Stage 2 Research Report of the 2019 Last Schooners Project

The two-masted schooner *Katie Eccles* and three-masted schooner *Oliver Mowat*

Prince Edward County, Ontario

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EXECUTIVE SUMMARY

The 2019 pilot season of the Last Schooners Project initiated a multi-year research project aimed at documenting two Prince Edward County's submerged heritage sites as part of a wider project researching sailing vessels and sail operations in the final years of sail commerce on Lake Ontario. The project was conducted independently of threats to the preservation of the site.

Research on the *Katie Eccles site,* located 8.9 km northeast of Timber Island and 9.7 km south of Amherst Island in Eastern Lake Ontario, was conducted under License to Carry Out Marine Archaeological Fieldwork No.2019-001.

Examination of *Katie Eccles* was limited to a non-intrusive remotely operated vehicle-based survey. Digital video was recorded throughout the site to construct a three-dimensional photo model of the site. The site was determined to have high archaeological value and the author recommends it be nominated to the provincial heritage site list.

License to Carry Out Marine Archaeological Fieldwork No. 2019-01b was granted for the study of the *Oliver Mowat*, located 7.5 km west-southwest of Main Duck Island. Due to delays in receipt of the permit, no fieldwork was conducted on *Oliver Mowat* during the 2019 field season.

A second field season planned for 2020, returning to the *Katie Eccles* and recording the *Oliver Mowat* was canceled. As a result, no archaeological fieldwork was undertaken under permit 2019-01b on the *Oliver Mowat.*

PROJECT PERSONNEL

Primary Investigator	Benjamin Ioset
Archaeologist/Technical Advisor	Christopher Dostal
R.O.V. Technician	Timothy J. Frizzell
Vessel Operator	Scot M. Ioset

ACKNOWLEDGEMENTS AND CONTRIBUTORS

The following organizations contributed funding and technical equipment to the Last Schooners Project: Texas A & M University Department of Anthropology and the Institute of Nautical Archaeology.

I would like to extend my thanks to Ontario's Marine Archeology Service for their assistance and efforts in making this project a reality. Thank you to my graduate committee for their guidance in the organization of this project and to the field team. I would also like to extend thanks to Paul Adamthwaite and the staff of the Picton Naval Marine Archive, for their assistance and for sharing their vast knowledge of Prince Edward County's maritime history. Finally, I would like to acknowledge the help given to this project by Jose Casaban and Glenn Greico, without whom this project would not have happened. All of your time and efforts are greatly appreciated.

Stage 2 Research Report of the 2019 Last Schooners Project,:
The two-masted schooner *Katie Eccles* and the three-masted schooner *Oliver Mowat*

1. INTRODUCTION

The Last Schooners Project 2019 field season was the pilot season of the author's doctoral dissertation research at Texas A&M University. The Last Schooner Project seeks to study the last years of sailing commerce on Lake Ontario through archival and archaeological investigation of late 19th sailing vessels which persisted into the first three decades of the 20th century. Prince Edward and Frontenac Counties, at the eastern end of Lake Ontario, contains an understudied assemblage of schooners lost in the early 20th century. These wrecks bear witness to the rapid and revolutionary changes in sailing technology that were introduced in the waning years of sail, which have largely been unstudied, eclipsed by technological developments in steel shipbuilding and steam propulsion. Furthermore, the remains of these vessels provide testament to the persistence of traditional sailing amidst the local maritime community.

Two such schooners, the two-masted schooner *Katie Eccles*, and the three-masted schooner *Oliver Mowat* were selected as the subject of the present archaeological and archival study for their exceptional preservation and detailed historical records which have allowed detailed analysis of sailing ship construction in the final years of sail. Furthermore, both vessels operated in different niches within the economy of the lakes, and, taken together, are illustrative of the broad changes undergone in sailing vessel operations, in the roles of vessels in the wider economy, and in the challenges of maintaining financial viability among aging sailing vessels.

Site assessment and background research was conducted under marine archaeological license 2019-001 on the *Katie Eccles*, located 5.5 miles (8.9 km) northeast of Timber Island and 6 miles (9.7 km) south of Amherst Island. The 2019 field team consisted of four researchers, who were in the field from 13-18 June 2019. The team employed a Teledyne Seabotix LBV-150-2 remotely operated vehicle to record the present condition of the site and to develop a 1:1 scale photo model and site plans. The team was unable to survey the *Oliver Mowat* during the 2019 field season and no work was conducted on-site due to the cancellation of the 2020 field season (license 2019-01b).

This project was undertaken as a research project, without any developmental threat to the sites. However, an assessment of present site conditions is provided to aid Ontario's Underwater Archaeological Service in any future site monitoring efforts, to better understand ongoing site formation processes and predicting future degradation.

This report is submitted to the Minister of Tourism, Culture, and Sport as a condition of licensing in accordance with part VI of the Ontario Heritage Act, R.S.O. 1990, c. 0.18.

2. PROJECT BACKGROUND

2.1 Review of Existing Fieldwork

No archaeological assessment or fieldwork has been conducted on either the *Katie Eccles* or the *Oliver Mowat* before the 2019 season of the present project.

2.2 Research Design and Objectives

Great Lakes shipbuilding, and particularly hull design, remains poorly understood. While archaeological fieldwork has steadily advanced our knowledge of shipbuilding, no further study has been conducted of hull forms since Wilson's *Great Lakes Historic Ships Research Project* (Wilson 1989). Furthermore, the outfitting and rigging of Great Lakes vessels remain little studied. Great Lakes sailing vessels developed through a process of gradual refinement to suit the unique requirements of the commerce and conditions on the lakes. Very little of this process was written down or preserved in the form of shipyard documents, scantlings lists, construction plans, or lines drawings.

As historical sources attesting to vessel design, construction, outfitting, and operations are limited, the examination of the archaeological remains is the primary means by which these questions can be addressed. This potential is furthered by the unparalleled preservation afforded to vessels The project seeks to advance our understanding of how new technologies were introduced and influenced the daily operation of sailing vessels and to contextualize the hull design and construction of these schooners in the wider development of shipbuilding on the Great Lakes.

The two-masted schooner *Katie Eccles* was selected as a representative of smaller sailing vessels typical of those operating out of north shore ports on Lake Ontario between the 1870s and 1928. The *Eccles*'s career, which extended from 1877 to 1922, was exceptionally well-documented, and accordingly, it is an excellent representative of vessels engaged in short-distance commerce within Lake Ontario and on the Upper Saint Lawrence in the waning years of sail commerce.

Likewise, the *Oliver Mowat* was selected as a representative of a typical three-masted schooner, having participated in long-range inter-lake trade early in its career, becoming increasingly confined to Lake Ontario in the early years of the 20th century.

The *Katie Eccles* was the focus of the Last Schooners Project 2019 field season, the objectives of which were to produce a 1:1 scale-constrained photo model from the on-site video as well as to develop site orthophotos from which to generate a site plan. This data will be used to develop and draft a reconstructed set of lines, construction drawings, and a rig reconstruction as part of on-going research efforts for both *Katie Eccles* and historical research on *Oliver Mowat.* These finalized findings and reconstructions will be published in the author's doctoral dissertation.

2.3 Project Methodology and Work Conducted

The researchers determined that, within the limited scope of the project, the production of a 1:1 scale constrained photo model and orthographic site plan would be ideal means of recording the sites. The researchers employed digital videography and structure from motion computer

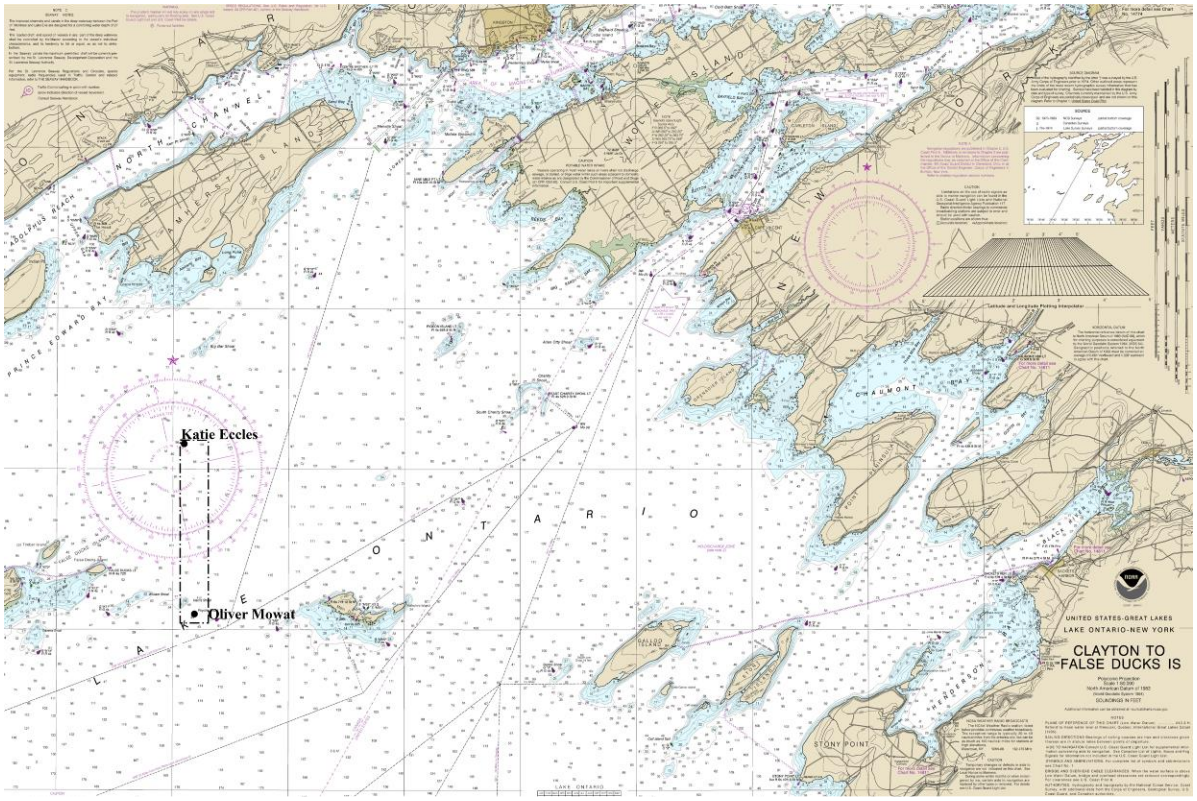

Figure 1. The *Katie Eccles* and *Oliver Mowat* site locations in eastern Lake Ontario. (NOAA Chart 14802)

photogrammetry to record and develop a 1:1 scale-constrained photo model of the site. Structure from motion photogrammetry utilizes the Exchangeable Image Format (EXIF) information of images to estimate camera positions from shared pixels appearing in overlapping images. By estimating numerous camera positions and the associated position of shared pixels, a point cloud is generated representing the subject. The resulting photo model, when scale constrained provides an accurate tridimensional depiction of the site from which remote analysis could be conducted.

As budgetary limitations precluded direct diver access to the site, access was facilitated by a Teledyne Seabotix LBV-150-2 remotely operated vehicle tethered with a 100 m coaxial cable, loaned to the project by the Institute of Nautical Archaeology. Digital video was taken with a GoPro Hero 7 mounted on the LBV-150-2 as well as a GoPro Hero 3 and 3+ which could be alternated between video and timed stills to obtain the best results. Significantly better results were attained with the GoPro Hero 7 on low-light settings to reduce noise from the requisite high ISO settings in low ambient light conditions. The internal camera of the LBV-150-2 was utilized

in the piloting of the ROV but was not recorded due to its low-resolution relative to the GoPro cameras.

The researchers conducted eight dives with the ROV on 14, 16, and 17 June 2019, recording more than 7.7 hours of on-site video and capturing 5,178 timed still photographs of the site. Individual dive times were limited to approximately one hour, our projections of the battery life of the GoPro cameras in low temperatures on site. The video was captured by the GoPro Hero 7 in 1440p resolution at 20-30 frames per second with wide-angle and low-light settings enabled. Redundant video was also taken with a GoPro Hero 3+ for several of the dives. The use of extracted video stills, though resulting in the loss of some resolution along edges, allowed the recording of relatively large areas of the site rapidly without the necessity to plan the overlap between subsequent photos.

Recording of the site was planned with repeated passes at 1 m depth intervals with the ROV and cameras angled perpendicular to the centerline of the vessel until complete video coverage of the hull was achieved. Footage thus recorded was supplemented by top-down video collected with repeated passes parallel to and offset from the centerline.

On 14 June 2019, a single orientation dive was conducted on-site but was aborted on account of increasing rough weather before the hull was located. High waves throughout the afternoon of the 14th and through the 15th of June prohibited further on-site operations. On 16th June four dives were conducted, with another three dives on the 17th, completing the recording of the site.

The captured video was imported into Agisoft Metashape, with frames extracted and grouped in chunks encompassing the port side, the port quarter, the stern, the deck, the starboard bow, and the starboard quarter. The large amounts of data and extended processing time involved in producing a unified model necessitated a division of the site into multiple chunks. Once still frames were grouped into overlapping chunks, a sparse cloud was generated. A dense point cloud was then generated from the sparse cloud, and the individual chunks were aligned and merged to form a unified dense point cloud. A mesh was then generated from the dense point cloud and photo textures were overlaid to complete a three-dimensional photo model of the site.

Scaling measurements were taken of identifiable features throughout the site utilizing a metric scaling bar attached to the lower side of the LBV-150-2's frame. These measurements were then utilized to constrain the photo model to 1:1 scale, thus allowing measurements to be taken from the photo model itself. As all measurements taken in 2019 were less than 15 cm, difficulties in constraining scale were encountered. The breadth measurements provided by the 1877 registration were applied athwart the fore hatch head ledge to further constrain the scale of the model. Despite the possibility for the introduction of error by relying on the surveyor's measurements, the measurement of the length from the forward side of the stem to the after face of the sternpost aligned closely with the recorded length, indicating the measurements are reliable.

Another characteristic of the site which might potentially introduce measurement error is the extent of colonization by Dreissenid zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*). Coverage by dressenids is highly variable across the site affecting the

reliability of measurements for some site features taken from the photo model. Where possible, measurements were taken where surfaces were free from dreissenid fouling.

From the completed photo model, orthophotos of the site were generated in Agisoft Metashape in multiple plan views from which a site plan was drafted. Site plans were drafted manually allowing for the inclusion of the researcher's interpretation of site features from both the photo model and a detailed examination of the on-site videos.

2.4 On-going Research

No fieldwork was conducted on the *Oliver Mowat* during the 2019 field season due to a delay in the receipt of the permit (2019-01b). A second field season of the Last Schooners Project was planned for June 2020 but was canceled because of the outbreak of the COVID-19 pandemic. This field season would have returned to the *Katie Eccles* to improve the data quality as well as survey the *Oliver Mowat.* This survey was to adhere to similar methodologies, albeit modified to improve results and similar research objectives as the 2019 survey of the *Katie Eccles.* Accordingly, no work was conducted on *Oliver Mowat* by the Last Schooners Project in either 2019 or 2020.

Research on the *Katie Eccles* is ongoing and includes reconstruction of the *Eccles'* lines from sections taken off the photo model, representing the exterior shape of the hull as it is preserved today. These sections will then be aligned and drafted into a set of ship lines representing the as-built hull form of the *Eccles,* from which the hull can be analyzed and its hydrostatic properties calculated.

3. THE *KATIE ECCLES*

3.1 The *Katie Eccles'* Operational History

The two-masted schooner *Katie Eccles* was built at the shipyard of H.B. Rathburn & Sons at Mill Point, Ontario (later Deseronto) at the mouth of the Napanee River on the Bay of Quinte (*British Whig*, 18 Jun. 1878).[1] The Rathburn shipyard, an extension of the H.B. Rathburn & Sons lumber company at Mill Point, had been established to construct and maintain the vessels of the Rathburn's lumber fleet and had been expanded in 1868 (Bowell 1868: 312-319). Among the workers listed at the Rathburn & Sons shipyard in 1867 were William Jamieson and his brother Hugh (Bowell 1868: 312-319).

Figure 2. The *Katie Eccles* under sail at an unknown date (Digital/print image from the Fr. Edward J. Dowling, S.J. Marine Historical Collection, University of Detroit Mercy).

William Jamieson, born at Bushmills in County Antrim, Ireland, had immigrated to Canada shortly before 1861-62 settling in Picton, Prince Edward County. William and Hugh found work at the H.B. Rathburn and Sons shipyard at Mill Point as ship carpenters (L.A.C., Census Returns for 1861, C-1069-1070; Census 1901, Deseronto, Hastings East Ontario, p.5, Family No.53; Bowell 1869: 312-319). By 1871, by the age of twenty-seven, Jamieson had become a master shipwright at the yard (Census 1871, C-9990, p.24, Family no.91). His brief career as master shipwright extended only from 1871 to 1879, but during this time he was a prolific shipbuilder. In 1871, Jamieson built his first vessel, the 190 gross schooner *William Elgin,* built on the bottom of the 1853 schooner *Catherine* (GLVD). Between 1871 and 1877, Jamieson completed fifteen vessels including the schooners *Star* (1873), *North Star, James G. Worts* (1874), *L.D. Bullock, Blanche*, *Nellie Theresa* (1875), *Ella Murton,* and *Maggie Hunter* (1876) (GLMC, GCM).

In 1877, the Rathburn shipyard was contracted by Captain Dexter Eccles, a member of a prominent family of ship owners and sailing masters from Wolfe Island, for the construction of a

[1] The *Katie Eccles'* first enrollment (N.A.C., RG-42, C-2471, VOL. 232)) lists 27 July 1877 as the "built date." This most likely represents the date of launching.

schooner of 120 tons. This new schooner was to be Jamieson's sixteenth vessel. It was relatively small by contemporary standards with a length of the deck of 95 ft. (28.96 m), a breadth of 24 ft. (7.21 m), and depth of 9 ft. 6 in. (2.89 m). The vessel would have a volume of 121 tons or a capacity for approximately 10,000 bushels (N.A.C., RG-42, C-2471, VOL. 232).

No known sources document the *Eccles*' first season afloat, apart from a note that she passed the winter of 1877-78 at Kingston Ontario (*British Whig,* 1 Jan 1878). Likewise, sources for the 1878 and 1879 seasons are scarce but indicate active involvement in the grain trade along the northern shore of Lake Ontario. On 3 June 1878, the *Eccles* was reported to have arrived at Kingston from Toronto with 8,617 bushels of wheat for the Montreal Transportation Company (*British Whig*, 3 Jun 1878). On 1 October 1878 (*Daily News)* the Eccles arrived at Kingston with 9,000 bushels of grain from Hay Bay on the Bay of Quinte, consigned to Diamond & Sherwood of Napanee (*Daily News*, 1 Oct. 1878).

In January 1880 Dexter Eccles sold the *Katie Eccles*, which retained an A1 insurance rating, to Archibald Campbell and Captain Henry Matthews for $8,000.00. Matthews would serve as the ship's master (*British Whig,* 7 April 1880). Both men were residents of the village of Lakeport, a small village intensely involved in maritime affairs and activity that served as the port of Colborne.[2]

In 1883, a Captain Redfearn assumed command of *Katie Eccles*. This was either Charles, Henry, or William Redfearn of Colborne, three brothers, all working as master mariners on Lake Ontario (*British Whig*, 12 Apr. 1883). Soon after, on 8 May, the *Katie Eccles* went ashore near Presque Isle, Prince Edward County with the steamer *Hiram A. Calvin* being dispatched from Kingston to assist in getting the schooner off of the shoal (*British Whig*, 8 May 1883). By the time the *Calvin* arrived the *Eccles* had already been lightered and floated off (*British Whig*, 10 May 1883). Campbell employed the *Eccles* in both the exportation of grain between north shore ports and New York ports and in the shipment of grain from these ports, and occasionally from Port Dalhousie or Toronto, to Kingston forwarders, primarily the Montreal Transportation Company (*British Whig,* 11 May 1880, 30 Jul, 6 Aug, 16 Aug, 23 Aug, 14 Mar. 1881, 30 May, 2 May 1883; *Oswego Palladium* 26 Nov 1881; *Marine Record* 1885:9).

Grain cargoes were largely taken on at Colborne, utilizing Campbell's wharf and elevators along the unprotected waterfront. The revenues of grain exportation were occasionally supplemented by taking northbound cargoes of coal, for which Campbell had several sheds constructed at the foot of his wharf in Lakeport (*Oswego Palladium* 31 May 1882; *British Whig* 14 Aug. 1882).

While this pattern seems typical of Campbell's operations in the 1880s, the *Eccles* often took other cargoes, particularly when the grain trade was slow or at the beginning of the season. Lumber products were commonly exported to New York ports, including rough cut lumber, ties, and bunch wood (*British Whig*, 8 Aug. 1882, 17 Aug., 21 Aug. 1886, 1 Sep., 8 Jun 1888). Coal

[2] Lakeport vessels were typically listed as registered in Colborne or the Port of Colborne, in rarer instances the port was listed as the Port of Caramhe, the township in which Lakeport is located.

from New York ports was a common returning cargo (*British Whig*, 2 Jul 1881; 14 Aug. 1882; *Oswego Palladium,* 11 Apr. 1884).

In 1889 the *Eccles* was rebuilt maintaining its A2 ½ rating it had held since 1886 (Inland Lloyds 1886:16, 1890:26; Gerald C. Metzler Great Lakes Vessel Database: 25428). In late August of that year, the *Eccles* was involved in a minor accident while entering Charlotte Harbor, when it fouled and carried away the topmast of the yacht *Velnette* and then fouled in the rigging of the *Endie.* Davis, the *Eccles'* master paid $22 in damages to the *Velnette*'s master (*British Whig,* 24 Aug. 1889). On 25 November 1889, the *Eccles* again met with misfortune when it went aground near Four-Mile Point on Simcoe Island. It was subsequently released (*British Whig,* 26 Nov. 1889).

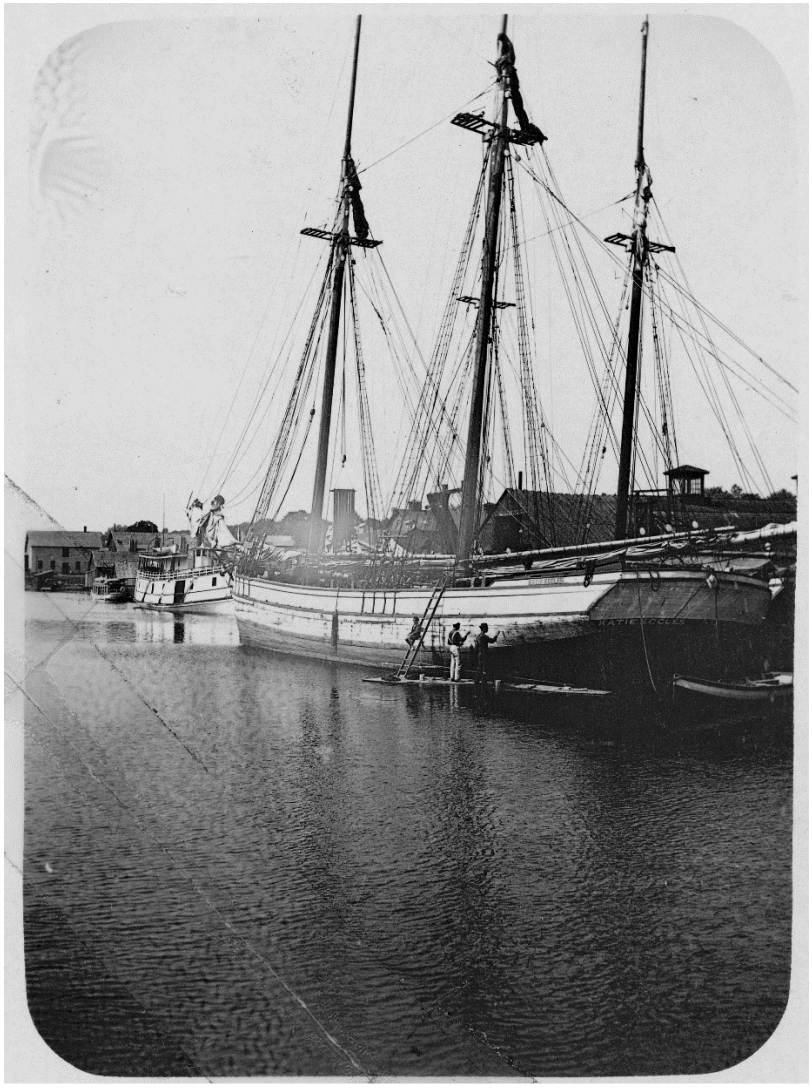

Figure 3. *Katie Eccles* being repainted at Napanee in 1900 (N-1551 –Transportation, schooner Katie Eccles, Napanee [1900] – LAHS Collection, Lennox & Addington County Museum, and Archives)

The 1890s brought significant changes to trade on Lake Ontario that altered the *Eccles'* operations. The passage of the McKinley Tariff Act of 1890 raised import duties to the United States to nearly fifty percent. While the pattern of grain exportation to Oswego from the north shore ports, principally from Lakeport and Prince Edward County continued in 1890, a distinct shift towards carrying grain to Kingston for transshipment occurred by 1891 (*British Whig*, 9 Jul. 1890). Without available return cargoes from Kingston, the *Eccles* usually returned light. While this meant less revenue per trip, it significantly reduced the time a vessel was detained in port unloading and loading cargoes, allowing more down bound trips laden with grain in the short sailing season.

This reliance upon transportation on behalf of forwarders increasingly put the *Eccles* and other schooners in competition with the expanding Canadian grain fleet operating from Lake Superior,

which experienced considerable investment in new steel bulk carrier vessels in the 1890s. As early as May 1886, the increased competition had begun to negatively affect this trade, when the *Eccles,* laden with 7,000 bushels of wheat from Brighton, and the grain-laden *Eliza White* were refused by Kingston forwarders in favor of grain-laden bulk freighters passing through Welland that might provide more grain at less cost per bushel (*British Whig*, 22 May).

For the 1892 to 1894 seasons the *Eccles* was mastered by Captain James Shaw (*British Whig*, 20 Mar. 1893, 1). On the morning of 25 November 1892, the *Eccles* grounded near Grafton, Ontario in heavy fog and seas but was released without the need for extensive repairs (*British Whig*, 26 Nov. 1892, 29 Nov., 30 Nov.).

Following the death of Archibald Campbell on 11 November 1896, Charles J. McCallum of Cobourg, Ontario purchased the *Eccles* in 1898 (*British Whig,* 4 Mar. 1898, *Daily News*, 10 May 1897; Archive of Ontario MS935, reel 180). That August, the *Eccles* underwent repairs including the replacement of some bottom planking and re-caulking beneath the waterline at Davis' Dry dock, Kingston (*British Whig*, 2 Sep. 1898). In 1899, Captain Steven H. Taylor of Lakeport was appointed master of the *Eccles* (*British Whig*, 15 Apr. 1899).

The *Eccles*' operations in the early years of the 1900s began much the same as in the 1890s. In 1901 and 1902 all newspaper sources found attested the *Eccles* carrying exclusively grain cargoes, these cargoes being insurable as *Katie Eccles* still held an A 2 ½ rating by Inland Lloyd's in 1901 and retained a value of $2,100 (Inland Lloyds 1902:26).

By the season of 1902, the *Eccles* had begun to take an increasing number of coal cargoes from south shore ports and the late-season trade in coal had become increasingly important (*British Whig*, 5 June 1902, 15 Sep., 31 Oct.). The 1902 coal strike on the anthracite coal fields of Pennsylvania, which had persisted from 12 May until 23 October of that year, resulted in high freight rates for coal late that shipping season. At Oswego masters seeking consigned cargoes paid $5.35 per ton, an increase of $.50 over prices before the strike. However, freight rates were significantly higher, receiving $.50 per ton, whereas past rates were $.25 per ton to Kingston or $.35-.45 per ton to Belleville and Trenton (*British Whig*, 31 Oct. 1902).

On 7 November 1902, the *Eccles* arrived at Lakeport and was brought alongside the eastern side of the exposed wharf for unloading. As it was preparing to unload a strong southeasterly wind arose threatening to break the *Eccles* against the pier. The schooner was moved to the western side of the pier only for the wind to shift to the southwest, again threatening to break the vessel against the wharf. To prevent the schooner from being broken apart, the crew bored holes in the bottom, scuttling it alongside the wharf. The following day the Calvin Company's steamer *Chieftain* was dispatched from Kingston to Lakeport to raise the *Eccles*. By Sunday, 9 November the *Eccles* had been towed into Kingston for repairs, entering Davis' Dry Dock on 11 November. Repairs were completed by 19 November and the damages did not exceed $100. The 150 tons of anthracite coal aboard that was brought to Kingston was purchased by R. Crawford and Company (*British Whig*, 7 Nov. 1902, 10 Nov., 12 Nov., 19 Nov.; *Colborne Chronicle*, 22 Feb 1978, 6). The *Eccles* immediately returned to service but was forced to lay up for the winter at

Oswego when no consignment of coal for the trip back to Lakeport could be found (*British Whig,* 22 Dec 1902).

The start of the 1903 season found Taylor again in command, he and mate Don I. Matthews traveling to Oswego in mid-March to outfit the vessel (*Enterprise of East Northumberland*, 19 Mar. 1903). It would be the first vessel to call at Lakeport that year, carrying a cargo of coal from Oswego. While preparing to unload coal at the Lakeport pier on Sunday, 5 April, a southerly wind arose, and the *Eccles* was compelled to sail to the shelter of Cobourg Harbor to unload (*Enterprise of East Northumberland*, 19 Mar. 1903., 8 Apr., 9 Apr.; *Colborne Chronicle*, 30 Aug. 1974).

In early 1904 Charles J. McCallum placed the *Katie Eccles* up for sale and entered negotiations with Captain Thomas Sullivan of Kingston and James Hanley of Watertown, New York (*Enterprise of East Northumberland*, 7 Apr. 1904). These negotiations fell through and it was instead sold to Captain James Dougherty of Deseronto, formerly of the steamer *Reliance* (*British Whig*, 11 Apr. 1904, 17 Apr.). Dougherty subsequently sold the *Eccles* to Captain Frank Barnhard, and who in turn sold to Captain John McCullough of Napanee and Alexander Foot of Deseronto in December 1904 (*British Whig*, 29 Dec. 1904, 17 Apr. 1905, 8 Apr. p4). The reason for this rapid succession of owners remains unknown.

In November 1906, the *Katie Eccles* made headlines throughout the region when it was reported to be lost. On 5 November, the *Eccles* had departed Oswego. The following day it was reported overdue and over the ensuing days, inquiries by telegraph produced no word of her. On 9 November, the *Daily Palladium* reported the *Eccles* lost along with its crew of five and the cook. On 9 November, the *Eccles* arrived in Napanee having been delayed by a misunderstanding of its itinerary as it had sailed down the St. Lawrence River (*British Whig*, 8 Nov. 1906, 9 Nov.; *Daily Palladium*, 9 Nov. 1906).

In late August 1908, McCullough and Foot sold the *Eccles* to Captain Harry T. Mitchell of Newcastle (now Bowmanville), with the intent of using the proceeds of the sale to purchase a steam barge (*British Whig*, 29 Aug 1908, 3 Sep). Mitchell had become master and owner of the 18-ton schooner *Minnie* of St. Catharine's, Ontario in 1896 at the age of seventeen, making a meager income in stone hooking. In 1898 Mitchell sold the *Minnie*, purchasing the sloop *Viking* which he likewise employed in stone hooking until 1906 when he purchased the *Katie* Eccles (Snider, 29 May 1943).

During the first decade of the 20th century, sailing vessels became increasingly relegated to coal transport. While the schooner was employed in the grain trade early in the shipping season and in the early fall before 1910, coal cargoes predominated. In 1915, all reported cargoes carried by the *Eccles* were coal from Oswego (*Oswego Palladium*, 1 May 1915, 10 Aug., 29 Nov.). Furthermore, consignments to forwarding companies seem to have declined in favor of consignments on behalf of individual businesses. The *Eccles* was employed for much of 1912 carrying coal to the Kingston cotton mill (*British Whig*, 16 Jun. 1912, 23 Jun., 28 Jun., 12

Jul., 17 Jul., 22 Jul, 30 Jul.). To increase the profitability of each trip, feldspar was occasionally taken on as a southbound cargo (*British Whig*, 15 Sep. 1912, 30 Sep., 4 Oct). The schooner was usually light for southbound trips, relying instead on quick turnaround and making more trips to turn a profit.

On the morning of 20 October 1908. The *Eccles*, having cleared from Kingston bound for the south shore of Prince Edward Bay, grounded on the Brothers, a series of shoals off the northern end of Amherst Island. It was released by the steamer *Donnelly* of the Donnelly Wrecking Company (*British Whig*, 21 Oct. 1908). In mid-September 1909, the *Eccles* grounded at Newtonville, near Newcastle while laden with coal from Oswego. It was again released by the *Donnelly*. Towed to Davis' Dry Dock in Kingston, the *Eccles* was returned to service by 6 October, only to return for further repairs on 13 October (*British Whig*, 21 Sep 1909, 22 Sep., 24 Sep., 13 Oct.; *Buffalo Evening News*, 22 Sep. 1909).

In early August 1911, the *Eccles* was involved in a collision with the small steamer *Jessie Bain,* while in Kingston Harbor. The *Bain* sustained significant damage to its stern while damage to the *Eccles* was relatively minor (*British Whig*, 2 Aug. 1911, 3 Aug, 7 Aug.). In late September of that year, the *Eccles* went aground near Brighton, Ontario while carrying coal from Sodus to Kingston, but was released by 9 October (*British Whig*, 28 Sep. 1911, 9 Oct.; *Oswego Palladium* 30 Sep. 1911). While laid up during the winter of 1913-1914 at Kingston Harbor, the *Eccles* was given a refit at a cost of more than $100 (*Oswego Palladium*, 4 Apr. 1914).

Little information was published regarding *Katie Eccles* in the intervening years between 1914 and 1922, aside from occasional reports of arrivals or clearances. All reported cargoes between 1914 and 1922 were coal from Oswego (*Oswego Palladium*, 1 May 1915, 9 Aug. 1916, 10 Aug.; *Republican Journal*, 6 Oct. 1916).

On Saturday, 30 July 1921 at 7:15 pm, *Katie Eccles* cleared from Oswego for Port Hope laden with 225 tons of anthracite coal consigned to Brown and Company. That night a northwesterly gale with winds reaching fifty miles per hour struck Lake Ontario producing heavy seas. By the evening of 31 July, nothing had been heard of the *Eccles,* and it was believed that it may have been lost. Concern at Port Hope was not alleviated until 3:00 p.m. on the afternoon of 1 August, when a telegram arrived from Kingston reporting the *Eccles* had weathered the gale behind Horseshoe Island *(Republican Journal*, 2 Aug. 1921; *Oswego Palladium* 1 Aug. 1921).

The 1922 season was slow for the *Eccles* and sailing vessels in the coal trade. A strike by the United Mine Workers of America on the Pennsylvania anthracite fields that persisted from 31 March until 2 September, effectively ceased the supply of coal to the elevators at Sodus, Oswego, and Fairhaven (Gadsby 1922:939-940, 950; Karanek 1975). The strike proved disastrous for vessel owners and operators reliant on the coal trade. Mitchell employed the *Eccles* in stone hooking on the shallow stone banks of the Bay of Quinte. Stone hooking involved the recovery of large stones from stone banks with a long rake. The crew then lifted the stones onto a scow before being transferred to a schooner which would deliver loads of stone to

construction sites. Though it was minimally profitable, the lack of overhead costs made this a viable, if laborious means of keeping a schooner in service throughout that season (Ford 2017:120-121; Snider, 29 May 1943). With the resumption of anthracite production, the coal freights returned in time to take advantage of higher late-season freight rates.

Several conflicting accounts of the loss of the *Katie Eccles* exist. The principal part of this account is based upon C.H.J. Snider's *Schooner Days* articles of 29 May and 5 June 1943, an account derived from an interview with Mitchell years later. The account, as written by Snider, contains several notable inconsistencies, including inaccuracies of some dates.

Late November found the schooners *Mary A. Daryaw, Horace L. Taber, Katie Eccles*, and *Lyman M. Davis* weather-bound for days at Oswego, awaiting improved conditions to make their final trip before laying up for the winter. *Katie Eccles* had loaded 180 tons of coal consigned to the Schuster Coal Company of Belleville awaiting a weather window for the trip (*Watertown Daily Times*, 29 Nov. 1922).

The weather predictions for Sunday, 26 November were unsettled as low-pressure systems centered on the Upper Lakes and western Lake Ontario with variable winds on the eastern end of Lake Ontario. (U.S. Daily Weather Map, 26-27 Nov. 1922). That afternoon the wind shifted from the northwest to the southwest with conditions seemingly improving. At 4:00 in the afternoon, with dusk approaching, but the weather improving, the masters of the schooners decided to attempt the trip, sailing out of the harbor before a southwest breeze following the *Lyman Davis.* Their departure was followed an hour later by the Kingston-bound *Mary A. Daryaw* and *Horace Taber*, mastered by brothers Frank Daryaw and Henry Daryaw (*Toronto Globe*, 28 November 1922; U.S. Daily Weather Maps 24-30 Nov. 1922).

The *Eccles* was undermanned with only three aboard: Captain Harry Mitchell, the ship's boy Hugh McCullough of Kingston (also given as Hugh Hanna), and Mrs. Mary M. Lloyd of Kingston, the ship's cook. As they sailed out of the harbor, Mitchell and McCullough hoisted sails, and Mary Lloyd manned the helm, she by all accounts was a competent sailor having gained experience during the previous three or four seasons during which she was employed in various vessels as a cook (Sandy Creek News, 30 Nov. 1922; Snider, 29 May 1943, 5 June).

The *Eccles* had run off five miles when the rudder became unresponsive. Mitchell brought the *Eccles* about by trimming the sails to return to Oswego, but with Oswego directly to windward, and being unable to tack, it became apparent they would not make the harbor. With no anchorages and only leeward shore to the east, Mitchell decided to run for the Canadian shore where they might anchor in the lee of the False Duck Islands or within Prince Edward Bay. The outcome of this decision depended on the location of their landfall, as the Duck Islands extending between Point Traverse and Stony Point presented the potential for going aground or ashore.

Throughout the evening the weather continued to deteriorate, developing into a driving snowstorm by 10:00 p.m., with ice and snow accumulating on deck. Despite the weather, the *Eccles'* maintained a north-northwesterly course under a mainsail with a slacked sheet. Two hours later, during an interlude in the snow, the crew sighted a light, eventually concluding that this was the False Ducks Light, warning of the Duckling Shoal (also called Outer False Duck Shoal or Gull Bar) extending southwest from False Duck Island with a least depth of less than 1 ft. (0.3 m). As it lay ahead, the crew hoisted all three headsails to make the *Eccles*'s turn off northward to clear False Duck Island on its northern side where there was sufficient depth. This had little initial effect until a westerly shift in the wind pushed the bow to the north and the *Eccles* narrowly averted going ashore passing close beneath the False Duck Light.

With the False Ducks astern, and nearing the lee of Timber Island, Snider records that when they reached the lee of Timber Island, the headsails were struck, the mainsail sheeted in, bringing the bow into the wind, and both anchors were dropped in 15 fathoms (90 ft. / 27.4 m). Mitchell recounted that the *Eccles* remained at anchor throughout November 27 and 28 (Snider, 5 June 1943). Other accounts diverge from Snider's account, including another account, reportedly given by Mitchell, indicating that the *Eccles* stranded on Timber Island after dragging its anchor (*Oswego Palladium,* 2 Dec 1922, 5). This latter story was supported by Captain Miller Donnelley (*Daily British Whig*, 29 Nov 1922; *Daily Intelligencer,* 28 Nov. 1922, 30 Nov.; *Sandy Creek News*, 30 Nov. 1922; *Republican-journal*, 1 Dec. 1922). The account of Mitchell provided by Snider does not indicate that the *Eccles* went aground at any stage of its struggle between 26 and 28 November.

The *Katie Eccles* was not alone in its struggle on the night of 26 November and the early morning of 27 November. The *Lyman M. Davis,* with which the *Eccles* had departed Oswego, was stranded at Waupoos Island only seven miles west-northwest of Timber Island (*British Whig*, 29 Nov 1922). The *Mary A. Daryaw* and the *Horace Taber* were both driven aground off Four-Mile Point on Simcoe Island, southeast of Kingston. While the *Daryaw* was released within two days, the *Horace Taber* soon began to break up and quickly became a total loss (*Daily British Whig*, 27 Nov 1922, 30 Nov; *Daily Intelligencer*, 27 Nov).

With *Katie Eccles* overdue, concern had arisen over the safety of the vessel and its crew. No further news came until late on the afternoon of Tuesday, 28 November, when, the weather having cleared, Captain Miller Donnelly of the Donnelly Wrecking Company's tugboat *Mary P. Hall,* returning from the *Lyman M.* Davis at Waupoos Island, sighted the *Eccles* at Timber Island, and reported her hard aground. The *Hall* was unable to approach the schooner due to the depth of water surrounding it and having observed smoke rising from the stove pipe, returned to Kingston, assured of the crew's safety (*Daily British Whig*, 29 Nov 1922; *Daily Intelligencer*, 28 Nov. 1922, 30 Nov.; *Sandy Creek News*, 30 Nov. 1922; *Republican-Journal*, 1 Dec. 1922). With Donnelly's report at Kingston, a telegram was sent to W.E. Schuster of the Schuster Coal Company in Belleville, the consignee of the *Eccles'* cargo, notifying him that the vessel had been found and the crew was safe (*Sandy Creek News*, 30 Nov 1922).

The morning of 29 November dawned clear with a westerly breeze. According to Snider, the *Eccles's* crew believed they might attempt to reach the Upper Gap at the entrance to the Bay of Quinte while the weather remained favorable. While making preparations to weigh anchor, a westerly squall arose and within a half-hour, the *Katie Eccles* was pitching head-on into the heavy sea at anchor. The strain being transferred to the windlass by the chain cable was so great that Mitchell became concerned that the windlass might be dismounted and pulled over the bow. To alleviate the strain on the windlass, the crew took the chain from the remaining anchor, wrapped it around the foremast, and bent it to the jib sheet bits on the windlass with a towing hawser. The hawser parted on the first rise and chain rapidly let out through the hawse pipes. Mitchell reported that the hawse pipe was torn loose, the pipe sliding down the chain, though both hawse pipes remain in place on-site. With the chain threatening to cut through the bolster and planking of the bow, the crew set a double-reefed mainsail to keep the bow into the wind and dropped the remaining anchor only to find their remaining chain was insufficient. This chain parted and the anchor was lost.

By the afternoon of Wednesday, 29 November, the *Eccles* had begun to drag its remaining anchor and was working its way off the shoal. With nothing remaining that could be done to save the ship, Mitchell decided to abandon the *Eccles*. Lowering the yawl from the davits and securing a bow painter to the schooner's bow, they boarded from the main chains amidships after gathering what provisions remained aboard. Mitchell was the last to make the leap from the main chains to the yawl (Snider, 5 June 1943, *Daily* Intelligencer 30 Nov 1922). The crew landed the yawl on the western shore of Timber Island, where they built a shelter and a fire on the southern end of the island where it would be visible from Point Traverse. The *Eccles* reportedly remained at anchor throughout the afternoon, until later in the day having dragged the anchor and gone adrift, it disappeared from view. On 30 November, the crew were taken off the island and later taken to Kingston (*Daily* Intelligencer 30 Nov 1922; *Republican-journal* 2 Dec 1922; *Toronto Telegram* 5 Jun 1943).

With the *Eccles* adrift, it was expected that it might go ashore on Amherst Island but by Saturday, 2 December, no report had arrived (*Cape Vincent Eagle*, 7 Dec. 1922). By December 7, Mitchell concluded that the vessel had foundered, a great loss to him as it was nearly all he owned (*Cape Vincent Eagle*, 7 Dec 1922).

On 5 December a large section of the upper stern of the *Eccles* came ashore in Reid's Bay on the south shore of Wolfe Island (*Republican-journal*, 7 Dec. 1922). Later in December, Captain Claude W. Cole of Cape Vincent, who was taking the lightkeepers off from Pigeon, False Duck and Timber Islands, reportedly located the wreck with its topmasts protruding above the water in what he estimated to be approximately 80 ft. (26.7 m) of water opposite the Upper Gap, between Amherst and Timber Islands. Cole towed part of the mainsail and its boom to Cape Vincent, where it was placed on the Pyke Coal Company's dock, and reported the wreck to the Pyke Wrecking Salvage Company (*Cape Vincent Eagle*, 28 Dec. 1922; *Sandy Creek News*, 28 Dec.). Nothing came of the talk regarding raising the *Eccles*, no salvage efforts seem to have been undertaken, though the masts were taken down as they were a hazard to navigation.

The *Katie Eccles* was relocated on 4 August 1985 by local divers Barb Carson and Doug Pettengill during an echosounder search of the Upper Gap. A mooring block was placed on the site in 2002 and has been subsequently maintained by the preservation organization *Save Ontario's Shipwrecks*, facilitating public access to the site, which has become a frequently visited dive site (Personal Communication with Barb Carson, 23 Mar 2020).

Owners of the *Katie Eccles*:

1887-1880	Capt. Dexter Eccles, Wolfe Island
1880-1898	Archibald Campbell and Capt. Henry I. Matthews, Lakeport
1898-1904	Charles J. McCallum, Cobourg
1904	Capt. James Dougherty, Deseronto
1904-1905	Capt. Frank Barnhart, Deseronto
1905-1906	Capt. John McCullough, Napanee, and Alexander Foot, Deseronto
1906-1922	Capt. T. Harry Mitchell, Newcastle (later Bowmanville)

3.2 Description of the *Katie Eccles*

The remains of the *Katie Eccles* lie in 105 ft. of water (32 m.) within Prince Edward Bay 6 miles south of Amherst Island (9.7 km) and 5.5 miles (8.9 km) northeast of Timber Island. Local bathymetric charts indicate the lakebed in the vicinity of the site is relatively featureless, with mudflats surrounding the site (Fig.1) (NOAA Chart No.14802). The hull lies on a southeasterly heading and retains an overall preserved length of approximately 126 ft. (38.4 m) including the jib boom and bowsprit, and a length on deck of 95 ft. 6 in. (29.1 m) (Fig.4-7).

The bow rests with a list to port of approximately 3-3.5 degrees, the port side resting embedded in sediment along the turn of the bilge, with the starboard turn of the bilge being exposed along much of the length of the hull and the stern more deeply embedded in the bottom. The stern lists to starboard, indicating a potential break in the keel aft of amidships. The hull retains a maximum profile of 12 ft. 7 in. (3.84 m) measured at the starboard chock rails immediately forward of the fore chains.

The *Eccles*' hull is intact for approximately two-thirds of its length. From the bow to midships at the mainmast, disruption of the hull is limited to disarticulation of some deck planking and damage to the bulwarks between the port fore chains and amidships, and at the starboard bow between the starboard hawse pipe and the starboard chock bitts. The starboard chock and cap rail have been detached forward of the cathead to starboard.

Forward of the fore hatch, the deck, particularly on the port side, is covered by tangled standing rigging which is draped over the port rail between the port fore chains and the cathead. Arrayed along the foredeck, from fore to aft, are the pawl post, windlass, and a considerable amount of chain piled on deck. Though the forecastle companionway hatch remains, the companionway, visible in historic photographs, has not been preserved (Figs.3, 13).

Figure 4. Site Orthophoto of the *Katie Eccles*

Figure 5. Elevation Views of *Katie Eccles* generated from the site orthophoto.

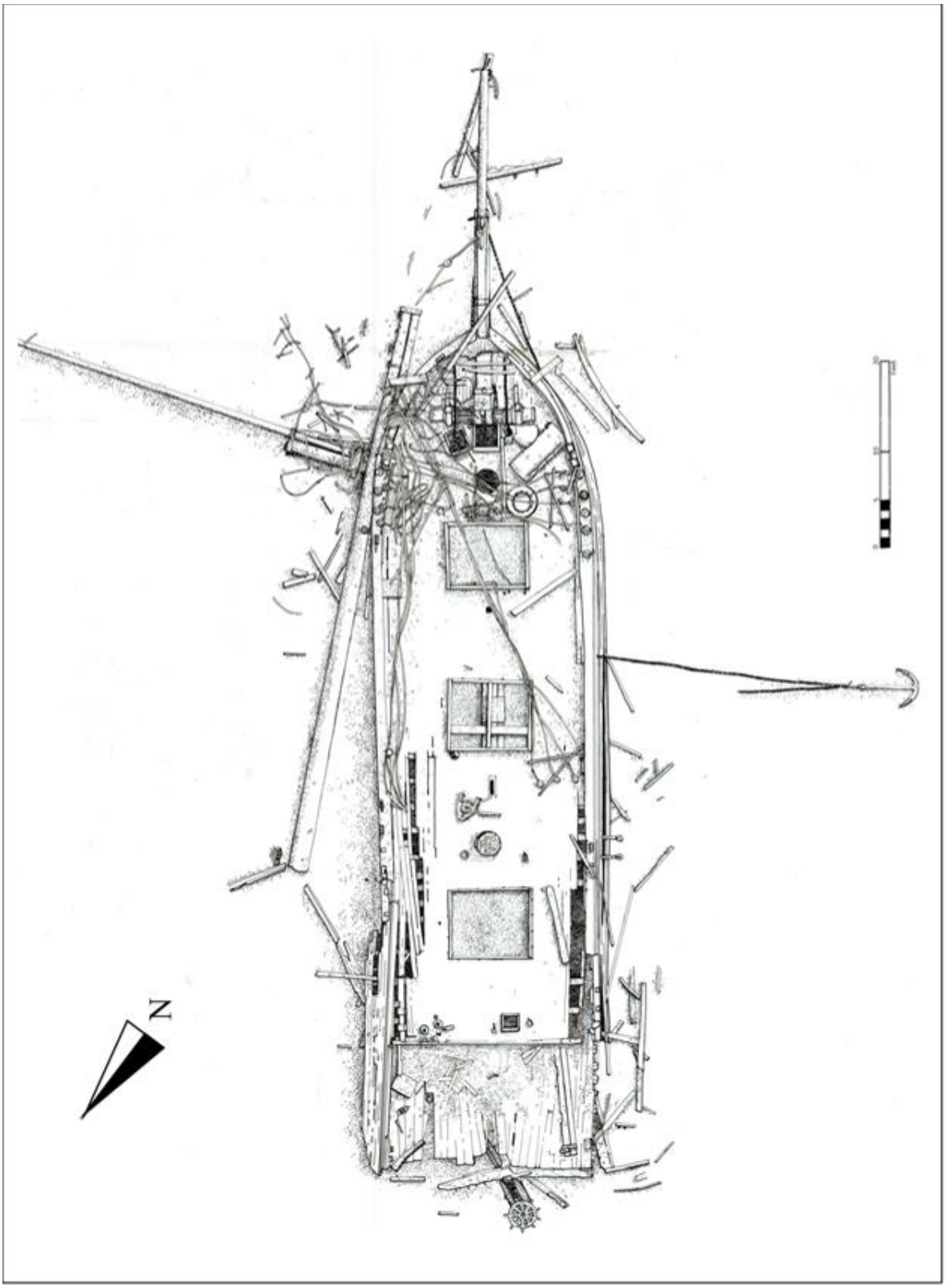

Figure 6. Site plan of the *Katie Eccles* (B. Ioset)

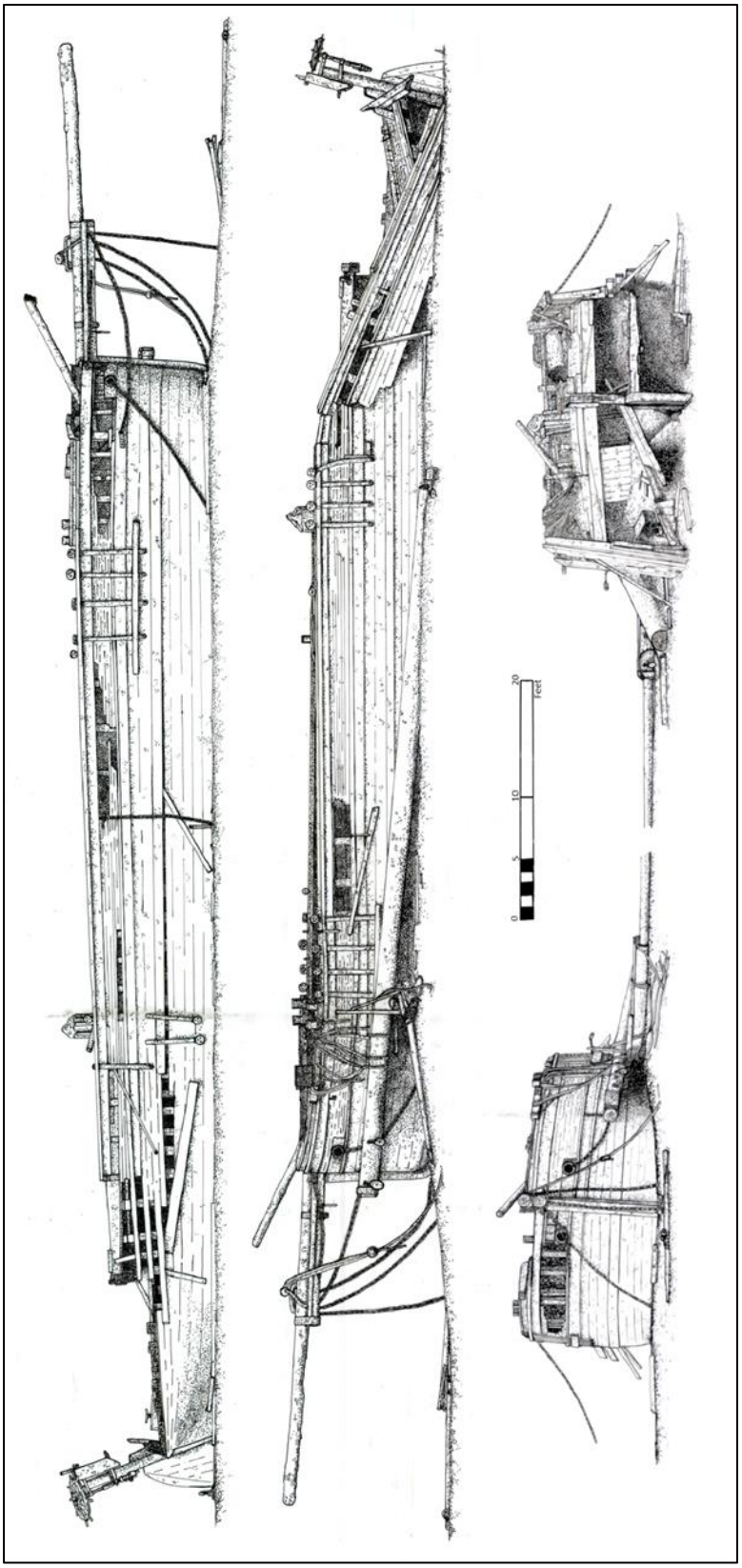

Figure 7. Site plans of the *Katie Eccles* (B. Ioset)

To starboard, forward of the fore hatch, a vertical boiler lies on its side resting against the bulwarks while its baseplate remains in situ just forward of the steam winch.

The deck is interrupted by three hatches in addition to the forecastle companionway hatch and a small hatch to starboard forward of the great beam. The centerboard box extended from the aft head ledge of the fore hatch to just forward of the mainmast. Forward of the mainmast, the deck is pieced by the hole for the centerboard pennant chock. The chain pennant runs from the chock to the centerboard winch, which lies on deck to port. The mainmast is broken off at the boom saddle.

The damage sustained in the aftermost third of the hull is primarily attributable to the wrecking process. The upper section of the hull including the quarterdeck, cabin, cabin floor, and counter are missing, having washed ashore on Wolfe Island (*Republican-journal*, 7 Dec. 1922). The remaining stern is split open beginning athwart the aft hatch where the sides have separated from the deck along the waterways.

The most significant damage to the hull has been inflicted to the port quarter. A large section of the upper port quarter, 30 ft. (9.15 m) in length and 5ft. 5 in (1.34 m) in height, has broken away. Its forward end remains partially articulated with the rail and deck, sloping aft to the taffrail, which is embedded in the bottom. This section comprises a section of the bulwark, cap rail, waterway, the plank sheer, and two strakes beneath. The port quarter between the upper and lower turns of the bilge has broken off and lies flat on the bottom, partially beneath the upper port quarter. The half frames and planking of the lower turn of the bilge have separated along the sternpost and deadwood and have settled to port. The sternpost, inner post, deadwood, and transom are intact, though with a list to starboard. The starboard quarter is broken off along the upper turn of the bilge, above which the hull is missing.

This localized damage to the stern is most consistent with the *Eccles* having gone down stern first, striking the bottom on its port quarter, disarticulating this portion of the hull from the longitudinal assembly. The transference of this force forward along the hull and the momentum of the deck resulted in the compression of the sides and the separation of the deck from the hull along the waterways as it settled. The missing components of the upper part of the stern were likely disarticulated in the impact and floated away.

Much of the rigging remains throughout the site. The bowsprit and jib boom remain largely intact. The martingale, spreader spars, and the outer portion of the jib boom all lie on the lakebed beneath the bowsprit.

The foretopmast and its doubling with the foremast rest on the lakebed, laying at an angle approximately perpendicular to the hull with the masthead pointed away from the hull. The lower foremast is unaccounted for below the hounds. The mainmast lies off the port side, approximately parallel to the hull, with the masthead pointed forward. The mainmast overlies the foremast doubling and is thus raised off the lake floor at its head. The wire shrouds of both the fore and mainmast remain attached to the masts at the hounds.

The present disposition of the masts is not a result of the wrecking, as the topmasts protruded above the surface at the time of its sinking (*Cape Vincent Eagle*, 28 Dec. 1922; *Sandy Creek News*, 28 Dec.). The arrangement of the masts is most likely the result of salvages clearing the wreck as a hazard to navigation by cutting off the foremast beneath the hounds, the foremast doubling and topmast being secured by wire rigging, before removing the lower foremast. The mainmast was broken off above the deck.

A spar, likely the fore gaff, lies off the port quarter parallel to the hull. This spar was omitted from the 2019 photo model and site plan due to difficulties in integrating it into the photo model of the hull from which it is separated.

3.3 Construction of the *Katie Eccl*es

The intactness of the *Eccles'* hull precluded detailed recording of many interior structural components without penetration of the hull. Constructional features were observed where possible, through the hatchways, and at the break of the deck aft, where the interior of the hold is visible as far forward as the aft hatch. Examination of other components, such as framing or deck beams, was often only possible where disarticulation of the hull or the displacement of planking enabled observation of these features.

While no scantling lists have been found for *Katie Eccles*, the Board of Lake Underwriter's 1876 *Rules for the Construction, Inspection, and Characterization of Sail and Steam Vessels* are an invaluable reference for reconstructing minimal scantling dimensions and fastening requirements in vessels constructed to these standards (Dorr 1876). As the *Eccles* was classed A1 by the surveyor in 1880, the *Eccles* necessarily met or exceeded these minimum regulations at the time of its construction, though subsequent alterations of the hull in rebuilds are likely (*British Whig*, 2 Feb 1880).

Keel, Stem, and Sternpost Assemblies

The keel and keelson assemblies could not be observed along most of their lengths. At the forward extremity of the keel, the upper extent of the forefoot is exposed. The forefoot's lower half is embedded in the bottom. The stem has a straight run above the forefoot of approximately 8 ft. 6 in. (2.59 m) along its forward face. The stem is nearly vertical with a 2-degree rake forward. As the hood ends of the strakes remain seated within the rabbet the overall dimensions of the stem could not be determined. The external molded dimension from the rabbet line to the forward face of the stem is approximately 1 ft. 5 in. (0.41 m) at the head of the stem, tapering to 1 ft. (0.30 m) at the foot. The stem's forward sided dimension could not be reliably measured.

Though the aft end of the keel and keelson assemblies are not visible, the sternpost and inner post remain in situ, listing slightly to starboard with its heel embedded in the sediment. The sternpost has an exposed length of 7 ft. 6 in. (2.28 m), with an aft rake of 7 degrees. This appears to be, in part, a result of the disarticulation of the starboard quarter and distortion to the stern

sustained in the sinking, as evidenced by the space that has opened between the main transom timber and the aftermost half-frames on the starboard quarter.

The inner post, with an exposed length of 7 ft. (2.13 m) in length is fitted against the forward moulded face of the sternpost. The aft corners of the inner post are chamfered, forming the rabbet along the butting faces of the inner post and sternpost. The top of the inner post is notched to receive the main transom, which is fitted into this slot formed with the forward face of the sternpost.

Figure 8. The starboard bow. Note the straight stem, bobstay plates and plates for the bowsprit shrouds beneath the cathead.

Square Frames and Midships Half Frames

The square frames, though largely obscured by planking, both exterior and ceiling, were visible on the starboard side from the break of the deck as far forward as amidships. Here a split in the hull immediately below the load waterline wale has displaced two strakes, exposing the outer sided faces of the frames (Fig.9). No frames were observable below the bilge.

The midships square frames possess an average room of 1 ft. (30.5 cm), with each half-frame, sided 6 in. (15.25 cm) at the level of the load waterline wale. Spaces between frames average approximately 8-9 in. (20.3-22.9 cm), with frames set at 21 in. (0.53 m) centers. Here the *Eccles* seems to have been built to adhere to the 1866 Lake Underwriter's rules, which require spacing of frames at 21 in. (0.53 m) centers (Lewis 2000). The moulding of the square frames could not be measured, nor could the spacing of the shifts of the butts above and below the level of the bilge.

Between approximately 29 ft. 6 in. and 53 ft. (8.99-16.15 m) the presence of the centerboard trunk prevented continuous floors and first futtocks from crossing the upper face of the keel. Here half-frames would have been stepped into notches cut into the outer moulded faces of the pocket pieces in place of floors.

The uppermost futtocks, or top timbers, extended above the covering board to form the bulwark stanchions at every other frame. These top timbers are set in line with the forward half-frame of each pair. These top timbers, spaced at 3 ft. 6 in. (1.06 m) centers, extend approximately 2 ft. 6 in. (0.76 m) above the upper face of the covering board at amidships. All other frames extended to the top of the plank sheer, with the covering board fastened onto the frame ends.

Keelson and Deadwood Assembly

The entirety of the keelson assembly is buried beneath coal within the hold. Accordingly, nothing definitive can be said concerning its construction.

The deadwood is partially visible at the stern. The diagonal deadwood consisting of two diagonally set timbers, one riding on the other, fills the angle formed by the inner post and the timber that they ride on, presumably a sternson in line with and scarphed to the after end of the keelson. The existence of this sternson is consistent with both the 1876 Board of Lake Underwriter's rules and the necessity of integrating the keelson assembly with the inner post (Dorr 1876:29). The timbers of this diagonal deadwood could not be measured. Fasteners protruding from the port side of the deadwood indicate where the half-frames have pulled away, their fastenings being pulled through the frames.

Figure 9. The disarticulated lower hull sections revealing the framing amidships and the starboard main chains.

Main Transom and Counter Framing

The main transom remains in place in its notch in the inner post. The outboard ends of the main transom are heavily degraded. Furthermore, the transom has been recently snapped over the sternpost, the port side now sloping downwards (Figs 10). The starboard half of the transom remains in place but has seemingly shifted aft with the aft leaning of the sternpost. The starboard half of the transom has deteriorated on its upper face and part of its upper face has been detached and rests upright on the lake bottom below the starboard quarter. This section retains a standing knee on its outboard end, measuring 2 ft. 2 in. (0.66 m) in length along its horizontal arm, 1ft. 4.5 in. (0.41 m) in height, and is 4 in. (0.10 cm) thick. The lower outboard face of the knee is notched, presumably to fasten over the shelf clamp.

The aft face of the transom was notched to receive the counter timbers. No counter timbers have been preserved, but four fastenings, driven into the aft sided face, indicate their placement on the port transom. A larger fastening immediately outboard of the sternpost likely fastened a set of post timbers to either side of the transom. The fashion pieces formed the outer trim of the counter, protecting the end grain of the hull and counter planking. The face of which was curved to match the curvature of the counter. The port fashion piece has been preserved, resting on the bottom beneath the portside transom.

Cant and Half Frames

The number of cant frames employed in framing the bow cannot be estimated presently. However, the cant frames could not have begun farther aft than the chock rail bitts, aft of which the moulded faces of the stanchions are perpendicular to the centerline, and likely began forward of the pawl post.

At the starboard quarter, the half frames are obscured by the ceiling and external planking with the stations of the half frames are indicated by the protrusion of the futtocks from the break at the upper bilge. On the port side, the break below the upper turn of the bilge reveals the futtocks. The aftermost half-frame, observed at the upper turn of the bilge, appears to be a triple-frame set approximately 1 ft. 2 in. (0.34 m) forward of the transom with a siding of approximately 1 ft. 9.5 in. (0.55 m). All other frames on the quarters have a space of approximately 8 ½-9 in. (0.21-0.22 m) and sidings of approximately 1 ft. (0.34 cm). It appears that at least three half-frames were fastened into the sides of the deadwood, though the overall number of half-frames employed in framing the stern remains unknown.

Figure 10. The stern from the starboard quarter. Note the folding davit in the foreground.

Hooks and Pointers

No observation of the hooks and pointers below deck was possible without penetration of the forecastle companionway hatch. On deck, a pair of pointers were fastened to the inboard face of the cap rails, extending aft to the catheads with a hook fastened to at their forward end. Two crossbeams extended between the pointed and supported a small forecastle deck. A small section of the forecastle deck planking remains on the port side with the strakes laid parallel to the centerline.

Deck Structure- Clamps, Beams, Ledges, Carlines, Hatches, and Coamings

Though much of the deck structure is obscured by the planking of the deck, the displacement of the deck planks along the sides of the deck has exposed many of the beam ends. As a result, the position of most of the beams aft of the forward hatch are known. As the planking along the centerline of the deck is uninterrupted, nothing can be said of the use of carlines. A salting channel was cut along the centerline of the upper face of the observed beams.

The outboard ends of the beams are supported on a beam shelf, a detached portion of which at the stern measured approximately 5-5.5 in. (12.7-14 cm) high. The thickness could not be ascertained. The shelf was supported by a clamp of similar size beneath it.

The upper face of the shelf clamp is notched to receive the beam ends. No lodging knees seem to have been used in preventing fore and aft movement of the beams, instead filler timbers, which filled out the space between the deck clamp and the covering board above and between adjacent frames, prervented fore-and-aft movement of the frames. The covering board was fastened over

the upper face of these chocks and the frame ends of those frames not fitted with bulwark stanchions, thus securing the beams in place. Regrettably, fastening patterns could not be determined.

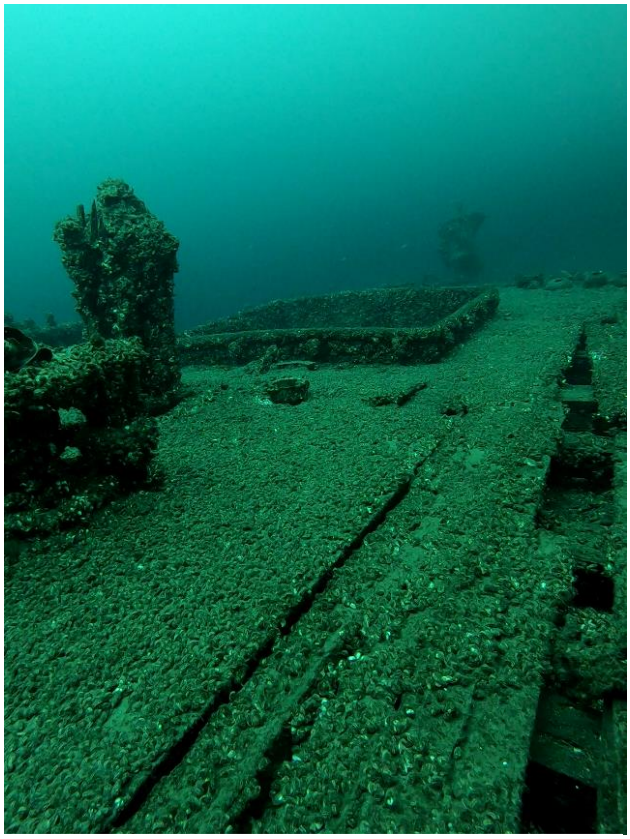

Figure 11. The deck looking aft along the port side.

The intactness of the deck forward of the forecastle hatch limited observation of the framing of the deck apart from that of the hatch itself. This hatch measures 2 ft. (0.60 m) fore-and-aft and 2 ft. 3 in. (0.68 cm) athwartships, measured inside of the coamings. The forward and aft sides of the hatch were framed by a set of beams, the sides by two headers, presumably dovetailed into the beams. A coaming, approximately 2 ½ in. wide (0.06 m) was fastened onto the beams and the headers. The coamings and head ledges met in half laps at the corners, with the head ledges overlapping the coamings.

The forecastle companionway, visible in one historical photograph (Figs. 3, 13), has not been preserved. The companionway had a roof sloping downward forward, with a slight camber to the roof, the sides curving down and overhanging the sides of the companionway. A ladder remains fastened to the after beam of the forecastle hatch, allowing access to the compartment below. The positioning of the foremast hole, centered 17 ft. 6 in. (5.33 m) along the baseline, necessitated the placement of the mast partner beams immediately forward and aft of the mast.

The next attested beam positions are those of the hatch beams of the fore hatch, which is situated between 22 and 29 ft. 6.70-8.83 m) along the baseline. Both the fore and aft hatches measure 7 ft. (2.13 m) fore-and-aft by 8 ft. 6 in. (2.59 m) athwartships, measured inside the coamings. Both are similarly constructed. The hatch beams, 7 ½ in. (19.05 cm) sided, are dovetailed to receive a set of headers that framed the side of the hatch opening. Two half beams were dovetailed into the outer face of the headers and set on the shelf clamp between the hatch beams of each hatch. The hatch coamings themselves are approximately 10 ½ in. (26.7 cm) in height at the centerline and 4 in. (10.2 cm) thick. The coamings met at the corners with half-lap joints, the coamings overlapping the head ledges. Four eyelets are fastened along the outer face of each coaming by which the hatch covers were lashed down.

The midships hatch is situated between 39 and 46 ft. 6 in. (11.88-14.17 m) along the baseline. The main hatch measures 7 ft. (2.13 m) by 8 ft. 6 in. (2.59 m), inside the coamings and was similarly built to the fore and after hatches. A beam crosses the hatch opening at 45 ft. (13.71 m) along the baseline. The coamings and head ledges are notched at their centers to accommodate

the strong backs of the hatch covers with the head ledges notched to receive a fore-and-after, which remains *in situ.*

The mainmast partner beams are 9.5 in. (24 cm) sided and spaced 2 ft. 2 in. (0.65 m) apart, framing the mainmast hole. Aft the mainmast partners, two beams are set between the aft partner beam and the forward hatch beam of the aft hatch which is set between 63 and 70 ft. (19.20-21.33 m) along the baseline.

Two beams were set between the aft beam of the after hatch and the great beam, all approximately 7.5 in. (19.05 cm) sided with 2 ft. 7.5 in. (0.80 m) space between. A small hatch is present on deck, offset to starboard immediately forward of the great beam. The hatch measures approximately 1 ft. 6 inches square inside of the coaming. This hatch may have been intended to allow inspection of the hold aft without the removal of the hatch covers. A salting channel was cut along the centerline of the upper face of the observed beams.

The great beam appears to consist of two composite half-beams, with the after half-beam consisting of three lengths of timber joined in long diagonal scarphs. The construction of the forward half-beam is unknown. An athwartships coaming was fastened atop the after half-beam and has only been preserved at its outboard ends. The outboard ends of the coaming show that the coaming was lower along the width of the quarterdeck gangways. These gangways were approximately 4 ft. 6 in. (1.37 m) wide, inboard of which the coaming increased in height. These higher coamings functioned as the cabin footing and have only been fragmentarily preserved. A timber fastened to the after face of the great beam beneath and of a length slightly shorter than the short coaming may have served as a shelf to which the plank ends of the quarter-deck were fastened.

Covering Board

The covering board measures approximately 4 in. (10.1 cm) thick, and 12 in. (30.5 cm) wide. The covering board was fitted from the inboard sides of the frames. It is notched to fit over the top timbers, with their outer sided face of the frames flush with the outer face of the covering board, and the covering board fastened onto the upper face of the intermediate frames, the beams, and the chocks. A rub strake, the same thickness as the covering board, and a width the same as the thickness of the plank sheer was fastened over the outboard face of the covering board, thus enclosing the stanchions.

Stanchions

The *Eccles* relied on a series of closely-spaced stanchions and the centerboard box to support the beams along the centerline. Though limitations on the penetration of the hull prevented measurement or detailed recording of these stanchions, several stanchions were observable at the hatches and forward of the break of the deck to the aft hatch.

The stanchions at the forward hatch beam of each hatch are offset to starboard, suggesting these may be stepped into a sister keelson. Stanchions were set along the centerline at each to the four beams between the aft beam of the after hatch and the great beam, and seemingly stepped into the upper face of the keelson. The stanchions were presumably secured to the beams by iron plates, though further examination is necessary to corroborate this (Dorr 1876:46). A pair of iron stanchions were placed immediately forward of the aft bulkhead, supporting the great beam.

These stanchions have been bent forward by the compressive force of the hull striking the bottom.

Centerboard and Centerboard Box

The centerboard trunk is largely inaccessible below decks and therefore unobservable along the majority of its length. It is exposed at the fore hatch and the midships hatch. Within these hatches, much of the centerboard trunk's height is obscured beneath coal.

Figure 12. The centerboard pennant chock, pennant cable and centerboard winch with the mainmast looking aft

The centerboard is situated along the centerline between 29 ft. 6 in. (8.99 m) and approximately 53 ft. (16.15 m) along the baseline, the aftermost extent estimated from the positioning of the pennant chock. The forward end of the centerboard box projects forward of the aft head ledge of the fore hatch, the forward post of the centerboard case being fastened into the underside of the beam with the strakes of the box laterally fastened through it. Thus the centerboard box has an approximate overall length of 22 ft. 6 in. (6.85 m). The width of the centerboard box or its cap plank could not be measured.

At 31 ft. 6 in. (9.60 m) along the baseline a small rectangular opening in the deck, measuring approximately 8 in. by 4 in wide. (20.3 by 10.2 cm) was likely to allow inspection of the centerboard's pivot pin. Thus the pivot pin is located approximately 3ft. (0.91 m) aft along the centerboard's length.

A metal plate 3 ft. (0.91 m) long has been bent over the top of the centerboard trunk to cover the cap plank and uppermost strakes of the trunk within the opening of the midships hatch. Heavy wear on the cap plank around indicates that the fitting of this plate was likely intended to protect the cap plank and centerboard from damage while loading by coal chutes along elevated railway trestles.

Ceiling Planks

The ceiling planking, obscured throughout much of the hull by coal, was observed only aft of the break of the deck. At the transom, there are approximately fourteen ceiling strakes in place between the centerline and the upper turn of the bilge. All visible scarphs within the regular ceiling strakes were butted, though on the shelf clamp the joins were hook scarphs. On the port side, the tenth ceiling strake from the centerline, a strake which tapers narrower along its lower face, is notched to receive a beam for the cabin floor.

Exterior Planking

The planking below the lower bilge could not be observed. Amidships, there are four strakes visible between the bilge and the load waterline wale. The load waterline wale is approximately 8 ½ in. (2.1 cm) wide. Four strakes were fastened between the load waterline wale and the plank sheer. The strakes amidships, both below and above the load waterline wale, are approximately 6 in. (0.15 m) wide. The plank sheer is 1 ft. (0.30 m) in width. Rub strakes were fastened over the chainplates along the plank sheer. The inboard face of the rub strake is rabbeted to accommodate the chainplates.

Deck Planking

The planking of the *Eccles'* deck is characterized by relatively narrow but thick strakes laid parallel to the centerline of the hull. Planking widths measure between 5.43-5.45 in. (13.1-13.7 cm). At the bow, the plank ends are tapered to fit flush against the outer face of the covering board. The outermost planks and plank ends may have rested on the chock timbers between the frame ends and which extended beyond the covering board forming a shelf.

Interior Bulkheads

The *Eccles'* interior spaces were presumably subdivided by a minimum of two transverse bulkheads, one being the aft bulkhead of the forecastle, and the aft bulkhead separating the hold from the cabin. Without penetration no observation of the aft forecastle bulkhead was possible.

A portion of the aft bulkhead, consisting of nine vertically-laid planks, has been preserved on the port side. These planks have been fastened to the forward face of the great beam. Their lower ends are buried in coal and could not be observed. A horizontal nailer is fastened to the forward face of the bulkhead at approximately half of its height. The bulkhead is broken out starboard of the centerline and at the port side of the hull.

Bulwarks, Cap Rail, Rail Stringers, Chock Rails, and Bulwark Fittings

The bulwarks are framed by the top timbers set at 3 ft. 6 in. (1.06 m) centers, with heights of 2 ft. 6 in. (0.45 m) amidships. The cap rail tapers from 1 ft. (0.30 m) amidships to 2 ft. (0.60 m) wide along its curve at the bow. It is approximately 6 in. (0.15 m) thick and fastened on top of the top timbers. Two rail stringers were fastened to the inner and outer faces of the stanchions beneath the cap rail.

Between these rail stringers and the covering board, the bulwarks were planked with seven narrow strakes. Five small scuppers were cut into the lower strake amidships with five more along the main chains. A narrow gap between the lower bulwark planks and the covering board is apparent in historical photographs (Fig.3).

At the bow, the chock rails extended from the knightheads to immediately forward of the fore chains. The chock rail is intact to port but has been detached on the starboard side forward of the cathead along with the cap rail. The chock rails were thus 6 ft. 6 in. (1.98 m) long forward of the cathead and 10 ft. 6 in. (3.20 m) long aft, and approximately 5.5 in. (0.13 m) in height. The chock rail was narrower than the cap rail at approximately 5.5 in. (0.13 m) wide. A set of iron

chocks were fastened to the upper face of the chock rails between the catheads and the hawse pipes.

The catheads extend outward parallel to the cant of the frames. The catheads consist of a knee, the lower arms of which were fastened to the inner sided face of the stanchions and extended at least to the deck. This arm is fitted into a notch in the inner face of the cap rail and fastened into the rail stringers and stanchions. The upper arm of the cathead has an outboard length of 3 ft. 6 in. (1.06 m). The port cathead has been partially disarticulated from the bulwarks, having been pulled aft by the rigging in which it has become entangled.

Pairs of bitts were placed along the chock rails at the aft end, immediately aft of the main chains, and at the quarters immediately forward of the taffrail. A single bitt was fastened to the bulwarks amidships on each side, slightly forward of the mainmast. The bitts were fitted to the inside of the bulwarks, being notched into the inboard face of the cap rail and presumably fastened to the cap rail, covering strakes and to the deck.

The aft chock rails extend from the taffrail forward for an exposed length of 17 ft. 2 ½ in. (5.24 m). While its internal construction remains unknown, two thin stakes are fastened to the outboard face of the rail, and with a cap rail forming the upper face. The forward end of the chock rail terminates in a simple diagonal trim piece. Nothing has been preserved of the counter or taffrail, for which historical photographs are the principal source of information (Fig.3). The taffrail continued at the level of the chock rails, its outer face formed by three planks butted end to end. At the join of the taffrail and chock rails, a wooden chock was fitted inboard of the davits, the inboard end of the chock timber terminating in a curved molding. A fairlead was cut into this chock on each side.

3.4 Description of the *Katie Eccles'* Deck Equipment and Fittings

Windlass

The pawl post's forward face is situated 7 ft. (2.13 m) along the baseline. The centerline of the windlass barrel is situated approximately 10 ft. 6 in. (3.20 m) along the baseline. The barrel is supported on two carrick bitts. The after side of the carrick bitt is rounded with a bitt post set forward of the windlass barrel. The carrick bitts were braced to the beams forward by a simple diagonal brace on each side between the forward face of the bitt and the deck.

The pawls are mounted to the after face of the pawl post, the pawls acting on the pawl rim along the centerline of the windlass barrel. Immediately outboard of the pawl rim, centered at 10 in.

(25.4 cm) outboard of the centerline, are two purchase rims. Two purchase arms acted on the forward side of the purchase rims, pivoting on a pin in the sides of the pawl post and actuated by a rocker on the upper forward face of the pawl post. These were connected to the purchase arms by purchase links. Outboard of the purchase rim, between 1 ft. and 2 ft. 6 in. (0.30-0.76 m) outboard, were the whelps, along the length of which the diameter of the barrel tapered. Outboard of the whelps and against the inner face of the carrick bitts, between 2 ft. 6 in. and 3 ft. 4 in. (0.76-1.01 m) outboard of the centerline, were a set of cable lifters. The cable lifters have pockets for the links of the chain cable. The chain pockets could not be measured. Outboard of the carrick bitts are a set of warping ends, the ends of which are 6 ft. (1.82 m) outboard of the centerline. A chain stopper, still attached to its lanyard, lies against the after face of the pawl post atop the pawl rim.

Fig.13 The foredeck with the pawl post, windlass and forecastle hatch

Chain Cable, Hawse Pipes, and Anchor

A single anchor remains on-site, located approximately 30 ft. (9.14 m) off the starboard side at amidships. It remains shackled to the hull by a length of smaller chain running outboard from the cap rail amidships and by the chain, running towards and underneath the starboard bilge. The anchor itself IS an admiralty style folding-stock anchor with a shank approximately 6 ft. 4in. (1.92 m) long, a crown 11 ½ in. (0.29 m) in-depth and with 4 ft. 7 in. (1.40 m) between bills. The palms measure 1 ft. 6 in. (0.45 m) long.

Both sets of anchor chains remain seated in the chain wheels, extending from the hawsepipes over the top of the windlass. To port the chain is piled on deck aft of the windlass within a cable trough, presumably obscuring the opening of the port chain pipe. The hawsepipes consist of a single hawsehole on each side of the stem, cut through the bow timbers and bolster block, and fitted with an iron hawse pipe. In contrast to Mitchell's account, both hawsepipes remain in place. Outboard, both the port and starboard chains run aft and down, disappearing beneath the bilge below the catheads.

Vertical Boiler and Steam Hoist

The *Eccles'* donkey engine consisted of a vertical boiler, likely of the vertical-cross tube type, situated 19 ft. 6 in. (5.94 m) along the baseline and offset to starboard approximately 4 ft. (1.21 m). The baseplate of the boiler remains fastened to the deck though the body of the boiler has toppled to starboard with its upper end against the bulwarks slightly forward of the chock rail bitt. The drain pipe and gauge cocks are visible on what is now the aft side of the boiler. On the forward upper side of the boiler is the pipe steam gauge. The funnel and crown plate of the boiler

is disarticulated from the boiler body and lies immediately forward of the boiler body on deck (Fig.14).

The vertical boiler was attached to a steam engine and hoist by a steam pipe which fed into a valve chest and single-cylinder on the starboard forward side of the winch. The piston arm was linked by a pitman arm to a flywheel on the starboard side of the winch assembly. The winch was secured by a base formed by two fore-and-aft beams secured to the deck. The flywheel was attached to a small spur wheel by a connecting rod, which acted presumably on the main spur wheel on the main barrel. This main spur wheel is situated inboard of the starboard bearings of the main barrel. This main spur wheel is situated inboard of the starboard bearings of the main barrel. Outboard of both bearings are a pair of warping ends that extend beyond the frame.

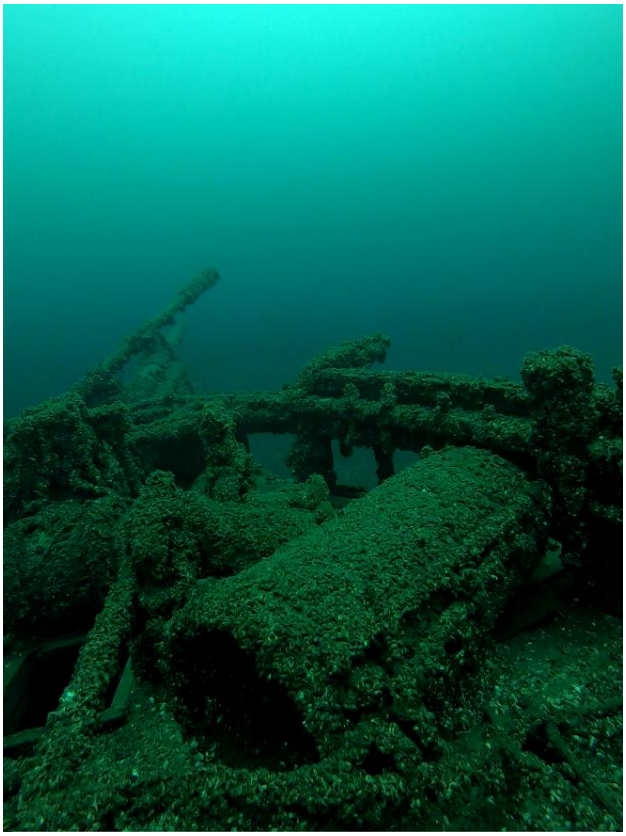

Figure 14. The vertical boiler resting on the fore deck. Note the funnel and possible steam siphon at center left.

What appears to be steam pipe runs forward from near the valve chest to what is likely a steam siphon situated on deck 14 ft. (4.26 m) along the baseline, immediately aft of the starboard carrick bitt. The details of this feature are obscured by dreissenid fouling, yet its connection to the boiler and the absence of bilge pumps elsewhere support this identification.

Centerboard Winch

The centerboard winch (Fig.11), which may also have functioned as the main halyard winch, has been dismounted and rests on its side to the port of the centerboard pennant chock where it was originally mounted. The winch rests face-down on one of the frame plates. These frames are connected by four tie rods, one between each leg of the frame plates and between the upper and lower winch barrels. The main spur gear is located against the lower frame plate. The main barrel retains several turns of the pennant cable, which runs to the pennant chock. Due to dreissenid fouling, the specific components of the winch mechanism could not be identified.

Folding Davits and Stern Chocks

The inboard halves of the folding davits were fastened to the upper face of the chock rails. The inboard halves of the folding davits were fastened to the aft chock rails. These inboard davit timbers were 5 ft. 5 in. (1.67 m) long. A hinge is fastened to the upper face of the davit and the folding davit arm. The davit arms had an upward curving profile along their length of 4 ft. 6 in. (1.37 m). Slots for two internal sheaves are cut into the outboard end of the timber. Only the portside davit was observed on-site.

Rudder and Steering Mechanism

The rudder and the rudder stock remain in place against the sternpost without any apparent damage to which might be attributed the failure of the *Eccles'* steering gear or rudder. The heel of the rudder could not be examined as it is embedded in the lake bottom. The rudder is of the 'plug-stock' type in which the stock is set forward of the rudder body, centered over the pintles. The rudder stock begins approximately two feet below the top of the rudder, fastened into its forward face. The rudder has an exposed length, to the head of its stock, of approximately 12 ft. (3.65 m). No pintles or gudgeons were identified.

The rudder body has a height of 6 ft. (1.82 m) along the post and a maximum width of 3 ft. (0.91 m) along the bottom. The flat upper face is approximately 1 ft. (0.34 m) long. The rudder consists minimally of an afterpiece, two middle pieces, and a main piece along the post. It may have been footed by a sole, but as the heel of the rudder is embedded in the lake bottom, this could not be confirmed.

The Eccles steering gear has been dismounted along with its wheel box and now hangs from the head of the rudder stock by the front panel of the wheel box. The lowest strakes of either side of the wheel box remain attached, bound together by the internal supports and the front panel. The angled after face of these strakes indicate that the wheel box was mounted directly against the counter.

Though many details are obscured by dreissenid fouling, the steering gear is a worm-simplex steering gear, in which the worm is mounted forward of the post. The worm of the steering gear rested on bearings forward of the rudder stock and aft, mounted to the taffrail. The eight-spoke wheel has an exterior diameter of approximately 3 ft. (0.91 m), the iron band forming the outside of the wheel being 3 in. (7.6 cm) wide.

Fenders

At least two wooden fenders remain on site. These timbers measure 9 ft. (2.74 m) long, 9 ½ in. (0.24 m) wide and had a slightly curved profile to conform to the curvature of the hull. The fenders, visible in historical photographs (Figs. 2-3) extended between the covering board and the load waterline wale.

3.5 Description of the *Katie Eccles*' Rigging Components

The *Katie Eccles* retains a well-preserved, albeit incomplete, assemblage of rigging and spars, attesting to rigging practices on the Great Lakes after the adoption of wire rigging and the proliferation of iron hardware within the rig in the final quarter of the 19th century and the early-20th century.

Bowsprit and Jib Boom Spars

The *Eccles'* bowsprit remains intact and in situ, stepped into the forward face of the pawl post with its lower face resting on the stem head. The bowsprit has a housed length of 7 ft. (2.13 m), measured to the forward face of the stem. The steeper steeving of the bowsprit evident in historical photographs (Figs. 2-3) was likely lost with the flattening of the sheer, as the steeving

of the bowsprit is now nearly parallel to the deck. The bowsprit was secured by a gammon iron inboard of the chock rails. The bowsprit has an octagonal section on its housed length.

The outboard length of the bowsprit, forward of the chock rails is approximately 12 ft. (3.65 m), making the overall length of the bowsprit approximately 19 ft. (5.79 m). The outboard length has a flat upper face, formed by the fastening of two battens to either side of the bowsprit, or by a plank fastened to a flat upper face of the bowsprit, terminating just before the iron bowsprit cap band.

The jib boom has an overall preserved length of 28 ft. 6 in. (8.68 m), with a doubling of 12 ft. 6 in. (3.81 m). The jib boom was secured by an iron band 3 ft. 6in. (1.06 m) forward of the chock rails, and by the bowsprit cap. The outermost section of the jib boom is broken off at approximately the attachment of the inner jib stay and lies beneath the jib boom. An iron band is secured just below the head of the jib boom, to which are shackled the jib boom guys on its lower face.

Figure 15. The bowsprit and jib boom of *Katie Eccles* with the bobstays, starboard and port bowsprit guys, jumbo jib stay and jumbo jib boom. Note the spreader and martingale spar.

Spreader and Martingale Spars

The spreader and martingale spars rest on the bottom beneath the bowsprit cap and jib boom with the martingale spar overlying the spreader (Fig.15). A saddle fitted to the forward face of the spreader rested against the underside of the jib boom when the spar was lashed in place. Two fairleads hang from staples on the starboard arm of the spreader and, though not observed, are presumed present on the port side as well.

The martingale tapered along its length, widening upwards to form a set of jaws fitted to the lower side of the jib boom where it was fastened against the head of the bowsprit (Fig. 2). No measurements could be obtained for the spreader or martingale spars.

Bowsprit and Jib Boom Standing Rigging- Bobstays, Bowsprit Guys, Footropes

The inner and outer chain bobstays are attached to staples on the underside of the bowsprit at 10 and 11 ft. (3.04 and 3.35 m) forward of the chock rails. The inner bobstay is attached at a bobstay plate fastened through the stem at the top of the forefoot. The outer bobstay plate is attached to the forefoot below the inner bobstay plate and is embedded in sediment.

On both sides of the bowsprit, a set of chain footropes are shackled into a staple on the outer face of the rail stringers beneath the cap rail. These footropes are attached to the sides of the bowsprit 8 ft. (2.44 m) forward of the chock rails.

The bowsprit shrouds are present but remain intact only on the starboard side. The starboard bowsprit guy is attached at a shroud iron on the side of the bowsprit 12 ft. (3.65 m) forward of the chock rails. The inboard end was shackled to a plate fastened into the plank sheer beneath the catheads. The port shroud has broken near its inboard end with the shroud hanging down from the bowsprit. The details of the chain of both the bowsprit shrouds and bobstays were not discernable due to dreissenid fouling.

Figure 16. The foremast doubling with the remains of the cross trees and trestletrees and the fid in place.

Jumbo Jib Stay, Jumbo Jib Boom and Horse

The jumbo jib stay remains attached to the bowsprit immediately inboard of the bowsprit cap, 11ft 6 in. forward of the chock rails. It lies draped to port of the bowsprit running aft along the port side on the bottom. At its upper end, the forestay remains looped around and seized back on itself at the hounds of the foremast.

Just aft of the bowsprit cap, a fore and aft iron horse, on which the jumbo jib boom traveled, is fastened into the upper face of the jib boom, immediately aft of where the jumbo jib stay was looped and seized around the bowsprit. No hardware was observed on the jumbo jib-boom, though its inboard end was obscured from view by rigging. The boom, approximately 18 ft. 6 in. (5.64 m) long, lies resting across the bowsprit and extends out over the starboard rail (Fig. 15).

Foremast, Foretopmast, Cross Trees, and Trestletrees

Though the foremast step could not be observed and, therefore, the position of the mast step along the baseline could not be determined precisely, the foremast hole is centered 17 ft. 6 in. (5.33 m) along the baseline with a diameter of approximately 2 ft. (0.60 m). The mast has been un-stepped without causing damage to the deck.

While the lower foremast beneath the hounds is unaccounted for, the doubling of the foremast and the foretopmast rest on the bottom with the hounds resting against the hull at the port forechains and the masthead extending outward. The foremast doubling, partially obscured by the mainmast which overlies it near its lower end, has an approximate length of 9 ft. 6 in. (2.89

m) with an octagonal cross-section formed by the chamfering of the corners of the lower masthead.

The trestletrees were fastened immediately above a set of iron hounds. Photographs of *Katie Eccles* show that it was outfitted with parallel crosstrees, with five cross-planks fastened along their outer ends with space between each (Figs. 2-3). The forward crosstree remains intact and in place to starboard, whereas the aft crosstree is partially detached and lies at an angle to the fore crosstree. Three eyes were fastened into the aft face of the doubling below the mast cap to which the peak halyard blocks were hooked. The uppermost peak halyard block remains in place.

The foretopmast has a length exceeding 38 ft. 6 in. (11.73 m).[3] Its lowest section has a squared cross-section, with a tapering rounded cross-section along its remaining length. The topmast remains stepped between the trestletrees with an iron fid inserted into its slot at the foot of the topmast from the starboard side.

Foremast Shrouds and Fore Chains

The foremast retains both sets of wire shrouds which are looped about the doubling of masthead above the trestletrees. Each set of four shrouds comprising two wires with deadeyes turned in at their ends looped about the doubling. The starboard shroud deadeyes lay inboard of the fore chains and the deadeyes fastened at the cap rail, running across the deck and over the port chock rails at the bitts to the foremast hounds. The port shrouds have fallen inboard of deadeyes on the cap rail, the shrouds running forward before running over the port chock rail between the cathead and the bitts to the foremast hounding below.

Two sheer rails were fastened to the fore shrouds above the deadeyes and immediately above the port and starboard running lights. These running lights, the backboards of which have not been preserved had Fresnel-lens lanterns set against a backboard, which were lashed to the shrouds. Two Fresnel lenses, presumably from these lights, are present among the artifact assemblage on the port side of the deck immediately forward of the great beam. Three rails were lashed to the shrouds in place of ratlines as the shrouds narrowed at the hounds (Fig.3).

The fore chains consist of four bar chainplates on either side, bolted at the second strake beneath the plank sheer. At the plank sheer the chainplates were protected by a rub strake, 13 ft. 6 in. (4.11 m) long and approximately 5 in. (0.12 m) wide. Above the rub strakes, the chainplates are exposed on the outboard face of the bulwarks. Individual chain plates measure approximately 5 ft. 9.5 in. (1.76 m) long and approximately 3.5 in. (8.89 cm) in width. The upper end of the chainplates passed through slots in the cap rail and were secured in place in these slots by the fastening of a batten along the outboard face of the cap rail. The foremost chainplates were spaced at centers of 2 ft. 6 in., 2 ft. 3.5 in., and 2 ft. 6 in. (0.76, 0.70 and 0.76 m) apart.

A three-hole deadeye is hinged to the upper end of each chainplate. Between the first and second deadeyes, either a single sheave block or a small deadeye was fastened to the cap rail. This and an eyebolt fastened to the upper face of the cap rail immediately aft of the fore chains likely represent components of the jig tackles.

[3] In rendering the photo model the upper end of the mast was clipped. This measurement represents the measurable extent within the photo model. A more accurate measurement will be provided in the 2020 report.

Four belaying pins were secured in a pin rack along the cap rail's inner face between the cathead and the chock rail bitts. At least three belaying pins, but possibly five were observed set along the cap rail at the fore chains. These were set in line with the first deadeye, between the second and third deadeyes, and between the third and fourth deadeyes. A fourth pin may be obscured beside the fourth deadeye with the fifth beside the eyelets for the jig tackles aft of the fore chains. Pin racks were formed by the fastening of a batten along the inner face of the cap rail with holes drilled to accommodate the belaying pins.

Figure 17. The mainmast along the starboard side overlying the foremast doubling.

Foremast Forestays and Backstays

The jumbo jib stay remains looped and seized about the mast at the height of the trestle trees, passing forward through the opening between the trestletrees and inside of the forward crosstree. The inner jib stay is bent to the foremast doubling between the upper and lower peak halyard eyebolt at approximately halfway up the doubling. The outer jib stay is seized beneath the head of the topmast, approximately 36 ft. (10.97 m) above the heel. The main topmast stay and the mainstay remain shackled to eyes on the after side of the mast cap.

Mainmast and Main Topmast

The mainmast is centered at deck level at approximately 58 ft. (17.67 m) along the baseline. The mainmast has a diameter of approximately 2.6 ft. (0.79 m) at deck level and is secured in the mainmast hole by wedges that remain in place. Several partially preserved mast hoops remain about the mainmast.

A boom saddle was fitted to the mainmast, its upper face 4 ft. (1.21 m) above the deck. It was supported on six chocks, each 3 ft. (0.91 m) long. The mainmast is snapped off above the boom saddle, 4.4 ft. (1.34 m) above the deck.

The main portion of the mainmast lies just off of and parallel to the port side, overlying the hounds of the foremast. The preserved length of this section of the lower mainmast, measured to the mast cap is 63.5 ft. (19.35 m) with a doubling of approximately 10.5 ft. (3.20 m). Therefore,

the lower mainmast had a height of approximately 68 ft. (20.72 m) above the deck, with the hounds 57.5 ft. (17.52 m) above the deck. The approximate diameter at the masthead is approximately 1 ft. 1 ½ in. (0.34 m). The mainmast trestletrees are detached and the loops of three of the pairs of shrouds have slid down the mast to the hounds. The iron hounds are approximately 4 ft. 3 in. (1.29 m) long, with widths of 1 ft. (0.30 m) at the top, tapering downward along their length. The main topmast is broken off even with the top of the mast cap.

Main Shrouds and Main Chains

The mainmast shrouds were rigged in like manner to the fore shrouds. The port set of shrouds has been pulled forward with the sheer rails and deadeyes laying to starboard and slightly aft of the midship hatch. The shrouds run forward over the corner of the midships hatch, across the fore hatch, and across the foredeck, draping over the rail at and just aft of the port cathead. The shrouds remain looped around the masthead, having slid down to the hounds. The port shrouds lie slightly forward of their deadeyes along the rail, running forward along the inside of the bulwarks, overlying the port foremast shrouds before running over the cap rail at the port chock rail bitts.

The main chains likewise consisted of four chainplates fastened in like manner. The chainplates are spaced 2 ft. 6 in., 2 ft. 4 in. and 2ft. 6in. (0.76, 0.70, and 0.76 m) apart. Four deadeyes were aligned along the outboard side of the cap rail. A deadeye was fastened to the rail between and inboard of the first and second deadeyes for a jig tackle. A block hooked into an eye on the cap rail 51 ft. 6 in. ft. (15.72 m) along the baseline, just forward of the main chains, is possibly the lower attachment point for the foretopmast flying backstay. A belaying rail was fastened to the inboard faces of two stanchions beneath this block. The rail has only been preserved on the port side. Four belaying pins are aligned along the main chain deadeyes, with another pin forward at the block.

The main chains have sustained considerably more damage than the fore chains. On the port side, the aftermost chain plate has been bent forward. Of the starboard main chains, only the third chain plate remains in place along the cap rail with its deadeye articulated. The first and second chainplates have pivoted on their bolts in the second strake beneath the plank sheer and hang downward. The fourth chain plate appears to remain partially attached but is seemingly broken off at the level of the plank sheer.

Fore and Main Booms and Gaffs

A single spar lies on the bottom well off the port quarter, laying approximately parallel to the hull with its jaws pointing forward. As a result of its relative isolation from other site features, this spar was not able to be incorporated into the site photo model, and accordingly, measurements could not be taken. Without reliable means of measuring this spar, its identification relies on comparison with historical information and photographs (Figs.2-3).

Historical accounts record that part of the main boom was recovered by Capt. Claude Cole when he first located the *Eccles* in December 1922, thus eliminating the possibility it is this spar as the remaining spar is complete, leaving the fore boom, and the gaffs (*Cape Vincent Eagle*, 28 Dec. 1922; *Sandy Creek News*, 28 Dec.). According to historical photographs, the fore gaff should possess two bands for the peak halyard blocks, as well as two pendant blocks beneath the gaff

jaws, while the main gaff would possess three bands for the peak halyard blocks as well as an eye to which a flag halyard block was hooked (Figs 2-3).

The spar retains its gaff jaws, each jaw formed from a single piece fastened to the sides of the spar. A clapper remains in place, its upper end inclined aft, resting in a notch at the end of the spar and between the jaws, the inboard face of the clapper curved to the mast and resting flush with the inner face of the jaws. A hanging iron is fastened into the upper faces of the jaws, to which the throat halyard blocks were fastened. A single eyelet was observed on the underside of the port jaw for the pendant blocks of the main topsail outhaul.

While the length of the spar is relatively clear of dreissenid fouling, especially dense bands of fouling are notable at the outer tip and at three bands along the outer half of the spar's length. The preference of dreissenid mussels for ferrous metal substrates, seen throughout the site, suggests these obscure the bands for the peak halyards and end cap. Part of the eye of the end cap is visible. The placement of these fittings, particularly the end caps and the number peak halyard bands allows reliable identification of this spar as the main gaff. Therefore, the fore gaff, fore boom, and main boom remain unaccounted for.

Main and Fore Sheets and Sheet Horses

At 54 ft. 6 in. (16.61 m) along baseline the foresheet horse remains fastened to the deck, presumably bolted through a beam. The iron horse is approximately 2 ft. 6 in. (0.76 m) in length. Its diameter could not be measured. The main sheet horse is missing with the upper section of the stern, but a treble block resting inside the port quarter is possibly the upper mainsheet block. Likewise, a double block laying against the port aft corner of the midships hatch may be one of the foresheet blocks.

3.5 Catalogue of Artifacts Identified on *Katie Eccles*

While the primary purpose of the 2019 survey was the documentation of the hull rather than the documentation of artifact assemblages throughout the site, many artifacts were nevertheless recorded in the process of documenting the hull. Therefore, a basic inventory of non-rigging artifacts has been included to assist the monitoring of the site and to assess the movement of artifacts throughout the site due to unauthorized handling. The majority of portable artifacts on the *Katie Eccles* are grouped in several assemblages on deck, indicating that the artifacts have been moved from their original provenience and have been subject to intermittent handling. This list of artifacts is incomplete and represents only those artifacts identifiable from the on-site video.

2019.001- Caulking Iron

Remarks: Straight body with a flat unflared head. The caulking blade has a broadened shoulder with a flat caulking edge.
Appears: GHO010018 (008:47)
Location: Lies on ceiling planking of collapsed port quarter, with the head, pointed forward and slightly outboard and caulking tip aft.

2019.002- Cast Iron Stove

Remarks: Flat-top range stove. At least three compartments are visible in the after face of the range. Two smaller compartments, one above the other, along the right side, when facing forward, are likely the firebox and the ash removal doors. The large opening is the oven. No opening for the stove pipe was identified.

Location: Portside, immediately inboard of the disarticulated upper port quarter within the area of the cabin.

2019.003- Possible Metal Bucket

Remarks: Intact. Seemingly has a bale that remains attached to lugs at the rim.

Location: Atop the ceiling planking of the collapsed section of the lower port quarter.

2019.004- Wooden Stool

Remarks: Rectangular wooden stool. The seat curves upwards slightly at its ends. The seat is set on a single post with four curved legs radiating outward towards the corners.

Location: Upright atop the starboard quarter, inboard of the break along the upper turn of the bilge.

The largest assemblage of artifacts on the *Eccles* is concentrated on the portside deck along the forward face of the great beam. Though this assemblage principally consists of artifacts associated with the cabin, these artifacts have been removed from their original provenience and have been curated at this location. The following assemblage appears in the following video segments GHO010021 (0:08:42), GHO20023 (0:00:20), GHO30022 (0:08:36).

2019.005- Glass Jar

Remarks: Intact glass canning jar. Metal rim remains attached. Lid forced in.

Location: Port side resting against the forward side of the great beam.

2019.006- Glass Jar (Sealed)

Remarks: Intact glass canning jar. Metal rim and lid remain sealed.

Location: Port side resting against the forward side of the great beam.

2019.007- Glass Jar (Sealed)

Remarks: Intact glass canning jar. Metal rim and lid remain sealed.

Location: Port side resting against the forward side of the great beam.

2019.008- Glass Jar (Sealed)

Remarks: Intact glass jar. Metal rim and lid remain sealed.

Location: Port side resting against the forward side of the great beam.

2019.009- Running Light Fresnel Lens

Remarks: Lens remains intact but separated from any other components of the running light lamp. Lens has a semi-circular curvature with upper and lower lips and four Fresnel bands on either side of a broad central band.

Location: Rests against the forward face of the great beam to port.

2019.010- Sewing Machine

Remarks: Upright resting on its bedplate. Both the body of the machine appears intact, albeit corroded and detail obscured by dreissenid fouling. The spool pin and balance wheel are present but further detail is obscured by fouling.

Location: On the port side of the deck forward of the great beam. Upright with the arm extending towards the port side and the balance wheel inboard.

2019.011- Glass Bottle

Remarks: Intact glass bottle with a short neck and high shoulder.

Location: Against the forward face of the great beam to port.

2019.012-Glass Bottle- Broken

Remarks: Glass bottle with a long, narrow neck, broken below the shoulder.

Location: Against the forward face of the great beam, port side.

2019.013-Dish

Remarks: Shallow dish, no identifiable features.

Present provenience: Along the forward face of the great beam to port.

2019.014- Running Light Fresnel Lens

Remarks: Intact. Semi-circular curvature with upper and lower lips and four Fresnel bands on either side of a broad central band. No color could be identified.

Present provenience: Forward of the great beam, port side.

2019.015- Pitcher

Remarks: White ceramic pitcher. Broken at and below the shoulder. Single handle intact. Scalloped rim.

Location: Against the forward face of the great beam, port side.

2019.015- Oil Lamp

Remarks: Partially intact base for oil or gas lamp. Rounded shoulder with a flat upper surface around the mouth of the reservoir.

Location: Forward of the great beam, port side.

2019.016- Oil Lamp Burner

Remark: Tentatively identified as the burner of an oil lamp.

Location: Forward of the great beam, port side, beside the oil lamp body.

2019.017- Copper Kettle

Remarks: Seemingly copper. Straight sides, rounded shoulder. Two small ears for bales situated in line with the spout.

Location: Immediately forward of the great beam, port side.

A small assemblage of artifacts has been curated atop the centerboard winch amidships and near the mainmast. These consist of the following artifacts:

2019.018- Ceramic Pot

Remarks: Intact with an everted rim. Possibly a chamber pot.

Location: Located amidships, on deck to port of the mainmast.

2019.019- Oil Lamp

Remarks: Draped stamped decoration around the upper shoulder. The upper side is bent and broken open.

Location: Resting on top of the centerboard winch.

4. CONCLUSIONS FOR *KATIE ECCLES* AND SITE MANAGEMENT RECOMMENDATIONS

The 2019 field season of the Last Schooners Project, while necessarily limited in the types of analysis that could be conducted through remote-access and non-disturbance methods, produced considerable information concerning the construction and design characteristics of the *Katie Eccles* as well as the outfitting of the sailing vessel throughout its operational life.

Among the accomplishments is the unequivocal corroboration of the proposed identification of this site as *Katie Eccles*. Comparison of constructional features of the hull with historical photographs and historical accounts of the wrecking are consistent with those of the *Katie Eccles*.

Preliminary analysis of *Katie Eccles* indicates minimal use of compass-timber in the hull's construction. No lodging or hanging knees were employed in the structuring of the deck, and only a single standing knee is confirmed on-site, situated at the outboard end of the main transom. Instead of lodging knees, chocks were applied between the frame heads above the shelf clamp, preventing shifting of the frame heads. Closely set centerline stanchions, the centerboard box, and stanchions supported the deck structure.

Further constructional details of significance include the frame spacing at 21 in. (0.53 m), a measurement which adheres to the 1866 regulations set by the Board of Lake Underwriters, and the spacing and sided dimensions of the decks structure discussed above. Furthermore, the extensive assemblage of deck equipment attests to advances in operations in the latter years of sail, including the incorporation of steam hoists alongside a vertical boiler. Though sailing vessels on the lakes utilized steam winches and vertical boilers in hoisting operations since the 1860s, it is unclear if the *Katie Eccles* was originally equipped with its vertical boiler and winch, which are seemingly not present in a photograph dated 1900 (Fig.3). Other significant alterations include the plate protecting the centerboard box within the midship hatch to accommodate loading coal by trestle chutes at the main hatch.

Finally, the *Eccles* possesses an extensive, though incomplete, assemblage of wire rigging and rigging components. Analysis of these rigging components and the overall rigging and sail plan is on-going and will likely yield valuable information regarding rigging practice and proportion on wire-rigged Great Lakes sailing vessels.

The *Katie Eccles* is significant as a representative of typical schooners engaged in trade on Lake Ontario at the end of the 19th century and in the first three decades of the 20th century. The exceptional state of the *Eccles'* preservation and the completeness of the vessel make the *Eccles* an important archaeological resource.

Despite the exceptional preservation and nearly ideal preservation environment exhibited by *Katie Eccles,* several threats to site stability were identified.

Perhaps the preeminent threat of destabilization of the site is colonization by Dreissena polymorpha (Zebra mussels) and Dreissena rostriformis bugensis (Quagga mussels). Observations on site identified dense dreissenid macro-fouling throughout the site, but

particularly on vertical surfaces of the hull and on metal fasteners and deck equipment. Though species identification could not be conducted, studies in the Lake Ontario offshore suggest that populations likely consist primarily of quagga mussels (*Dr. rostriformis bugensis)* (Wilson et al. 2006:11-28).

Such dreissenid fouling, particularly on fastenings and ferrous metal substrates, poses a threat to preservation as the acidic micro-environment formed within dense fouling accelerates corrosion of ferrous metals (Binnie et al. 1990). Corrosion rates are typically measured in mils per year, a mil (mpy) being equal to one one-thousandth of an inch. Street states that while corrosion rates of 1 mpy are typical in freshwater, corrosion rates of 10 mpy or higher likely require intervention to ensure continued stability, while greater than 20 mpy indicates rapid corrosion. The present estimates of biologically assisted corrosion rates associated with dreissenid fouling range between 10 and 30 mpy, or 0.03 inches per year. One study recorded corrosion rates of 33-39 mpy (Street 2017, USACE 1998). Thus, at the upper limits of these rates, a 5/8 in (0.625 in/15.875 mm) iron plate could potentially corrode through in 10.4 years if corrosion progressed equally on both surfaces. This potential for rapid corrosion poses an immediate threat to the integrity of iron-fastened shipwrecks, such as the *Eccles*, though fasteners are partially protected by being embedded within the timbers which they fasten. As yet, no effective solution is available to mitigate this threat in an environmentally-conscientious manner, both for the *Katie Eccles* and other sites within the Great Lakes.

The preservation issues imposed by dreissenid fouling are compounded by contact between recreation SCUBA divers that frequent the site. Binnie et al. indicate that the physical removal of dreissenid mussels results in significant disruption of the underlying wooden substrate to which they have attached. Repeated removal resulted in substantial damage or destruction of the underlying surface. Their removal from ferrous metal surfaces may likewise contribute to the detachment of corrosion products, exposing underlying, un-corroded metal to corrosive conditions (Binnie et al. 1990).

The handling of artifacts by SCUBA divers is indicated by the curation of artifacts along the port side at the great beam. The removal of these artifacts from their original positions on the site not only has disrupted their proveniences within the site but also calls into question the provenience of all artifacts on site. This curation also increases the likelihood of looting and encouraging further handling of these artifacts.

The efforts of the preservation organizations *Save Ontario's Shipwrecks* and *Preserve Our Wrecks* have mitigated much of the immediate risk of anchor damage associated with frequent visits to the wreck through the placement of a permanent mooring on site. Despite this mooring, a comparison of the condition of the site as of June 2019 with published photographs of the site show the starboard bow has sustained damage since 2014. Anchor damage is likely responsible for detaching the starboard chock rail forward of the cathead along with a considerable portion of the bulwark planking on the port bow. The port bowsprit guy has been broken near its inboard end in the same period, due to unknown causes. At the stern, the starboard transom timber and transom knee have broken away and lie on the bottom below the starboard transom. Furthermore, the break of the main transom at the sternpost occurred recently, also possibly the result of anchor damage (Dekina 2014).

To help ensure the continued preservation of the *Katie Eccles*, the author recommend, first, that the site be assigned a Borden number to assist in the administration and monitoring of the site. The author also recommends nomination of the site as a provincial heritage site under the *Ontario Heritage Act* as an exceptionally well-preserved, aesthetically exceptional, and archaeologically important heritage site attesting to the end of sailing commerce on Lake Ontario and the decline of local, small-scale maritime trade with the emergence of the modern, industrialized transport economy on the Great Lakes.

5. COMPLIANCE LEGISLATION

The following section is included in compliance with the 2011 Standards and Guidelines (Section 7.5.9):

This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c. 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister and that the archaeological fieldwork and report recommendations ensure the conservation, protection, and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism and Culture, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offense under Sections 48 and 69 of the Ontario Heritage Act for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the Ontario Heritage Act.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act.

The Cemeteries Act, R.S.O. 1990 c. C.4 and the Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

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