gather digital images used in constructing a digital photo mosaic. Images were gathered with a Sony 3 CCD Megapixel Handycam in a Light & Motion Bluefin underwater housing attached to the nose of a Silent Submersion UV-26 Diver Propulsion Vehicle (DPV) (Figure 4). With the DPV in a horizontal position, the camera was aimed directly at the bottom. A bubble level was mounted on the camera housing to aid the diver piloting the DPV in keeping the camera at right angles to the bottom at all times. In this manner, the DPV pilot "flew" the DPV and camera over the *Daniel Lyons* site approximately 20 feet above the lakebed, continuously recording video. Lanes were close enough to allow an overlap of video footage of several feet between lanes, ensuring the entire wreck site was recorded without gaps. Four hundred twenty-three successive, overlapping still images were captured from the digital video. These images were then hand-assembled in Adobe Photoshop 7.0 and printed in a scale of one inch equals four feet (1 in. = 4 ft.) (Figure 5). Because of large variations in site relief, scale errors were introduced into the mosaic through varying lens-to-wreck distances. The wide-angle lens (necessary to gather as much data as possible in a limited bottom time) introduced additional parallax error at the lens's periphery. These errors made site plan production directly from the photo mosaic problematic. Hull structures in the photo mosaic, therefore, needed to be checked for accuracy and any errors corrected. A few wreck details were missing or blurred in the mosaic, requiring further on-site correction.

Figure 4. Capturing digital images for *Daniel Lyons* photo mosaic with DPV. Photo by Tamara Thomsen.

The printed mosaic was overlaid with graph paper and traced with pencil atop a lighted table. This produced a preliminary site plan with gross site features with varying degrees of detail and accuracy. Project divers were then assigned wreck sections, which were traced from the preliminary site plan onto waterproof Mylar film. Attached to a waterproof slate, the Mylar film allowed divers to take an exact copy of the site plan with them to the bottom. Divers were instructed to correct any errors on their assigned section, as well as record accurate measurements and construction details. This focused diver efforts on specific tasks and eliminated time spent hand-sketching gross wreck features while in-water. All measurements were recorded in tenths of a foot to minimize recording errors and later converted to feet and inches using a Calculated Industries Model 8525 calculator set to a fraction resolution of 1/8 inch.

The Phase II survey allowed archaeologist to identify and record in plan view the overall underwater site while recording wreckage detail for archaeological interpretation (Figure 6). The *Daniel Lyons* survey was designed to answer several questions as part of an overall research design. The primary objective was to document Great Lakes canal schooner construction. A second objective was to identify collision damage and compare with historical records to verify accident details. A third objective was to provide positive vessel identification through identifying marks or artifacts.

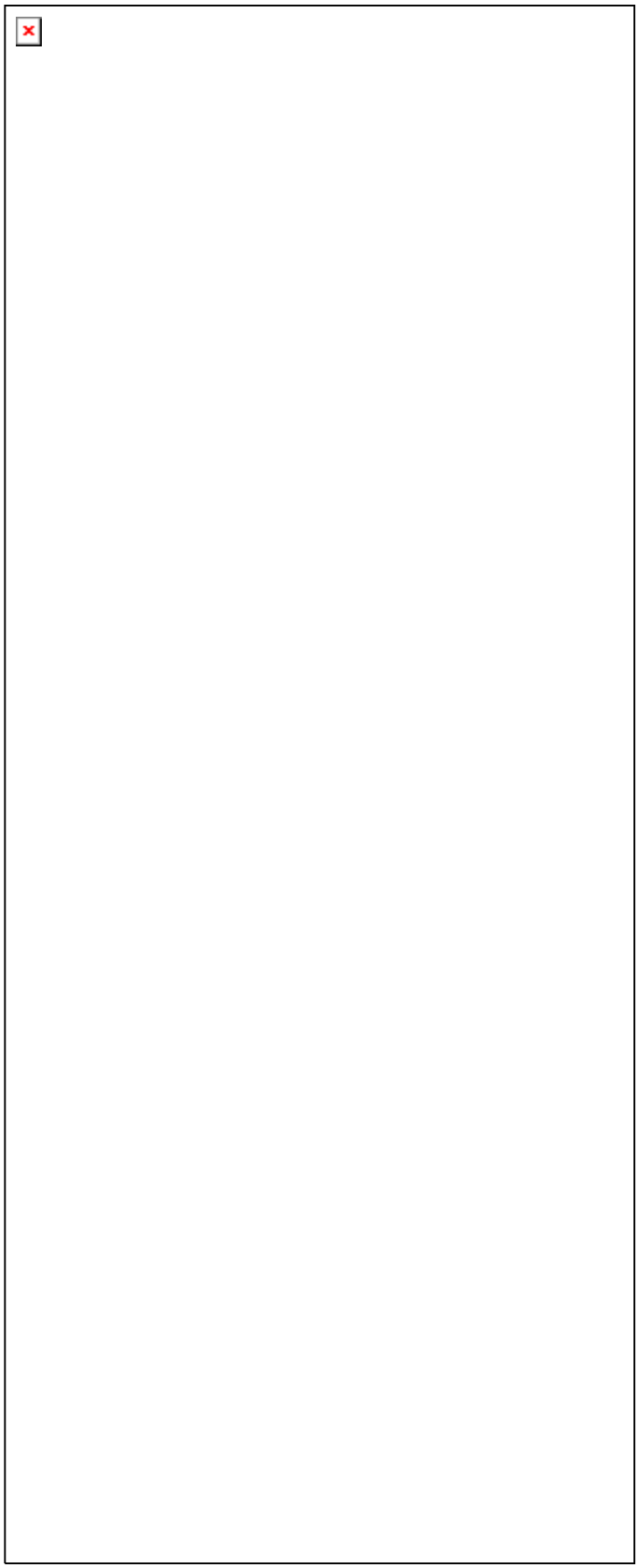

Figure 5. *Daniel Lyons* photo mosaic.

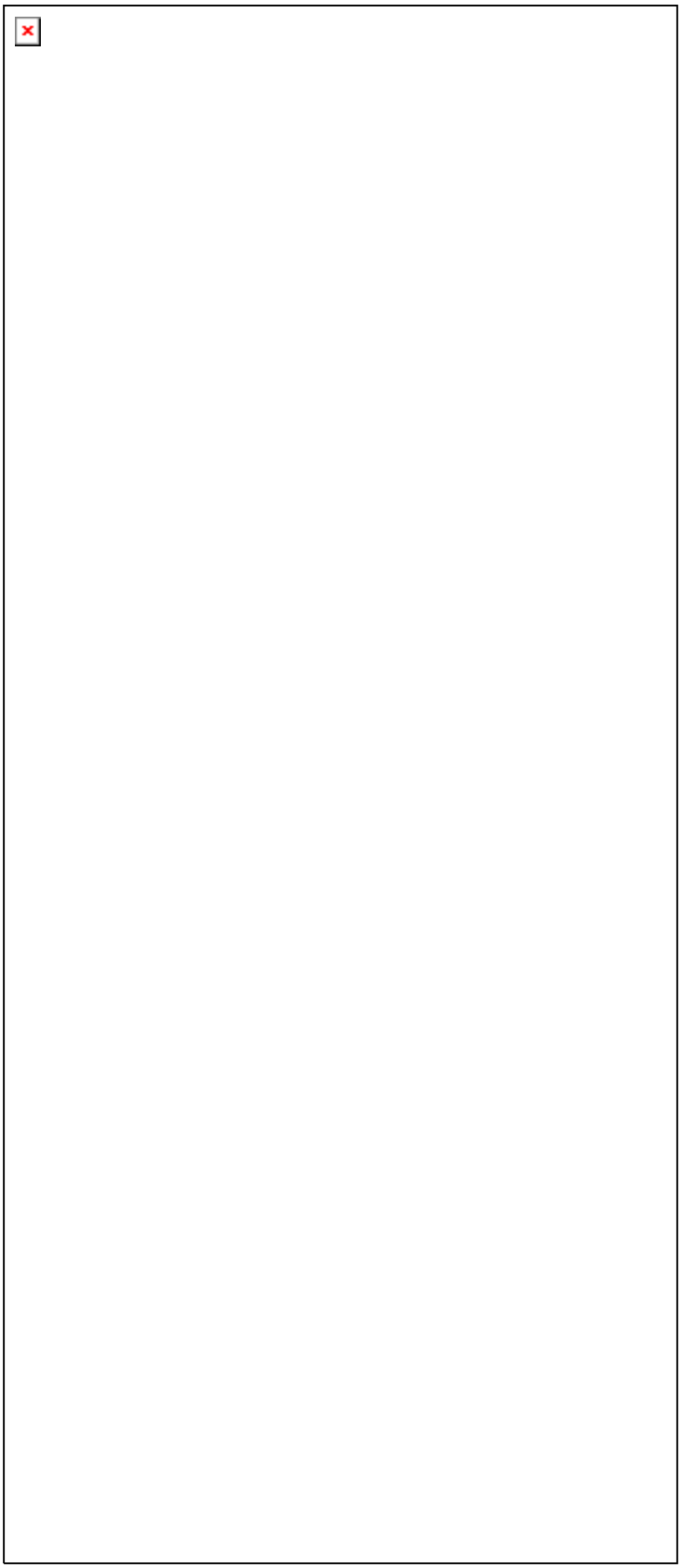

Figure 6. *Daniel Lyons* site plan.

Despite having a collapsed hull, the *Daniel Lyons* site represents a nearly complete Great Lake's schooner. The collapsed hull exposes many construction details not visible on more intact vessels. The *Daniel Lyons* lays on the lakebed at a heading of 305 degrees. Both hull sides have collapsed to port, and the vessel's stern is scattered off the wreck's starboard quarter. The centerboard trunk remains intact and standing. The centerboard chain runs from the centerboard inside the trunk to the centerboard winch that lays near the trunk's port side. Both stem and stern posts are intact with deadwood. Much of the standing and running rigging is present, including masts, topmasts, gaffs, booms, and wire rope – all strewn about the wreck site.

The *Daniel Lyons*' bow is the site's most visually impressive feature (Figure 7). Before toppling to port, the bowsprit and jib boom dislodged from their location atop the stempost and split the bow in two along the stempost's starboard side, coming to rest atop the keelson. The jib boom is 53 ft. 6 in. in length and tapers slightly toward its tip, measuring 1 ft. 3-5/8 in. in diameter at its base and 11 in. in diameter at its center. Jib stays were fastened to the jib boom with two iron rings that are located 3 ft. 2 in. and 11 ft., respectively, from the jib boom's tip. Twenty-two feet from the jib boom's base is an iron ring that still fastens the jib boom to the end of the bowsprit. A 6 in. tenon protrudes from the base of the jib boom that secured the jib boom to the bowsprit by a mortised wooden block that remains intact atop the bowsprit. The bowsprit lays beneath the jib boom and extends 25 ft. 6 in. from bow. The bowsprit continues beneath the starboard side hull, which lays somewhat flattened over the bowsprit, stempost, and deadwood. A tangle of wire rigging lays around the bowsprit, as well as a sail gaff, complete with jaws, that lays immediately to starboard of the jib boom.

Figure 7. *Daniel Lyons'* bow. Note diver in upper left. Photo by Tamara Thomsen.

The canaller's bluff bow is readily apparent. The stempost is 7 in. sided by 2 ft. 2 in. molded, and is rabbeted to accept the outer hull planking. Its leading edge is protected with a stem iron that is beginning to separate at the stempost's upper end. The stem iron has a 90 degree bend at its top that hooks onto and partially covers the top of the stempost's uppermost surface. The starboard bow's outer hull planking is 6 in. wide and 2-3/8 in. thick, and is intact with the exception of the foot of the bow. The starboard knighthead remains fastened to the outer hull planking's leading edge. The lower 4 ft. of 6 starboard cant frames are visible where the outer hull planking is absent. Square frames aft of the cant frames are absent, having broken above the turn of the bilge and are now obscured beneath the outer hull planking.

An 8 in. diameter hawse pipe remains intact, centered 6 ft. from the railcap and 4 ft. from the bow. The starboard anchor chain runs through the hawse pipe and lays in a small loop atop the starboard side hull before ending in the sand. Neither anchor is present, having been salvaged in 1985 by local divers and fisherman (Milwaukee Public Library n.d.). Six bulwark stanchions are visible where the bulwark planking is missing, measuring 6 in. sided and 9-5/8 in. molded, spaced 2 ft. on center. Eight feet aft of the bow is an iron open chock that is fastened atop the railcap.

The starboard side lays ceiling down and is nearly intact from the stempost to 106 feet aft where there is a clean break from the collision with the *Kate Gillett*. Portions of the bulwark have been crushed where the starboard side has collapsed onto the centerboard trunk. Three foremast chainplates are extant on the starboard side. The forward most forechain is 33 ft. 6. in from the bow, the second forechain is 2 ft. 10-3/4 in. aft of the first, and the last forechain is 2 ft. 2-3/8 in. aft of the former. The mainmast was supported by four chainplates. The two forward mainchains are absent, but evidence of their fastenings is visible. The first extant mainchain is 82 ft. 3-5/8 in. from the bow, and the second mainchain is 3 ft. 2-3/8 in. aft of the former. The chainplates themselves are 3-5/8 in. wide by 5 ft. 10-3/4 inches long. Mainchain deadeyes are 8-3/8 in. in diameter and 3-5/8 in. thick, with 1-3/4 in. in diameter holes.

Immediately aft of the starboard side's collision damage lays the stern, complete with a fragment of the keel, keelson, deadwood, cant frames, outer hull planking, and fashion timber (Figure 8). The keel is broken 7 ft. aft of the mizzenmast step, and the large stern structure now lays approximately 40 feet north of its former location, likely the result of an entanglement with fishing nets. The broken keel section is 10 ft. 6 in. in length. A filler piece rides atop the keelson. Three deadwood timbers ride atop the filler piece, between the filler and the inner post. Cant frame fragments are extant on the starboard side, fastened to the deadwood with iron bolts. Fragments of outer hull planking are extant on the starboard cant frames as well as over the port side's keel / stern post interface. The stern post is 16 ft. 7-1/4 in. long, 10-1/4 in. sided by 10-1/2 in. molded. The stem post's aft surface is recessed to accept the rudder post. An inner post is attached to the stern post's forward edge, and measures 1 ft., 5-3/8 in. molded. The inner post runs from the keel to the underside of the fashion timber. The fashion timber is 18 ft. in width, and rises ten feet above the lakebed in its current position.

Figure 8. Stern section with keel, deadwood, cant frames, outer hull planking, and fashion timber. Mizzenmast step and keel is visible in upper right. Photo by Tamara Thomsen.

Immediately outboard of the sternpost, laying ceiling up, is the starboard side hull from the collision damage aft, measuring 33 ft. 6 in. in length. This section contains both square and cant frames for the entire run of the hull. Both square and cant frames are double framed. Each futtock is 4-1/2 in. sided by 8-3/8 in. molded. Frame spacing varies slightly between 1 ft. ¾ in. and 1 ft. 5-1/2 in. Ceiling planking averages 8 in. wide by 3-5/8 in. thick. Two hanging knees remain attached atop the ceiling planking, each knee is 4 ft. 3-5/8 in. along the body, 2 ft. 4-3/4 in. along the arm, and 8 in. sided. A pin rack with intact belaying pins is extant, as well as a pin rack fragment that lays on the lake bed between the two starboard hull sections.

The intact transom lays abaft of the keel. The transom has no counter and has overall dimensions of 18 ft. 10-3/4 in. wide and 7 ft. 6 in. tall (Figure 9). The transom's outboard ends retain the side counter timbers that originally fastened to the fashion timber's ends. Two post timbers remain extant, each 6 ft. in height. There are five horn timbers on either side of the post timbers that measure (from the post timbers outboard) 6 ft., 5 ft. 6 in., 5 ft. 3-5/8 in., 4 ft. 9-5/8 in., and 4 ft. 4-3/4 in. in height. The horn timbers vary in sided dimension from 4-3/4 in. to 6 in., and vary in molded dimension from 6-5/8 in. to 7-1/4 in. Both the post and horn timbers are cut to join with the fashion timber, fastened with iron bolts. A single-sheave mizzen sheet block remains attached above the post timbers. The two outermost horn timbers retain iron rings attached near their upper ends. Stern knees at the top of either side's counter timber measure 2 ft. 1-1/4 in. along both the arm and body and 1 ft. 4-3/4 in. at the throat.

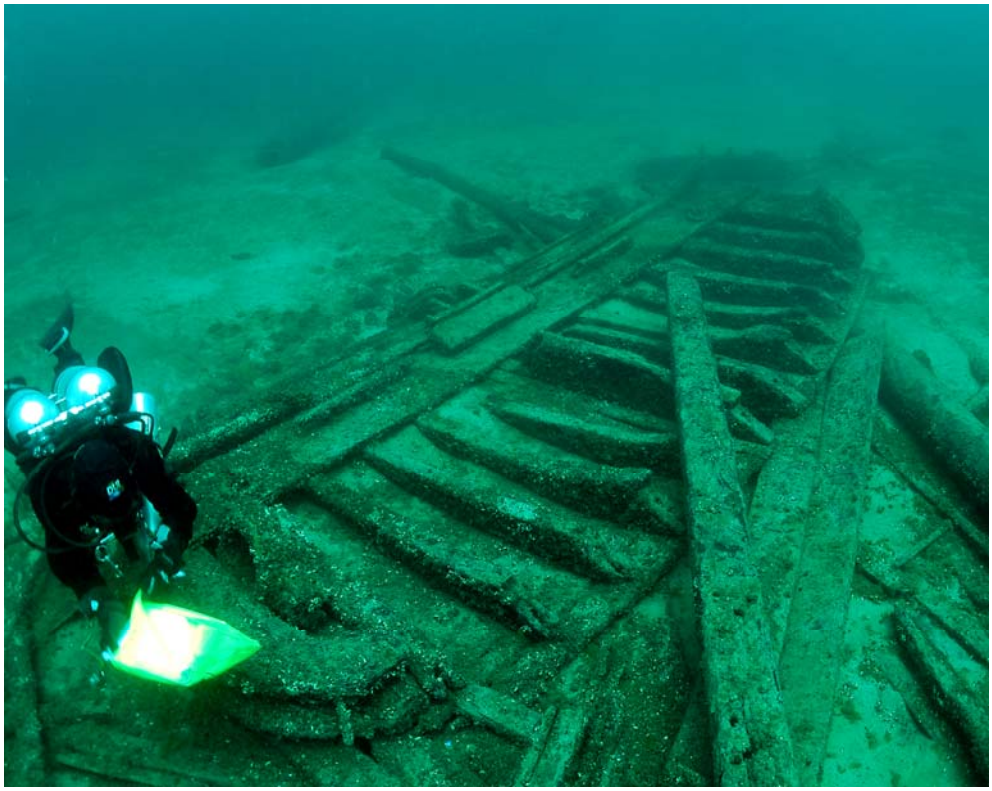

Figure 9. WHS research diver documenting the transom. Photo by Tamara Thomsen.

The port side hull has collapsed outward and lays ceiling up on the lakebed. The port side is largely intact for its entire length with the exception of the port quarter, which is separated by a break 32 ft. 5 in. forward of the transom. The port quarter section's ceiling is planked in widths varying from 6 in. to 1 ft. 4-3/4 in. Three mizzen chainplates are extant 15 ft. forward of the transom, with all three chainplates equally spaced at 1 ft. 5 in.

Forward of the port side hull break, the port side is double framed with 5 in. sided and 7-1/4 in. molded futtocks. Frames are spaced at 12 in. Ceiling planking is 3 in. thick and varies in width from 8 in. to 1 ft. 6 in. The two uppermost strakes, beneath the hanging knees, are somewhat thicker at 4 in., and are 1 ft. 7 in. and 1 ft. 5 in. wide. Deck beams are 6 in. sided and 7-1/2 in. molded and are spaced at 3 ft. 9-5/8 in. on center. Each deck beam was supported by a hanging, lodging, and bosom knee. Hanging knees are 2 ft. 8-3/8 in. along the arm, 2 ft. 3-5/8 in. along the body, 1 ft. 2-3/8 in. at the throat, and 6 in. sided. Lodging and bosom knees are 2 ft. 8-3/8 in. along the arm, 2 ft. along the body, 10-3/4 in. at the throat, and 4-3/4 in. sided. Bulwark stanchions are separate timbers fastened between frame sets, rather than extensions of the top timbers.

Three sets of mooring bitts are located along both the port and starboard sides. The foremost bitts are located 32 ft. aft of the bow. The aft most bitts are located 32 ft. forward of the transom, and the amidships bitts are equidistant between the other two sets. Each bitt set is constructed of square timbers 4 ft. 6 in. tall, 9-5/8 in. sided, and 8-3/8 in. molded. The bitt timbers are spaced 2 ft. 6. in. on center. The foremost bitt has a closed wooden chock that passes through the bulwark planking between the bitts at deck level.

At the bow, sandwiched between the port and starboard sides, are the remains of the forecastle deck, sampson post, windlass, and chain locker. The curve of the starboard bow holds the starboard side somewhat off the wreckage beneath it, allowing limited access to the forward keelson and foremast and sampson post steps. Both steps are U-shaped, opening towards the stern. The sampson post step is 1 ft. 6 in. long and 6 in. wide, and rises 3-5/8 in. above the keelson. The foremast step is 8 ft. feet aft of the sampson post step, and measures 2 ft. 9-5/8 in. long, 1 ft. 2-3/8 in. wide, and rises 3-5/8 in. above the keelson; mortise dimensions are 1 ft. 7-1/4 in. long by 4-3/4 in. wide.

The sampson post has fallen towards the port quarter, and the windless now rests atop the forecastle companion way (Figure 10). The forecastle companion way is 3 ft. square on the outside of the combing. The combing is 10-3/4 inches tall on its inside edge, and 3-5/8 in. thick. The sampson post (or pawl bitt) formerly rose 6 feet above the main deck and is 1 ft. 4-3/4 in. square. The windlass pawl remains attached to the sampson post, and is 1 ft. wide, 1 ft. 7-1/4 in. long, and 5/8 in. thick. The windlass is 11 ft. 10-3/4 in. wide; circumference measurements could not be obtained due to the anchor chains, sampson post, and other hull structure and debris covering the windlass. The windlass' pawl rim teeth are 3-5/8 in. apart on center. Two purchase rims are 1 ft. 10-3/4 in. apart, each rim 3-5/8 in. wide. The crosshead remains attached to the forward side of the sampson post, complete with two purchase rods connecting the crosshead to the purchase rims' ratcheting mechanism. To weigh anchors, two hand levers were inserted in either side of the crosshead and two crewmen then worked the hand levers up and down, ratcheting the purchase rims and revolving the windlass. The pawl locked the windlass and kept it from reversing rotation between purchases. The anchor chain whelps are 2 ft. 8-3/8 in. wide and covered with four turns of the anchor chain on either side of the windlass. Outboard of either whelp is a 4 in. cheek piece that held the windlass to the carrick bitts. The windlass was supported by two carrick bitts 4 in. sided and 1 ft. 3-5/8 in. molded.

Each bitt is braced by a standard knee that measures 4 ft. on deck and 2 ft. 8-3/8 in. along the carrick bitt. A fragment of the windlass strongback that joined the sampson post to the carrick bitts is extant on sampson post's aft surface.

Figure 10. Sampson post, windlass and forecastle companion way. Photo by Tamara Thomsen.

The centerboard trunk remains upright and is the site's most dominant feature. The trunk is mounted atop the keelson on the vessel's centerline, and rises 9 ft. 7 in. above the keelson and is 25 ft. 8 in. long and 1 ft. 6 in. wide. The trunk is covered with 10 planks on either side that are 5-3/8 in. thick. Plank width from the top down is 8-3/8 in., 9-5/8 in., 10-1/4 in., 10-1/4 in., 9-5/8 in., 10-3/4 in., 1 ft. 1-1/4 in., 1 ft., 1 ft. 2-3/8 in., and 1 ft. 2-3/8 in. The trunk's covering board is 8-3/8 in. wide, and rises 1-1/4 in. above the trunk's side planking. A 2 ft. 8-3/8 in. long by 2-3/8 in. thick carling is mounted atop the covering board 9-5/8 in. from the trunk's aft end. This carling supported the centerboard winch, and the centerboard chain still runs through a hole in the center of the carling. The centerboard itself is visible through this hole, and remains in a retracted position with the chain still fastened to its aft edge. The centerboard chain runs from the centerboard down the trunk's port side; the other end remains attached to the centerboard winch, which lays on the bilge ceiling to the trunk's port side. The winch is heavily encrusted with zebra mussels and is nearly indistinguishable except for the presence of the centerboard chain (Figure 11). The *Daniel Lyons* was sailing to windward at the time of the collision, and the centerboard trunk would have been at least partially deployed, the impact with the bottom driving the centerboard into its current retracted position. A second centerboard access hole is located atop the trunk, 2 ft. 2-3/8 inches aft of the trunk's forward end. This square access hole is 7-1/4 in. wide and 8-3/8 in. long. The centerboard's pivot pin remains

intact, located 1 ft. 6 in. from the trunk's forward edge and 2 ft. 6 in. from the top of the keelson. The pivot pin's shank is 2 in. in diameter, peened over on a washer that is 6 in. in diameter. The pin is driven through the trunk from the starboard side, and is secured on the port side by a 1 ft. 1-1/4 in. long forelock pin that is driven through the shank.

Figure 11. Centerboard winch. Photo by Tamara Thomsen.

Immediately forward of the centerboard winch lays an inverted capstan with an attached deck beam and 6 capstan partners (Figure 12). The capstan is heavily encrusted with zebra mussels that obscure many finer details. The capstan is 3 ft. 4-3/4 in. tall overall. The pawl rim rises 8 inches above the capstan partners. The capstan's barrel is 1 ft. 8 in. tall with vertical whelps spaced 8 in. on center. The drum head is 1 ft. tall and 2 ft. 2 in. in diameter. Handspike holes are 2 in. square and spaced on 1 ft. centers around the drum head. The capstan's data plate was absent and no patent dates were visible.

The keelson is visible aft of the centerboard trunk, extending 60 ft. 2 in. from the trunk to the break. Keelson dimensions are 18 in. sided and 18-¾ in. molded. The center of the mainmast step is 5 ft. 9 in. aft of the centerboard trunk. The mainstep is 6 ft. 1-1/4 in. in length, 18 in. wide, and 4-3/4 in. thick. The step's mortise is 1 ft. 7-1/4 in. long and 7-1/4 in. wide, centered on the step. A scarph is visible on the keelson's upper surface 4 ft. 2-3/8 in. aft of the mainstep. Aft of the scarph, two holes for the bilge pump shafts penetrate the keelson. Each hole is 2-3/8 in. in diameter. The forward pump shaft hole is 17 ft. 4-3/4 in. from the centerboard trunk. The aft

pump shaft hole is 2 ft. 10-3/4 in. aft of the former. The forward hole is slightly offset to the keelson's starboard side; the aft hole is centered on the keelson. A stanchion mortise is centered between the two pump shaft holes. The bilge pump itself lays off the keelson's starboard side. The pump is heavily encrusted with zebra mussels that obscure any manufacturer's marks or patent dates. The pump is cast iron, 2 ft. tall with a square base, and was mounted to the deck with a bolt at each corner of the base. The pump's outlet is semicircular and measures 7-1/4 in. wide by 4-3/4 in. tall. It appears the bilge pump was mounted with a backing plate that now lays beneath the mizzenmast near the pump.

Figure 12. Inverted capstan mounted atop capstan partners and deck beam. Photo by Tamara Thomsen.

The mizzen step is 7 ft. 3-5/8 in. long, 18 in. wide, and 3-5/8 in. thick. The mizzen mortise is 1 ft. 4-3/4 in. long by 8-3/8 in. wide, and is offset toward the step's forward edge. The mortise begins 2 ft. 3-5/8 in. from the step's forward edge and ends 3 ft. 7-1/4 in. from the step's aft edge. The limber boards are 6 in. thick and 1 ft. 2 in. wide. Visible ceiling planks measure 3-3/4 in. thick and vary in width from 8 in. to 1ft. 2 in.

The intact mainmast lays off the starboard quarter and is 87 ft. 6 in. long. The mast's foot is round and 1 ft. 8 in. in diameter, reinforced with a 2-3/8 in. wide iron band around its circumference. The tenon is 1 ft. 2-3/8 in. long, 7-1/4 in. wide, and 3-5/8 in. deep. A fragment of the boom stop remains attached to the mast 13 ft. 3-5/8 in. above the foot, measuring 3-5/8 in. square. The top of the hounds is 75 ft. 3-5/8 in. above the foot and is 1 ft. 7 in. wide at the trestle tree. The masthead is 1 ft. square and rises 12 ft. 2-3/8 in. above the hounds. The masthead has three pairs of iron eyes on either side of the masthead where the shrouds once fastened. Each eye measures 4-3/4 in. in diameter. The first set of eyes is 1 ft. below the top of the mast, with the remaining two sets evenly spaced below the first at 1 ft. 6 in. on center. The mainmast's trestle tree lays to the starboard side of the mainmast and is partially broken. The trestle tree's inside dimension is 1 ft. square, matching the mainmast's

masthead dimensions. The trestle tree's timber dimensions are 7-1/4 in. wide by 3-5/8 in. thick.

The intact mizzenmast lays across the keelson between the mainmast and mizzenmast steps. The mizzenmast is 69 ft. 4-3/4 in. long, with a base diameter of 1 ft. 4 in. The tenon measures 10-3/4 in. long, 4-3/4 in. wide, and 3-5/8 in. deep. The iron reinforcing band at the mast's foot is 2-3/8 in. wide. An intact wooden ring for the boom stop is fastened 17 ft. 8-3/8 in. above the foot, and is 2-3/8 in. square. No hounds were visible at the masthead, but the trestle tree remains intact 59 ft. 8-3/8 in. above the foot. The trestle tree is 7-1/4 in. wide, 2-3/8 in. thick, and 3 ft. 6 in. long. The trestle tree accommodated a topmast that was 9-5/8 in. square. The masthead is 9-5/8 in. square, with three sets of iron eyes 3-5/8 in. in diameter on either side of the masthead. The first set of eyes is 7-1/4 in. from the top of the masthead. The second two sets of eyes are equally spaced at 1 ft. 6 in. on center.

To the hull's starboard side lays the foremast's masthead. The fragment is 19 ft. in length and broken just below the trestle tree. The masthead is 1 ft. square. There are three threaded bolts with square nuts that measure 2-1/4 in square. The first bolt is 6 in. from the top of the masthead; the two lower bolts are spaced at 2 ft. on center. The trestle tree is extant and is 2-3/8 in. thick by 3-5/8 in. wide, with a 12 in. square inside dimension for the missing topmast. Two eye bolts 2-3/8 in. in diameter are attached to the underside of the trestle tree. A large tangle of wire rigging lays around the masthead and adjacent lakebed.

A topmast fragment lays to starboard of the bowsprit, forward of the mooring anchors. Measuring 11 ft. 8-3/8 in. in length, the topmast's foot is 1 ft. square, becoming round 2 ft. 5 in. above the foot. A mortise on the port side of the topmast's foot measures 3-5/8 in. wide, 4-3/4 in. tall, and 2-3/8 in. deep. A mast cap remains fastened to the topmast 9 ft. 2-3/8 in. above the foot. The mast cap is constructed of wood, 2-3/8 in. square and 2 ft. 6 in. long. An iron eye fastened on topmast's forward surface 2 ft. 9-5/8 in. from the foot. A 2 ft. section of chain remains attached to the eye.

The rudder lays near the mizzenmast's masthead, off the hull's starboard quarter (Figure 13). The rudder blade is 9-5/8 in. wide and 11 ft. 6-3/8 in. tall. The base of the rudder blade is 3 ft. 4 in. long. An iron reinforcing strap protects the rudder's underside and trailing edge. The rudder post is 9-5/8 in. in diameter, but is broken 1 ft. below the top of the rudder blade. The rudder lays amidst a tangle of wire rigging on the lakebed.

A fragment of the cabin roof lays inverted on the bottom far off the wreck's starboard quarter. The fragment consists of 18 planks that average ½ in. thick, 4-3/4 in. wide, and 9 feet long. Four frames are extant, measuring 2 in. thick and 4-1/8 in. wide. The frames average 13 ft. 6 in. in length and are spaced at 1 ft. 9-5/8 in. on center. There is a visible camber to the roof.

Figure 13. The *Daniel Lyons'* rudder. The mizzen masthead and trestle tree are visible to the left. Photo by Tamara Thomsen.

Conclusions and Recommendations

The *Daniel Lyons* is an excellent site to study Great Lakes canaller construction, but provided several challenges not encountered on previous WHS archaeological projects. The first obstacle was water depth. In 110 feet of cold Lake Michigan water, bottom times were extremely limited relative to shallow water sites due to nitrogen loading of divers' tissues. The colder temperatures associated with deeper Great Lakes sites also limit bottom times due to hypothermic restraints as well as manual dexterity. The limited bottom times were overcome by utilizing divers trained in staged decompression diving techniques and properly equipped to execute dives with extended bottom times with planned decompression stops. Divers trained to this level are often equally prepared for long exposures in cold water, utilizing dry suits and dry gloves with heavy undergarments to safely spend long durations submerged in cold water with little performance loss.

A second obstacle was the sheer complexity of the site. Although nearly all the *Daniel Lyons*' hull sections are represented, they are somewhat broken and scattered on the lakebed. To many recreational divers, a collapsed hull such as the *Daniel Lyons* holds little appeal compared to more intact vessels - even vessels that are entirely stripped of all rigging and gear. To an analytical eye, however, wreck sites such as the *Daniel Lyons* present a ripe opportunity to study and learn about historic wooden vessel construction. The advantage of broken hulls is that they offer many construction details that are hidden in more intact vessels. The *Daniel Lyons* 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 many intricate details that would be hidden were the *Daniel Lyons* completely intact, such as stem and stern

construction, inner framing techniques, and more hidden workings such as the construction and operation of the centerboard.

The *Daniel Lyons* 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 identify collision damage and compare with historical records to verify accident details, and the third 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 WHS 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 documentation level achieved during this project fulfils these requirements, and will serve as the source document for nomination to the National Register, as well as for outreach and education materials such as shoreside interpretive signage, waterproof dive guides that interpret the site to visitors, website entries describing the vessel's operational career and current disposition, as well at public multimedia presentations.

Despite achieving the above goals, many opportunities remain for further research that are beyond the scope of this project, yet can 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 clipper-type Great Lakes schooners, little comparative work has been conducted between archaeological remains of the two vessels types. Conducting a more detailed archaeological survey of the construction features specific to canallers, such as construction of the stem and stern, the turn of the bilge, and hull lines offers significant opportunities to add to our limited knowledge of canallers. Wooden vessels were rarely built to drawn plans. Today, little documentation exists that illustrates how wooden sailing vessels were constructed and the differences in hull shape and construction between the different schooner types, such as the canaller and the clipper-type models. The Goble shipyard was one of the most prominent yards on the eastern lakes, yet little documentation has survived describing the construction of Goble's vessels. The *Daniel Lyons* is of particular significance because it was the first three-masted vessel to be launched from the yard and served as a model for several nearly identical vessels that followed.

Due to their boxy hull shape, it has been suggested that canallers were poor sailers, particularly in heavy weather. The fact that a single Great Lakes storm claimed six of Oswego's canallers and crew lends credibility to this claim. With no historical documentation surviving that details Goble's hull lines, it is only archaeological sites such as the *Daniel Lyons* that can answer the questions of whether or not the canaller was an inherently dangerous craft. Further research and documentation at the *Daniel Lyons* site have the potential to answer these questions.

The second objective was to identify collision damage and compare with historical records to verify accident details. Historical records indicate the *Daniel Lyons* was struck on her starboard side halfway between her main- and mizzenmasts. Archaeological evidence supports this. Although the *Daniel Lyons*' hull is broken on

both her port and starboard quarters, it is apparent that the collision occurred on the starboard side. Examining the breaks on both the port and starboard sides, it becomes evident that the starboard break is much cleaner than the port side. The break in the starboard side is square and clean, as would be expected if the sharp bow of another vessel were wedged into it. The port side, however, is a large jumble of frames, ceiling, and outer hull planks without a definable break.

Historical accounts indicate the *Daniel Lyons* rolled onto her port side before she sank bow first. Archaeological evidence, however, suggests the *Daniel Lyons*' stern struck the bottom first. The *Daniel Lyons*' aft sections are far more broken than her forward sections. Additionally, her keel is broken seven feet aft of the mizzenmast step. This suggests that the *Daniel Lyons* sank stern first, breaking her keel upon collision with lakebed, which subsequently fractured the entire stern from the main hull. It is not likely the collision with the *Kate Gillett* caused the keel break, as it is farther aft than where the *Gillett* struck the *Lyons*.

The current location of the stern section is a bit perplexing, as it lays approximately 50 feet forward of its former location near the transom. Although no evidence of commercial fishing nets were identified, the current location is likely the result of an entanglement with fishing nets that dragged the stern section to its current location. The *Daniel Lyons* site was rediscovered with tips from local commercial fisherman, supporting the likelihood that the *Daniel Lyons* has had one or more encounters with commercial nets.

The third objective, to provide positive vessel identification through identifying marks or artifacts, was not achieved. Although the *Daniel Lyons* had not been as heavily visited as other Wisconsin shipwrecks, many artifacts were recovered by recreational divers following her discovery. Cultural artifacts that were not removed from the site are now hidden by the increasing mussel colonization. The vessel's size, location, construction, and collision evidence all support the identification as the *Daniel Lyons*, however.

The *Daniel Lyons*' large size, coupled with the fact that she is somewhat broken and scattered about the bottom, creates an incredibly complex site requiring a large amount of time to document her to the highest level. For these reasons the *Daniel Lyons* presented one of the more challenging archaeological surveys undertaken thus far by the WHS. The site's complexity is also a boon for the inquisitive recreational diver. Armed with even a meager knowledge of Great Lakes schooner construction, one can literally spend dozens of dives on the *Daniel Lyons* and still discover something new on each dive. Few schooners in Wisconsin waters present such a prime opportunity to learn and examine first hand the long-forgotten knowledge required to build some of the most beautiful ships to ever sail the Lakes - the three-masted schooner.

Although much was learned about the *Daniel Lyons* during the 2005 field survey, much more awaits documentation. The site's complexity, depth, and the fact that the vast majority of the survey crew was comprised of volunteers with limited archaeological experience creates opportunities for higher levels of documentation in the future. The site is a prime candidate for nomination to the National Register of Historic Places. A shoreside interpretive sign is currently in production and scheduled for installation at the Algoma Municipal Marina during the summer of 2006.

CHAPTER THREE
KATE KELLY

Historical Background

On a springtime day in 1867, shipbuilder John Martel looked on with pride as the schooner *Kate Kelly* slid into the water at Tonawanda, New York. Described by a contemporary newspaper as being "of medium size . . . good model and general build," the schooner possessed two masts, a square stern, a figurehead bow, and measured 126.3 feet in length, 25.8 feet in breadth, and 10.4 feet in depth (Bureau of Navigation 1867a; *Chicago Times* 1867). Martel designed the vessel to transit the Welland Canal - the narrow artificial river that connected distant Lake Ontario with the other Great Lakes below Niagara Falls. Her primary cargo would be grain, but the schooner could efficiently carry coal, iron ore, wood products, or any other low-cost bulk cargo.

Born to French immigrants in Quebec in 1832, John Martel moved to the United States in 1849 and eventually settled in Buffalo, New York - then the Great Lakes' most important shipbuilding center. By 1860, Martel was a mature ship carpenter and had married Mary Ellen, a young Irish woman, and had amassed $300 of personal property (United State Census Bureau 1860).

The 1860s proved a busy decade for the Martels. A son named John was born in 1863, with a daughter Mary Ann arriving five years later. In 1867, at age 34, Martel had worked his way up through the ranks of competing artisans to emerge as an independent shipbuilder. The schooner *Kate Kelly* may have been his first vessel and was certainly one of his earliest. By 1870, the Martels owned real estate worth $1,800 and personal property worth $400 (Unites States Census Bureau 1870).

By the time John Martel built the *Kate Kelly* in 1867, conditions for independent shipbuilders were on the decline on the eastern end of the Great Lakes. Two generations of shipbuilding and lumbering had taken its toll on accessible forests. In order to continue converting trees into money (the central job of the maritime frontier shipbuilder), many shipwrights moved westward to Michigan and Wisconsin. In the early 1870s, John Martel took part in this maritime migration and moved his operation and family to Saugatuck, Michigan, a picturesque small town on Lake Michigan's eastern shore. In 1873 and 1874, Martel launched at least four schooners at Saugatuck, including the *Marinette*, *Menekomee*, *F.B. Stockbridge,* and *L.B. Coats*.

The economic boom times did not last. A financial panic in the fall of 1873 ushered in a national depression that idled shipyards across the Great Lakes for several years. Martel, however, seems to have been more fortunate than many of his shipbuilding colleagues. He built two tugs in 1875 and another in 1877. Martel apparently understood that the days of building schooners were drawing to a close on the Great Lakes. When the region's maritime economy recovered at the end of the 1870s, Martel resumed building but focused on steamboats and became well known for his many tugs. Between 1880 and 1889, Martel launched forty-two vessels: five moderate sized package / passengers boats, one schooner, and thirty-six tugs (Heath 1930:79-81)

Little is known of Martel beyond the ships he constructed, but he was a stable and successful businessman of moderate means. After 1890, Martel's production slowed, but he continued to turn out the occasional tug and even a steam yacht during the 1890s. By 1900, Census records suggest that the now widower Martel had retired from active shipbuilding (Heath 1930; United States Census Bureau 1900).

During a career that spanned 28 years, the *Kate Kelly* had several owners, most of them associated with Lake Ontario trade. As a canaller, the *Kate Kelly* was one of hundreds of vessels built to fit through the locks of the second Welland Canal. Most of the canal locks were just 26.5 feet wide, 150 feet in length, and, originally, 9 feet in depth. This left the *Kate Kelly* with less than 4 inches of clearance on either side when transiting the canal. The vessel's sparred length is unknown, but would have been close to 150 feet. The *Kate Kelly's* career can be divided into four distinct periods. Her first year sailing out of Buffalo (1867-1868), the Captain Robert Hayes' Era (1868-1877), the McFarland / Goble partnership (1877- 1893), and her twilight years on Lake Michigan (1893-1895).

Lake vessels represented a quick, if volatile, investment. Entire vessels and vessel shares frequently changed hands and little is known about the *Kate Kelly*'s early owners. John Martel built the *Kate Kelly* for Lewis Ryerse, a Buffalo ship owner (Bureau of Navigation 1867a). Ryerse, however, only kept the vessel for a few months before selling it to Rumsen R. Brown and James M. Smith of Buffalo on 30 September 1867 (Bureau of Navigation 1867b). In early May 1868, the *Kate Kelly* again gained new owners: James Keller, Edward W. Parmalee, and Captain Robert Hayes. Hayes, who had only a 1/8 share in the vessel, took command, a post he would retain for nine years. The new owners changed the vessel's homeport from Buffalo to Oswego, the most important U.S. port on Lake Ontario (Bureau of Navigation 1868a). The *Kate Kelly* would call Oswego home for the next twenty-five years.

Hayes and his associates employed the *Kate Kelly* to carry grain from western Michigan ports, particularly Chicago, to Lake Ontario ports, most commonly Oswego and Kingston, Ontario. The vessel could hold 18,000 bushels of corn and over 19,000 bushels of wheat. While westbound from Lake Ontario, the schooner frequently carried coal, and occasionally picked up odd cargoes such as railroad iron. The schooner sometimes made the westbound trip light, and depended upon a good grain charter to make a profit.

The *Kate Kelly* suffered hard use while under the command of Captain Hayes. Newspapers, wreck lists, and admiralty court records report eight accidents and allude to others involving the *Kate Kelly* between 1869 and 1877. The schooner sustained major damage in at least two of these incidents (Hall 1870; National Archives 1877a). In 1869, the vessel grounded near Cheboygan, Michigan, and the schooner's entire cargo of wheat was reportedly lost (Hall 1870). The Classification of Lake Vessels and Barges insurance register noted that the *Kate Kelly* had undergone large repairs in 1870 and gave her just an A2 rating, an indication that the vessel was not in top condition for her age (Board of Marine Inspectors 1871). In April 1871, the vessel collided with the brig *Rosius* near the Eighteenth Street Bridge at Chicago (*Buffalo Commercial Adviser* 1871). In April 1874, she hit a dock at Oswego. Two months later, the battered vessel sprung a leak while transiting the Welland Canal. The vessel rounded out the year by grounding at Ford's Shoal on Lake Ontario in November

(*Chicago Inter-Ocean* 1874). Collectively, the number and severity of the accidents call into question Captain Hayes' competence.

The year 1875 began better for Captain Hayes and the *Kate Kelly*. Research has turned up no reports of accidents for most of the season. This all changed, however, in late September when the vessel fetched up on shore about 100 feet outside of the East Pier at Oswego. The vessel had been running light on a trip from Kingston, Ontario, and a stiff northwest wind had built up a large sea. By the time the *Kate Kelly* attempted to enter the port, however, the wind had shifted to the southwest and nearly died out. Whether Hayes misjudged the wind direction or was surprised by its sudden moderation is unknown, but the vessel lost headway. Heavy seas carried the helpless schooner onto the beach and deposited her broadside onto a hard bottom. The crew abandoned the ship, leaving her to pound on the beach throughout the night. By morning, a local newspaper reported that the *Kate Kelly* had broken her back, sprung her decks, and had been holed (*Oswego Daily Palladium* 1875a).

Initially, saving the schooner seemed doubtful. Had the vessel grounded this severely on a more distant beach, it would have certainly proven a total loss. The *Kate Kelly*, however, was insured for $12,000 and Oswego possessed first class ship salvage and repair capabilities. These factors encouraged salvaging the heavily damaged craft. Insurance inspector Captain Berriman hired the well-known shipbuilder George Goble to assist the salvors in removing the vessel from the beach. Goble and his partner James D. McFarlane operated one of the best-equipped shipyards on Lake Ontario. Using two powerful tugs, screw-jacks, and other implements, the salvors released *Kate Kelly* from the beach. On 30 September 1875, the Goble-built tug *Alanson Sumner* managed to pull the schooner into the harbor where she immediately sank. Three days, three steam pumps, and two canal boats later, the *Kate Kelly* floated again. This time just long enough to move her to the entrance to the Ontario Dry Dock, home the Goble and McFarlane yard, where she sank a second time (*Buffalo Commercial Advertiser* 1875; *Oswego Daily Palladium* 1875b, 1875c, 1875d).

As earlier reports had indicated, the *Kate Kelly* had sustained substantial damage. The keelson was broken aft of the centerboard trunk, several floor timbers were broken, and the starboard side had so many holes it presented "the appearance of a sieve." At first, the insurance appraisers could not agree on an estimated cost for repairs. An early observer predicted more than $6,000, while others suggested that the total bill, including salvage costs, would exceed the $12,000 for which the vessel was insured. Ultimately, Goble and McFarlane installed floor timbers, a new keel, and replanked the starboard side's entire bottom and some of the port side. They installed some new ceiling planking, pocket pieces on the centerboard trunk, and a new deck. The yard also lengthened her bowsprit and added an additional jib. These additions to her headgear may have been intended to improve her handling. In any case, the vessel had only one more known collision after the yard altered her rig (*Oswego Daily Palladium* 1875e, 1875f, 1875g, 1875h). It is unclear who paid for the *Kate Kelly*'s repair, but Captain Hayes and his current partners retained their ownership (Bureau of Navigation 1873c).

The *Kate Kelly*'s many accidents raise questions about her management, which was, to put it mildly, fluid during the Robert Hayes era. Charles Parker, who,

according to the enrollments, owned the largest share of the vessel during the mid-1870s, died during the summer of 1874. The family's small shipbroker business fell into the hands of Parker's son. When the elder Parker died, the owners should have applied for a new enrollment for the *Kate Kelly*. They did not, an omission that suggests sloppy, if not dishonest, business practices.

Bad practices eventually caught up with the *Kate Kelly*'s owners. On 22 October 1877, William H. Wolf and Thomas Davidson, the operators of a large Milwaukee shipyard, filed a libel suit against the schooner for non-payment of debts. Wolf and Davidson contended that they were owed $875 plus interest for repairs and supplies they provided to the vessel in October 1876. At the time of her arrest, the *Kate Kelly* was at Cleveland recovering from yet another mishap. On 13 October, the schooner was carrying 380 tons of iron ore from Ogdensburg to Cleveland and ran aground on a sandbar. To float the vessel free, the crew threw fifty tons of ore worth well over $200 into lake. The procedure in this situation involved arresting the vessel and, if payment was not made, to sell it at a federal pubic auction popularly called a Marshal Sale. Captain Hayes, court records reveal, had left a long stack of unpaid bills in Milwaukee and Chicago. When notice of *Kate Kelly*'s arrest appeared in the newspapers, six other creditors presented bills. The sum total for action, including court costs, totaled $5,580.10, a figure considerably more than schooner's current value. The largest claim against the vessel, $3,735.35, came from Goble and McFarlane, the shipbuilders who had rebuilt *Kate Kelly* two years before. The Wolf and Davidson claim, including interest, came to $927.09. Other bills presented came from ship chandleries, a butcher for groceries and supplies, for trimming (loading) a cargo of grain, and from the owners of the recently jettisoned iron ore. With pending bills far higher than the *Kate Kelly*'s value, her owners made no effort to pay off the creditors (National Archives 1877a).

Court records suggest that problems plagued the *Kate Kelly* partnership. The younger Parker, half owner, appears to have been insolvent by this time and Henry W. Green, owner of a quarter share of the schooner, indicated that "he might secure his own interest, but would do nothing to benefit Parker." For his part, Captain Hayes, who owned the final quarter of the vessel, admitted that the claims against the vessel were just and accurate but indicated that he was "unwilling and unable" to pay the creditors. The vessel went on the auction block on 6 November 1877 and sold to George Goble and James McFarlane for $3,000 (National Archives 1877b).

The question arises as to why first-rate businessmen with excellent credit and good judgment purchased the benighted *Kate Kelly* during a tough period in the Great Lakes economy. The answer to this lays in the vagaries of Admiralty Law. By initiating the arrest of the *Kate Kelly*, Wolf and Davidson became the first parties in line for the disbursement of auction proceeds. They received their full claim, both principal and interest. After deductions for $351.65 in court costs, the remaining six creditors had to split the remaining $1,l671.16, with each receiving just 39.5% of their original claims. Under these rules, Goble and McFarlane recovered $1,475.46 of the $3,000 purchase price. By putting up an additional $1,524.54, the Goble and McFarlane prevented the irrecoverable loss of more than $2200 on their $3,735.35 claim against the *Kate Kelly* and gained possession of a fully serviceable schooner (National Archives 1877b).

The admiralty court files preserve many of the original documents submitted by the plaintiffs. Significant to historians of Great Lakes seafaring life are grocery bills. Sailor's lore praised the plentiful food and fresh water aboard Great Lakes ships. This seems to be born out on the *Kate Kelly* in the early winter of 1876. Prior to setting sail from Milwaukee with 15,500 bushels of wheat, the vessel took on $83.53 worth of food. The crew appears to have subsisted on large quantities of salted and fresh meat. The ship left port with 55 pounds of salt pork, 153 pounds of corned beef, and 215 pounds of various cuts of fresh meats. This would have provided a typical crew of eight persons with well over two pounds of meat for each hand, every day, for a three-week period, a time span longer than the typical voyage between Milwaukee and Oswego or Kingston. Adding to the protein component were 10 pounds of salted mackerel. The cook also kept busy baking and the ship took on 30 pounds of sugar, 25 pounds of butter, 10 pounds of lard, ¾ barrel of flour, 6 dozen eggs, and 1 ½ bushels of apples. Other starches came from 2 bushels of potatoes and ½ bushel each of turnips and beets. The only green vegetables in evidence were several cabbages. Small quantities of rice, beans, pickles, and crackers provided additional diversity to the diet. Spices and condiments were simple and few, just salt and mustard. Great Lakes coffee, a favorite sailor's beverage, must have been extremely watery. The ship only took on six pounds for the voyage. The ship purchased no other beverages, but fresh water was always plentiful. It is also possible that sailors supplemented this diet with their own provisions (National Archives 1877a).

The *Kate Kelly*'s new owners George Goble and John McFarlane had little in common with Robert Hayes and his associates. The Ireland-born Goble was one of Lake Ontario's most respected shipbuilders and had been a fixture on the Oswego waterfront since the late 1830s, while McFarlane's father-in-law was F.G. Carrington, Oswego's most prosperous businessman (Alford 1957). The two successfully managed the *Kate Kelly* for more than fifteen years. During the 1880s and early 1890s, the *British Whig*, a Kingston newspaper, intermittently recorded the schooner's travels, cargoes, and occasional problems. During the Goble and McFarlane era, the *Kate Kelly* made frequent trips carrying grain (corn or wheat) between Chicago, Illinois and Kingston, Ontario. The vessel seems to have generally stayed busy, and when rates were high must have shown a tidy profit. For example, in August 1883, the vessel grossed $1,000 for carrying 16,000 bushels of wheat from Chicago to Kingston. In the summer of 1888, the schooner was grossing about $600 per trip on much shorter voyages carrying coal between Sandusky and Kingston (*British Whig* 1883a, 1883b, 1883c, 1883d, 1883e, 1888b, 1888c, 1888d, 1889).

Even under solid management, sailing ships on the Great Lakes faced constant dangers. As ships aged, the potential for problems multiplied. In September 1881, the *Kate Kelly* lost her fore boom during a storm (*British Whig* 1881). Five years later, in 1886, part of her foremast and her main topmast tore away during a June squall (*British Whig* 1886a). Later that summer, the aging vessel discharged 8,500 bushels of wet wheat, a sure sign of hull problems (*British Whig* 1886b). Major groundings, a frequent occurrence on the *Kate Kelly* under Captain Hayes, only appear to have happened once during the Goble and McFarlane years. On 13 November 1882 the vessel ran aground during a blow on Lake Ontario. A rescue party that included 30 men and a powerful tug lightered 5,000 bushels of wheat from the schooner and

pulled her from the shore (*British Whig* 1882). The sailing life, however, was dangerous, and in 1890 James O'Hara, a forty-year-old sailor from Rochester, fell from the main boom on the *Kate Kelly* while furling a sail in Detroit and died (*British Whig* 1890).

Time catches up with all ships. By the early 1890s, large wooden and steel steam-powered vessels, many exceeding 300 feet in length, had taken over the majority of the Great Lakes' bulk cargo trade. Many schooners had their rigging cut down for use as tow barges (Karamanski 2000). Others continued to operate independently well into the twentieth century. It could be a hard existence, but one that some independent mariners preferred to other forms of work.

In March 1893, a new owner took possession of the *Kate Kelly*. Captain Hartley J. Hatch of Chicago had commanded sail and steam vessels on the Great Lakes for nearly twenty years. During the 1870s, Hatch took the Great Lakes schooner *Mary L. Higgie* across the Atlantic and into the Mediterranean Sea. In early 1893, Hatch commanded one of Alexander McDougal's whaleback steamers on a long voyage from the Great Lakes to Liverpool, England (*Detroit Free Press* 1895a). Well-connected in the shipping world and highly respected among his peers, Hatch seemed well suited to wring profits out of the old schooner. The question remains, however, why would Hatch, who clearly had other opportunities, invest in and operate the old schooner? It proved a fatal decision.

Despite its decline as a port city in the 1890s, Chicago remained, according to Karamanski (2000), the "schooner city." A growing industrial giant, Chicago's demand for raw materials including iron ore, coal, and wood products, and its importance as a grain port, supported a large-scale maritime trade. With his connections, Hatch may have been well positioned to get good charters for the old, but inexpensive to operate, *Kate Kelly*. Unfortunately, more research is needed to uncover Hatch's trading practices.

On 28 October 1893, a Wisconsin newspaper reported that that *Kate Kelly* had run ashore on Spider Island, one of the many barriers that made the Death's Door Passage between Green Bay and Lake Michigan so hazardous. At the time, the vessel was carrying a heavy cargo of grindstones from Grindstone City, Michigan, to Milwaukee and suffered significant damage. The *Door County Advocate* marine reporter noted that the vessel's cargo, worth $10,000, was "far too valuable to risk out in an old leaky vessel at this season of the year" (*Door County Advocate* 1893).

Old schooners remained a suitable conveyance for wood, a cargo not easily damaged by exposure to water. Furthermore, soft woods could provide positive buoyancy sufficient to keep a flooded schooner afloat. Carrying wood, however, did not save the *Kate Kelly*. In May 1895, she left Alpena, Michigan, with a load of hemlock railroad ties and perhaps other wood products. The schooner stopped at Sheboygan, Wisconsin, before proceeding down the lake for Chicago.

On Monday morning, 13 May 1895, a vicious spring storm exploded across Lake Michigan, catching the *Kate Kelly* and sinking her. It is not known what specifically caused her loss; however, local farmers reported observing a schooner capsize near where the *Kate Kell*y was later found. The storm was particularly severe; several vessels went down and many others suffered significant damage. On Tuesday, 14 May 1895, a Kenosha-based tug brought in wreckage that clearly confirmed that the

Kate Kelly had gone down. The following day, the local U.S. Lifesaving Service crew spied a mast protruding several feet from the water. Resting in 10 fathoms of water, the wreck ultimately proved to be the *Kate Kelly*. On 9 June 1895 diver John Harms explored parts of the wreck and reported that the jib boom and bowsprit were intact. The foremast was gone (its broken remains may have been removed by early salvors to reduce the wreck's threat to other vessels), one anchor had been cast overboard, and the mizzenmast was enveloped in a tangle of rigging. Harms found no bodies, but brought up a large section of a flag that had been placed at half-mast in the forward rigging, perhaps a last futile attempt at a distress signal. Given the eyewitness account, the distress flag, and the reported condition of the wreck, it seems likely that the *Kate Kelly* battled the weather for some time. The end, however, came quickly with the vessel either capsizing or plunging to bottom after a large sea or set of seas swept the deck with enough force to tear off the cabin, yawl boat, monkey rails, and anchor (*Detroit Free Press* 1895a, 1895b, 1895c).

Description of Field Research and Findings

The *Kate Kelly* survey was designed as a Phase II archaeological survey of the shipwreck two miles east of Wind Point in Racine, Wisconsin (Figure 14) (42° 46.684' N, 087° 43.509' W). Predisturbance surveys involve the documentation of the site as it lays, with no excavation or artifact retrieval. Diagnostic artifacts that may indicate the site's age or identification are measured, sketched, photographed, and left in place. Predisturbance surveys have very little impact on a site, and are relatively inexpensive compared to Phase III excavations. The *Kate Kelly* was selected for survey for the information it could provide on Great Lakes schooners and the grain trade.

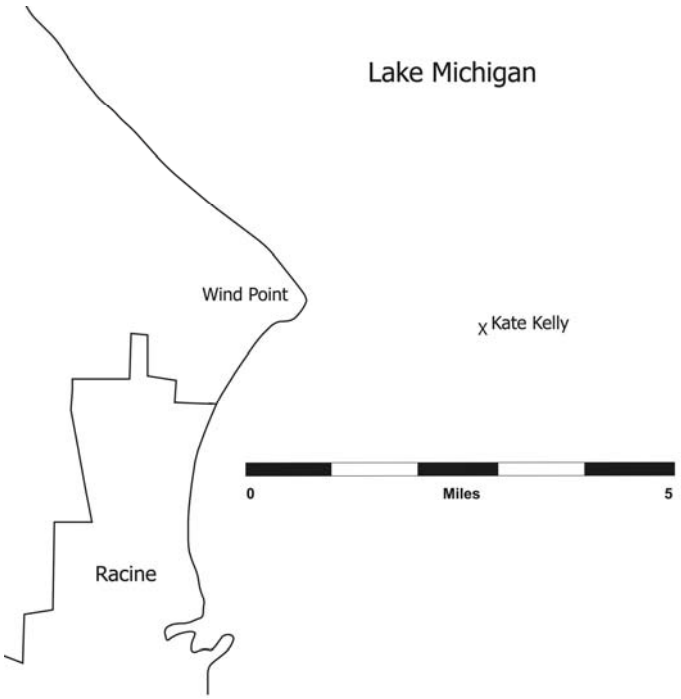

Figure 14. *Kate Kelly* wreck site off Wind Point, Racine, Wisconsin.

On 20 June 2003 a permanent mooring was emplaced off the wreck's starboard bow, anchored with a 2,000 lb. deadweight mooring block placed by the University of Wisconsin – Milwaukee's R/V *Neeskay*. The *Kate Kelly* lays in 55 feet of water, mostly broken up, but with large hull sections intact and associated gear remaining. Bottom temperatures ranged from 42-58° Fahrenheit, with visibility varying from 20 to 40 feet. Underwater archaeological fieldwork was coordinated by WHS underwater archaeologists Russ and Cathy Green. The majority of the fieldwork was conducted by volunteers from the Great Lakes Shipwreck Research Foundation, Inc. during the 2002 and 2003 field seasons.

A baseline was established forward of the lower hull section's bow and extended over the vessel's centerline to several feet beyond the stern. The scaled baseline gave archaeologists a reference to coordinate all measured sketches and photographs. Cross lines were established at ten foot intervals on either side of the baseline, extending beyond the farthest extent of wreckage at right angles to the baseline. The cross lines, in addition to acting as an additional reference, partitioned the wreck site into 10-foot by 20-foot sections for mapping. Each survey team member was assigned to sketch one 10- by 20-foot section. All measurements were recorded in feet and inches. All drawings were oriented to the baseline, and when finished were laid together like pieces of a jigsaw puzzle to assemble the site plan. In this manner the entire site was accurately mapped to scale. Disarticulated hull sections were mapped using temporary, discontinuous baselines installed at each hull section. These discontinuous baselines provided a reference point to coordinate all measured sketches. Disarticulated hull sections were then trilaterated from the main baseline to provide accurate positioning on the final site plan.

The Phase II survey allowed archaeologists to identify and record in plan view the overall underwater site while recording wreckage detail for archaeological interpretation (Figure 15). The *Kate Kelly* survey was designed to answer several questions as part of an overall research design. The first objective was to identify, by name or class, the vessel represented by the wreckage. The second objective was to document grain schooner construction techniques, specifically those of canallers. The third objective was to record any material culture that may provide insight into the vessel's crew and how they lived and worked aboard Great Lakes canallers.

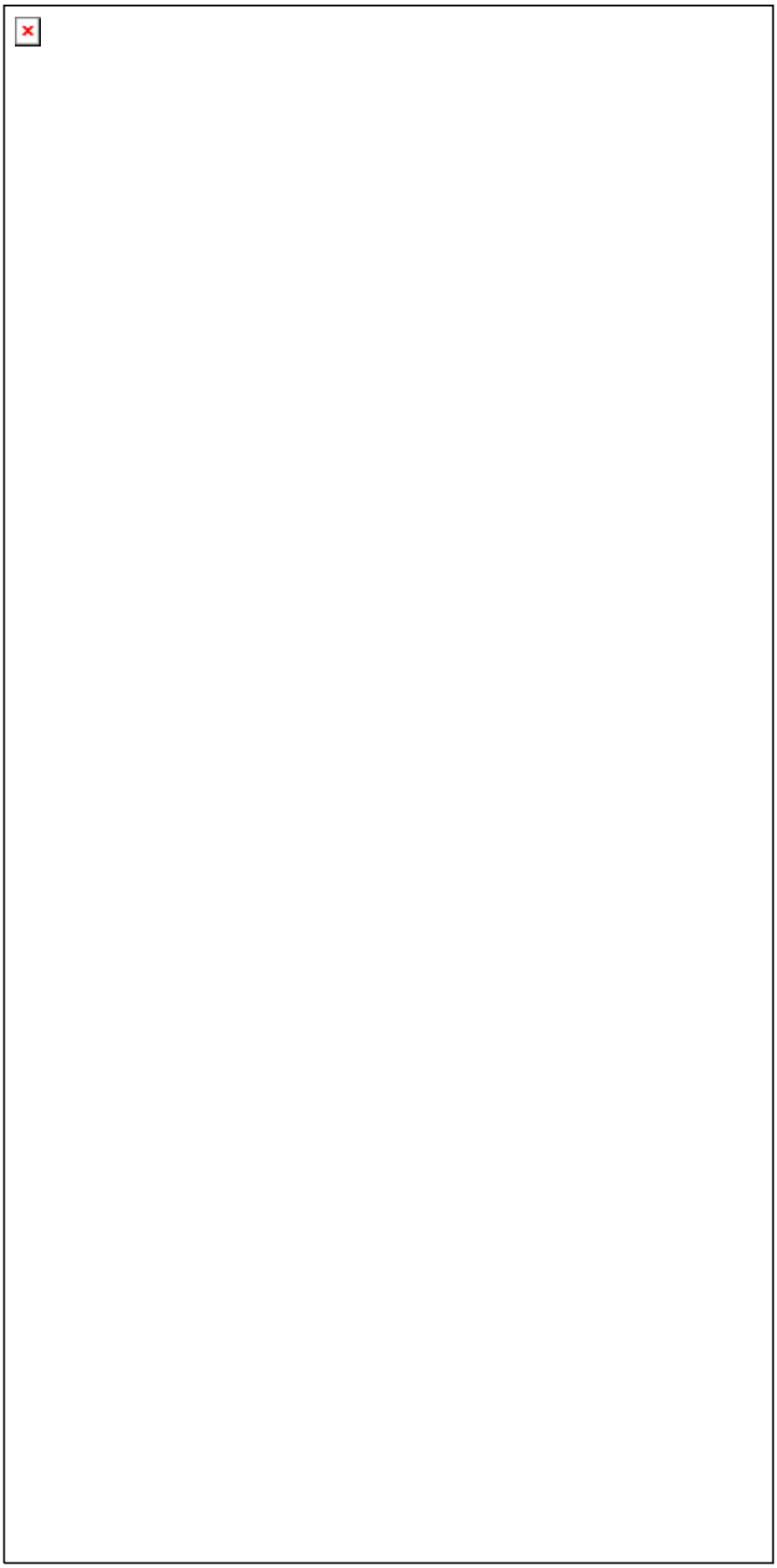

Figure 15. *Kate Kelly* site plan.

The *Kate Kelly* lays scattered over the lakebed in several large hull sections. The lower hull (bilge) is the largest hull section. Laying on a heading of 315 degrees, the keelson is 112 ft. in length and measures 14 in. molded by 12 in. sided. Two sister keelsons, and faying the sisters, two cousin keelsons, provide additional longitudinal hull support. The sister keelsons are 7-1/2 in. molded by 7 in. sided. The cousin keelsons are 7-1/2 in. molded by 9-1/2 in. sided. Both sister and cousin keelsons increase in sided dimensions adjacent to either side of the centerboard trunk. Here the sister's sided dimension increases to 11 in., and the cousin's sided dimension increases to 10 in. The sister keelsons begin 2 ft. 3 in. aft of the keelson's forward end. The cousin keelsons begin 3 ft. 9 in. aft of the keelson's forward end. Both the sister and the cousin keelsons terminate 8 ft. 4 in. from the keelson's aft end. Timbers of both the sister and cousin keelsons are butt scarphed.

The foremast step is located 15 ft. 4 in. from the bow (Figure 16). This mast step is 4 ft. long by 2 ft. wide, and is fastened to the keelson with iron bolts and clinch rings. The mainmast step is located 65 ft. 2 in. from the bow, but few structural components of the step remain intact. Two pumps shaft holes for the stern bilge pump are visible through the keelson 90 ft. from the bow.

Figure 16. Foremast step. Photo by Tamara Thomsen.

The hull is double framed with 52 frame sets extant to the turn of the bilge. Each futtock of the first two frame sets at the bow measure 9-1/2 in. molded by 5 in. sided, with a 20 in. space between the frame sets. Each futtock of all remaining frame sets measure 9-1/2 in. molded, and vary from 4 to 5 in. sided. Space between frame sets varies from 13-1/2 to 15 in. The aft most frame is 6 ft. 11 in. from the end of the keelson.

Limber boards measure 7-1/2 in. wide by 2 in. thick. Ceiling planking is 2 in. thick, and varies widely in length from 5 to 14 ft. Ceiling plank widths vary from 6 to 9 in. and are fastened with ¾ in. square nails, two nails per frame set. Bottom plank dimensions could not be recorded.

The centerboard trunk begins 32 ft. 10 in. from the bow. Overall dimensions are 26 ft. in length, 8 ft. 11 in. tall, and 11-1/2 in. wide. Two planks from the base of the trunk remain attached to the keelson, but the remaining trunk lays intact 12 ft. off the lower hull's port side. The trunk is planked with nine planks that vary in width from 8 to 13 in. Installed, the centerboard trunk would have risen 9 ft. 5 in. above the keelson, consistent with the *Kate Kelly*'s registered 10.5 ft. depth of hold.

A fragment of the centerboard is visible within the keelson's centerboard slot. The fragment is 8 ft. 4 in. long by 4 in. wide and retains an iron hanger on the fragment's forward end. The remainder of the centerboard lays adjacent to the lower hull's starboard side. This 10 ft. by 12 ft. fragment consists of 11 planks that vary from 10 to 13 in. wide. A 26 in. long by 3-1/2 in. wide iron strap wraps around the fragment's aft, upper corner. A clevis is attached to the strap and was used to raise and lower the centerboard within the trunk. The centerboard is broken cleanly in two, with the upper half lodged in the keelson and the lower half laying to starboard of the hull. This suggests that Capt. Hatch had the centerboard fully deployed at the time of her loss, and was snapped off when the *Kate Kelly* came to rest on the bottom.

The *Kate Kelly*'s anchor chains remain entangled around the lower hull section's bow and stretch 46 ft. across the lakebed to the windlass. As the forward hull broke up the windlass spun 180 degrees to where it lays in its present location. The anchor chain still takes several turns about the windlass, which lays atop the port side bow. The windlass' port side carrick-bitt stands askew, and the starboard carrick-bitt has collapsed beneath the windlass. A pinion gear and hand lever remains secured to the windlass' purchase rim, indicating the windlass was steam powered (Figure 17). Despite steam power, the anchors could still be raised by hand in the traditional method if needed, and one of the hand levers for the windlass' crosshead lays nearby on the lower hull section (Figure 18).

From the windlass, the anchor chain continues through the dislodged port side hawse pipe, which was torn from the hull and lays beneath the windlass. From the hawse pipe, the anchor chain runs through the port hawse hole and beneath the wreckage into the sand. The starboard anchor chain runs aft of the windlass and through the starboard hawse pipe, which also has been torn from the hull and lays 20 ft. aft of the starboard bow. Both hawse pipes have a 1 ft. 6 in. diameter collar that abutted the outer hull planking; the pipe that extended through the hawsehole is 1 ft. 8 in. long and 8 in. in diameter.

The *Kate Kelly*'s port and starboard bow separated at the stem post and lay adjacent to one another off the lower hull's port side. The windlass lays atop the port side bow fragment, which lays ceiling up on the lakebed. The port bow retains the port side knighthead, four cant frames, seven square frames, as well as a section of railing and ceiling planking. Forward of the port side bow, a large tangle of wire rigging lays partially buried in the lakebed.

Figure 17. *Kate Kelly*'s windlass with pinion gear and hand lever. Photo by Tamara Thomsen.

Figure 18. The windlass' hand lever, one of two used to manually weigh anchors, lays to the port side of the foremast step. Photo by Great Lakes Shipwreck Foundation, Inc.

The starboard bow fragment lays just aft of the port bow, and lays ceiling down. There is no evidence of the bowsprit or figurehead. A stem iron, stem post, stem apron, and 12 frames remain attached to the starboard bow. Much of the outer hull planking is extant, with 25 planks remaining from the bulwarks to beneath the turn of the bilge. Outer hull plank width varies from 6 to 10 in. Four extant cant frames are 7 in. sided with a 10 in. space. Square frames vary from 8 to 9 in. sided, with spacing varying from 1ft. 3-5/8 in. to 1 ft. 6 in. A 1 in. thick stem iron protects the stempost's leading edge, and wraps around the foot of the bow to continue along the keel. The stem post / keel joint is reinforced by a curved iron brace that is 1 ft. 9 in. long by 3 in. wide, secured with five peened iron bolts that are ¾ in. in diameter (Figure 19). Remnants of the wire bobstays and their anchors remain attached to the stempost, as well as remnants of the forestays fastened to the outer hull planking.

Several pieces of the *Kate Kelly*'s deck gear lay in a debris field around the forward hull sections. A double-acting, cast iron bilge pump lays in the sand 30 ft. forward of the lower hull section, obscured by a large colony of zebra mussels (Figure 20). Between the lower hull section and the port side bow is the donkey engine's winching drum (Figure 21). The drum is 16 ft. in length with a 5 in. diameter gypsy head on either end of the drum. Each gypsy head has a wide slot cut into the end; the slots on either end are parallel with one another. The drum's main gear is 3 ft. 4 in. in diameter with 1-1/2 in. square teeth on 3 in. centers. A smaller 10 in. diameter gear is centered on the drum shaft. A fragment of the donkey engine's boiler lays 14 ft. aft of the port side bow (Figure 22). A lumber port cover lays 15 ft. off the stern of the main wreckage.

Figure 19. Foot of the starboard bow, showing the stempost, stem iron, and iron reinforcement strap. Photo by Tamara Thomsen.

Figure 20. The bilge pump, heavily encrusted with zebra mussels, lays forward of the bow. Photo by Great Lakes Shipwreck Research Foundation, Inc.

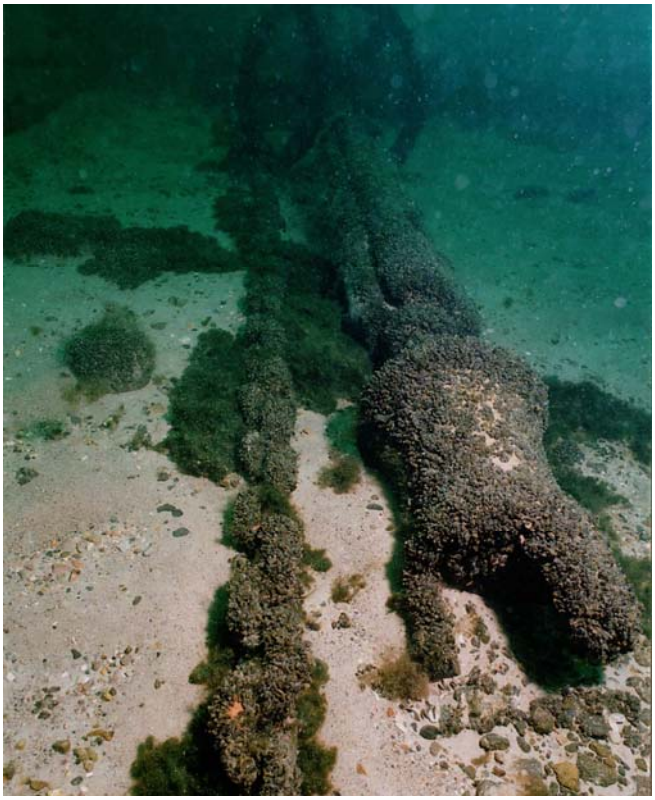

Figure 21. *Kate Kelly*'s winch drum and gear from the donkey engine. Photo by Tamara Thomsen.

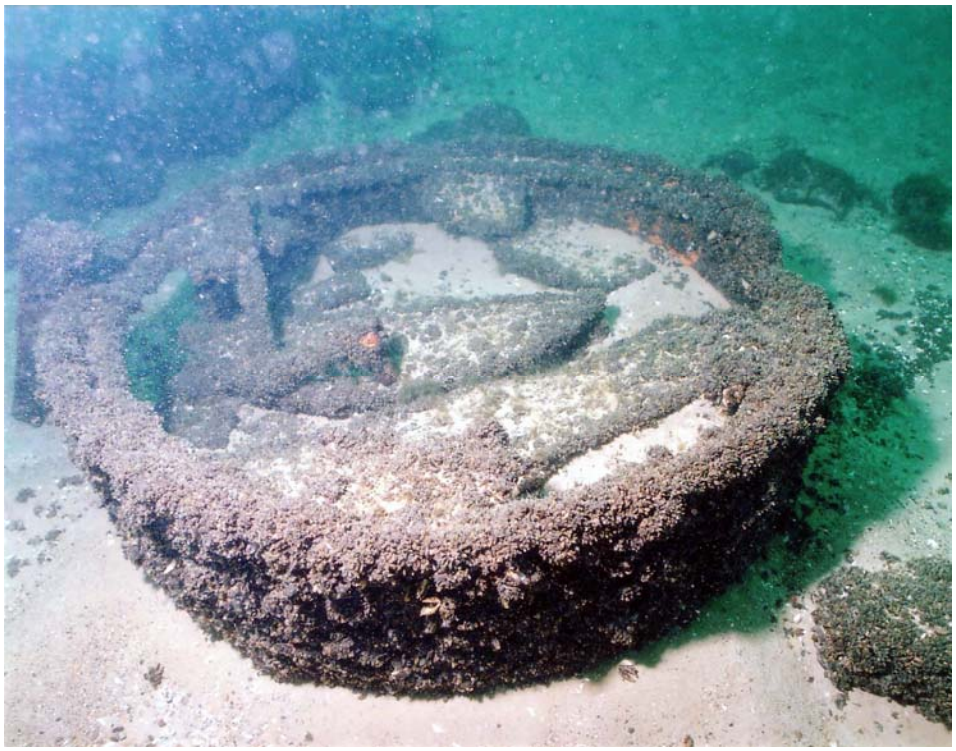

Figure 22. Donkey boiler fragment. Photo by Tamara Thomsen.

A disarticulated hull section lays 17 ft. off the lower hull's port quarter, perpendicular to the lower hull. Consisting of a section of hull side from deck level down that lays ceiling up on the lakebed, it was impossible to determine whether the section is from the port or starboard side. Twenty-six frame sets are extant, spaced on 24 in. centers. Eight hanging knees are extant, several of which have been repaired with iron strapping (Figure 23). The hanging knees nearest the lower hull section are spaced on 4 ft. centers; those knees opposite the lower hull section are spaced on 3 ft. centers. All knees are 14 in. on the arm, 26 in. on the body, and 12 in. at the throat. Sided dimension is 9 in. at the heel, which tapers to 6 in. at the toe. The knees are fastened to the hull with iron bolts with clinch rings. Ceiling planking varies in width from 7 to 8 in. A 12 in. wide by 3 in. thick beam shelf is attached atop the knees.

A large disarticulated hull section lays 250 feet off the main hull's port quarter. This section lays ceiling down on the lakebed, and measures 45 ft. 3 in. long by 10 ft. 2 in. tall. Fourteen outer hull planks are extant, 2 in. thick and varying in width from 6 to 8 in. Frames are spaced on 24 in. centers. It was impossible to determine whether this section was from the port or starboard side. A section of pipe 3 ft. 6 in. long and 3 in. in diameter is wedged between the outer hull planks nearest the main hull section.

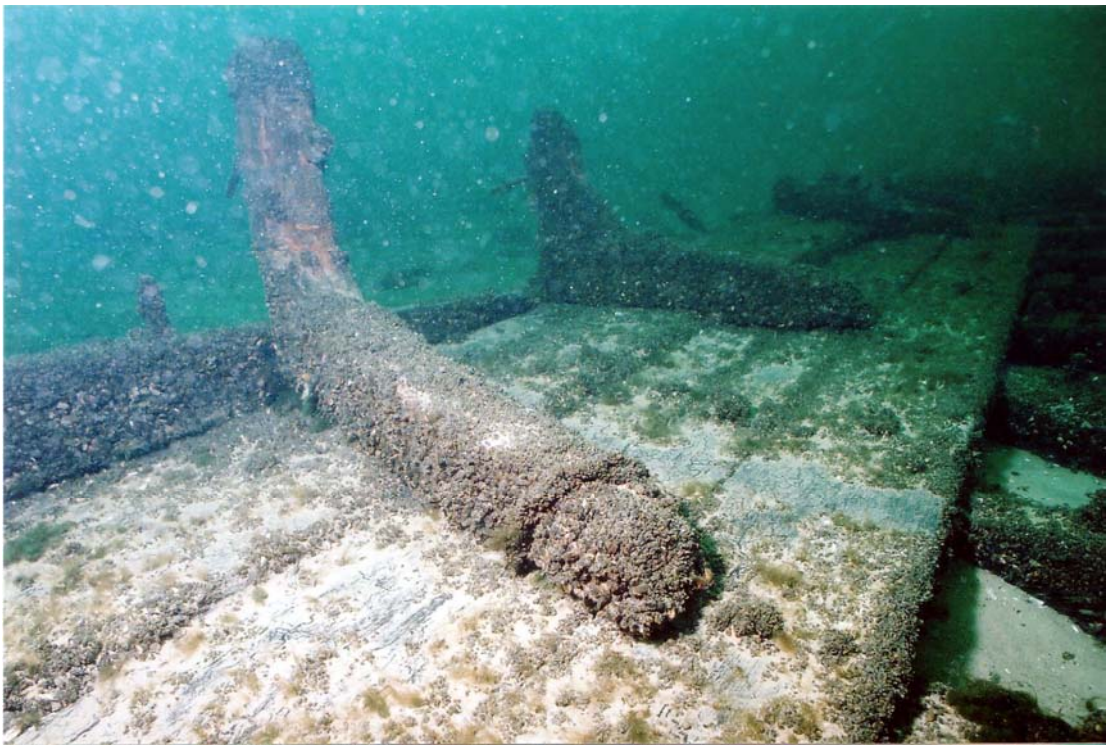

Figure 23. Hanging knees on disarticulated hull side. Note iron reinforcing strap on bottom of hanging knee. Photo by Tamara Thomsen.

Conclusions and Recommendations

The *Kate Kelly*'s wreckage lays widely scattered over the lakebed two miles east of the Wind Point lighthouse in Racine. Although broken up, large hull sections remain, providing clues into early Great Lakes schooner construction, specifically that of canallers. The *Kate Kelly*'s loss marked not only an end to a resilient old vessel, but a resilient old captain as well. We may never fully understand why such an accomplished skipper as Captain Hatch purchased a battered old vessel like the *Kate Kelly*, but it is unlikely that the *Kate Kelly* could have been commanded by anyone more capable than Hatch.

The *Kate Kelly* was a well-worn schooner at the time of her loss, having survived twenty-eight hard years on the Great Lakes. She was also a bit of an anomaly. Not only was she still operating as a self-propelled schooner at a time when many had been converted to schooner barges and were towed behind steamers, but she remained a two-masted schooner when nearly every other sailing vessel of her size on the Great Lakes had been converted to three masts. The popularity of converting from two to three masts was a result of the fierce competition between sail and steam as the nineteenth century progressed.

A two-masted schooner carried almost an equal amount of canvas as a three-masted schooner of equal size. On the two-masted, however, each sail was of such a large size that it required several crewmen to handle them. These large sails required a large amount of effort to raise, lower, reef, and trim. By converting to three masts,

total canvas area could be retained while reducing the size of individual sails. These smaller sails were easier to handle, and required fewer deck hands, which in turn cut the schooner's operating costs. By reducing operating costs, schooners were able to remain profitable despite falling freight rates.

Competition grew increasingly fierce as the nineteenth century drew to a close. Schooners needed to take every possible advantage to remain profitable. Sail technology had developed for centuries and there was little room left to improve upon the rig itself. Ironically, the schooners took advantage of the same technology that was causing their extinction – steam power. By incorporating steam power into sail handling, even fewer crew were required, trimming operating costs to the slimmest possible margin.

Donkey engines became a common sight on schooners – self-propelled and barges alike - during the last years of the nineteenth century. Donkey engines were small steam-powered engines used to assist in heavy shipboard work. Located near the vessel's bow, the donkey engine was powered by a small upright boiler and was attached to a winch drum that provided a mechanical advantage for raising or lowering sails, loading and unloading cargo, weighing anchors, warping along a pier, or any other task that required heavy lifting or pulling.

The *Kate Kelly*'s donkey engine illustrates how modern technology reshaped old-world occupations. For centuries, a sailor's brute strength was responsible for handling the many hard tasks necessary aboard a sailing vessel. Handling cargo, raising sail, and weighing anchor were all back-breaking tasks that for centuries had been completed by man-power alone. With advances in steam technology, however, the traditional sailor's role changed rapidly. Steam technology not only made commercial sail obsolete, but also helped commercial sail to remain a profitable form of transportation for several years longer than it would have without steam technology. One of the schooner's largest overhead costs was paying and feeding crew members. By incorporating steam power aboard schooners to handle heavy labor, crew size could be further reduced in order to squeeze as much profit as possible out of the highly adaptable schooner.

The *Kate Kelly* survey was designed to answer several questions as part of an overall research design. The first two objectives, to identify by name or class the vessel represented by the wreckage, and to document grain schooner construction techniques, specifically those of canallers, are related goals that were met by the survey. While no cultural material or identifying marks were discovered that positively identity the wreckage as the *Kate Kelly*, it is evident that the wreckage represents a vessel with the canaller's typical features of a bluff bow and flat floors and sides necessary to transit the Welland canal locks while carrying the maximum amount of cargo.

The third objective, to record any material culture that may provide insight into the vessel's crew and how they lived and worked aboard lakeshoring vessels, was also successfully met. The above mentioned donkey engine and steam-powered windlass are powerful reminders of the strong competition of the nineteenth century Great Lakes shipping trade, as well as how modern technology began reshaping traditional occupations.

Several major sections of the *Kate Kelly*'s hull have not been accounted for. It is possible that these missing hull sections lay nearby on the lakebed but have not yet been discovered. The surrounding lakebed was searched by divers, but it is possible that the missing hull sections have traveled a considerable distance during the sometimes violent storms that sweep the area. It is also possible that smaller artifacts and hull assemblages are obscured by shifting sands and may become uncovered in future years as sand migrates about the site. The site should be monitored in future years to document any new artifacts or hull assemblies that should appear.

Canallers are a vessel type unique to the Great Lakes, and are not well documented. As a well-preserved example of a nineteenth-century canaller, the *Kate Kelly* site is eligible for listing on the National Register of Historic Places. Study of the *Kate Kelly* wreck site has provided a wealth of information on how these specialized vessels were constructed and operated on the Great Lakes, and has the potential to provide even more data on this little-known vessel class. A shoreside interpretive sign for the *Kate Kelly* site will be installed at the Wind Point Lighthouse during the summer of 2006.

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1882 *British Whig*. 13 November.

1883a *British Whig*. 1 September.

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1883c *British Whig*. 28 July.

1883d *British Whig*. 26 July.

1883e *British Whig*. 16 June.

1886a *British Whig*. 25 June.

1886b *British Whig*. 16 October.

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