WRECK OF THE STEAM BARGE ADVENTURE:
AN ARCHAEOLOGICAL INVESTIGATION
IN LAKE ERIE AT KELLEYS ISLAND, OHIO

by
C. Patrick Labadie
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Great Lakes Historical Society
Peachman Lake Erie Shipwreck Research Center
Technical Report No. 1
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Peachman Lake Erie Shipwreck

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WRECK OF THE STEAM BARGE ADVENTURE: AN ARCHAEOLOGICAL INVESTIGATION IN LAKE ERIE AT KELLEYS ISLAND, OHIO

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ABSTRACT

This paper describes the results of historical and archaeological investigations into the shipwreck site of the ADVENTURE (Ohio State Archaeological Site #33ER481) and related facilities of the Kelley Island Lime & Transport Company (KIL&T Co.) at the North Bay quarry complex (Site #33ER336) on Kelleys Island, Ohio. Underwater and terrestrial archaeological research into these components of the Kelleys Island limestone industry is combined to provide significant insight into an important facet of Ohio's industrial history. The paper also provides an opportunity to showcase efforts to develop a recreational dive program designed to assist in the inventory of Lake Erie's underwater cultural resources.

Kelleys Island is the remnant of a Devonian limestone reef that once formed a divide between preglacial river valleys. The limestone found on Kelleys Island occurs in thicker beds, cuts easier, and makes better lime, flux stone, and building stone than the strata found elsewhere in the region. The potential of the limestone industry prompted the Kelley family to purchase the island in the 1830s and commence quarrying. By the 1880s, KIL&T Co. consolidated the holdings of the island's smaller operations, becoming the island's largest employer, and by the turn of the century, the largest producer of lime products in the world.

Virtually all of the stone products were transported from Kelleys Island by merchant steamers and sailing vessels. One of these, the steam barge ADVENTURE, met a disastrous end in 1903 while engaged in the trade. The remains of this vessel in North Bay of Kelleys Island provide insight into the maritime aspects of the lime industry during its heyday. Archaeological investigations of this shipwreck, undertaken as part of a nautical archaeology workshop offered at Firelands College, Bowling Green State University in 1997, are supported by archaeological investigations of portions of the upland quarry facility, undertaken as part of the mitigation efforts associated with the construction of a new boat ramp at nearby Kelleys Island State Park (Myers et al. 1992; Pape 1998).
INTRODUCTION

Underwater cultural resources, the physical remnants of centuries of both prehistoric and historic human activity, are a unique, priceless, and endangered Great Lakes resource (Yona and Mahoney 1993:3). The cold, fresh waters of the Lakes have preserved a diverse assortment of cultural materials. Lake Erie contains hundreds of shipwrecks and other cultural resources (e.g., wharves and docks, navigational structures, remains of now submerged land sites, and prehistoric artifacts). These cultural artifacts provide important material evidence of the regions' maritime history and the cultural development of the region. Boats and ships are especially important, being the largest and most complex objects or machines produced before the Industrial Revolution of the 19th century. Vessels formed the "leading edge" of technology of most pre-industrial societies (Muckelroy 1978:3). They created seafaring social groups, with a variety of economic, political, and religious consequences. The course of human history owes much to maritime activities. In many societies, including the early European settlements of the Great Lakes region, seafaring and fishing folk formed a distinct subculture alongside urban and rural groups (Lloyd and Mullen 1990:125).

A ship undertaking a voyage leaves absolutely no ink on the archaeological record if all goes as planned. At the end of the voyage the material evidence will be dispersed when the cargo is sold, the crew and passengers go their separate ways, and the ship is taken on a new enterprise. Only when disaster strikes during the voyage, and the whole unit—ship, cargo, and shipboard community is deposited on the lakebed, is there any chance of a permanent material record that is recoverable by archaeological techniques (Muckelroy 1978:7). When a ship sinks it is usually a fully operational system, containing all of the objects necessary for the vessel to function in a normal way. Thus, underwater archaeological sites are unlike most land sites which slowly decay after abandonment, such as dwellings or manufacturing facilities from which most of the furnishings, tools, and utensils are removed at the time of abandonment. A shipwreck, at the time of sinking, typically contains all of the equipment normally onboard an operating vessel of its time period.

A ship is an organized assemblage of objects and materials designed to perform certain functions. However, when she is holed, capsized, beached, or burned this organization begins to break down. She may sink to the lakefloor intact or arrive in pieces. Either way, over decades or centuries, the waves, currents, and aquatic organisms tend to break up and scatter the remains of the vessel or cover them with sediment. Because archaeologists are ultimately interested in not only the wrecks, but in the ships they once were, their principal task is untangling such disorganization.

Maritime or nautical archaeology is the scientific study, through surviving material evidence, of all aspects of seafaring: ships, boats, and their equipment; cargoes or passengers carried on them and the economic system within which they operated; their officers and crew, especially utensils and other possessions reflecting their specialized lifestyle, and shore-based navigational and support facilities. Underwater archaeology is a broader subject, dealing with the study of submerged cultural objects, regardless of whether or not the objects were produced or used by a seafaring culture.

The study of seafaring can be approached from three avenues: (1) historical, (2) ethnological, and (3) archaeological. The historical approach is concerned with uncovering and interpreting surviving documentary evidence for past events, which seeks to understand not only the precise course of events but also the reasons, causes, or motives behind them. The ethnological approach involves the systematic study of surviving indigenous (local) practices, traditions, and customs within the specialized seafaring or fishing communities, particularly in the context of social forms and economic systems. The archaeological approach consists of the study of objects which have survived from, on, and around the sea or large lakes, and from them derive insight into the people and societies which produced them. Ships of the Great Lakes (Barry 1996), Lake Erie Fishermen: Work, Tradition, and Identity (Lloyd and Mullen 1990), and Ships and Shipwrecks of the Americas: A History Based on Underwater Archaeology (Bass 1988) are published examples of these three approaches. The information and ideas contributed by these various approaches are mainly complimentary and their objectives are the same, only the sources of information tapped are different. Thus, in attempting to answer research questions about
seafaring, all three sets of evidence should be considered, and critically integrated within the study conclusion.

Stone quarries on Kelleys Island in western Lake Erie date back to around 1830. For over a century they yielded high-quality limestone that left the island in several forms: building stone for coastal construction projects, flux stone for steel mills, and burned stone for agricultural lime and other lime products. Eventually Kelleys Island became the largest producer of lime in the world (Myers et al. 1992:21). Virtually all of these stone products were transported from the island by merchant steamers and sailing vessels. One of these vessels, the steam barge ADVENTURE, met a disastrous end in 1903 while engaged in this trade. The remains of this shipwreck in the North Bay of Kelleys Island provide insight into the maritime aspects of the lime industry during its heyday.

Documentation of this shipwreck was undertaken as part of a nautical archaeology workshop offered at Firelands College of Bowling Green State University in September and October 1997 (Labadie and Herendorn 1998:143). The workshop, Shipwreck Archaeology for Recreational Divers, was organized by the Ohio Maritime Advisory Council, an advisory body to the Ohio Department of Natural Resources and the Ohio Historical Society. This body, appointed by the Governor of Ohio, is charged with assisting these agencies in their mission to preserve and promote the enjoyment of Lake Erie’s cultural resources.

Thus, the objectives of this paper are to describe the shipwreck site of the ADVENTURE and to document the history of this vessel, particularly in the context of the flourishing limestone industry of her era. The ADVENTURE is interesting for study purposes in that it has characteristics of two classes of Great Lakes vessels. Built as a schooner (Figures 1 and 2), she was later converted to a steam barge (Figure 3). The ADVENTURE also demonstrates the critical maritime transportation link between the Kelleys Island source and mainland users of limestone commodities. The importance of this maritime link will be explored through the example of this vessel.

The ADVENTURE as a Representative of Vessel Classes

Schooner ADVENTURE

The ADVENTURE was built as a schooner in 1875 at Detroit, Michigan by well-known shipbuilder John Oades. She was a conventional, two-masted schooner with straight stem and a square transom stern. Like hundreds of her contemporaries, she was fitted with toptimbs, a long bowsprit, and a centerboard, and she undoubtedly carried foresail and main, two gaff topsails, a foresstay sail, and two or three foresails or “jibs” (Figure 1). She may also have used the triangular “rafife” on her forecast which was characteristic of many Great Lakes sailing craft of her era (Kiblberg 1963:74,75). Her crew would have consisted of three or four men and a cook.

The ADVENTURE measured 104 feet in length, 24 feet beam (width), and 8 feet depth of hold. According to the laws of the U.S. Customs Department, official length was measured on deck from the inside of the stem to the after side of the sternpost; beam was taken to the outside of the planking at the widest part of the ship, and depth was measured from the upper side of the deckbeams amidships to the upper surface of the ceiling (inner) planking in the hold. Her register tonnage was 148.97 gross tons and 141.53 net (a “register” ton is equal to 100 cubic feet of enclosed space, and does not represent a measure of weight). The enclosed space below decks measured 139.86 register tons and she had a “trunk cabin” on her deck aft which measured 9.11 register tons. The ship’s weight capacity would have been approximately 250 tons of cargo (equivalent to 175,000 board feet of lumber).

ADVENTURE’s construction appears to have been typical of wooden ships of her day in most respects (Figure 2). She was built entirely of white oak and had closely-spaced transverse frames, all connected by a longitudinal backbone of heavy oak keel Ins. inner and outer planking was 3-inch thick white oak. The whole structure was strengthened by bands of planking, called "thick strakes," running the entire length of the hull under the deckbeams and along the bilges on both sides. The hull of such vessels was commonly stiffened further by the use of large tamarack brackets or “knees” under each deck beam where the beams met the vessel’s sides (although it has not been possible to confirm the use of knees in the ADVENTURE because so much of the upper hull structure was destroyed in her fire). The ship was iron-fastened, with 3/4-inch and 1-inch iron "treenails" in her frames and smaller 3/8-inch round and 1/4-inch square nails in the planking.

The ADVENTURE was among the smaller Great Lakes schooners. There were larger and more numerous ones called “canallers” and still larger schooner craft. Canallers measured approximately 145 feet in length, 25 feet in breadth, and 10 feet depth of hold. Several hundred canallers plied the Lakes. These vessels were tailored to the dimensions of the old (second) Welland Canal (1845 to 1853), connecting Lakes Erie and Ontario. The Great Lakes merchant fleet of the mid-1870s included some 2,000 canallers in all, nearly half of which were canallers (Barry 1996:123,124, Labadie 1989:19-22; Mills 1910:183-186). Schooners larger than canal-size were used principally in the lucrative grain and iron ore businesses or in the Chicago lumber trade, while canallers were employed largely in the Lake Ontario and Upper Lakes traffic. The smaller sailing craft, such as the ADVENTURE, were more often engaged in the “itinerant” trades, taking advantage of whatever small cargoes became available at smaller (and often shallower) ports. The largest sailing vessels in 1875 were 200 feet long, although a few schooner-barges exceeded that length; these latter craft were principally used as towbarges (Barkhausen 1947:10).

Steam Barge ADVENTURE

After serving as a sailing vessel for two decades, the ADVENTURE was rebuilt as a screw steam barge at Sandusky, Ohio in 1897 by Henry D. Root of nearby Lorain. The conversion seems to have been done on property owned by David Dussault. Dussault operated a sand and gravel business on the Baltimore & Ohio Railway dock at the foot of Warren Street, and on another dock at the foot of Meigs Street in Sandusky. Secondhand machinery was used for the ship’s conversion. Root was very highly regarded in marine circles, having operated a shipyard at Lorain since the early 1850s. He is credited with building some 49 vessels and rebuilding several others. Building all manner of Great Lakes craft, principally schooners in the early years and fish tugs after 1890, he operated a shipyard until 1908.

Figure 1. Rigging plan for a typical two-masted schooner approximating the ADVENTURE’s site and shape (modified from Kiblberg 1963:132).
Figure 2. Kelley Island Lime & Transport Company's lime dock and kilns at North Bay quarry complex, circa 1890 (Capt. Frank E. Hamilton Albans, Charles E. Frohman Collection, Rutherford B. Hayes Presidential Center at Fremont, Ohio). Wooden schooner at dock is of a design similar to the ADVENTURE when she was a schooner; wooden barrels stacked in warehouse at stern of schooner were used to ship lime.

Rebuilding of the ADVENTURE from a schooner to a steam barge was accomplished by reconstructing and rounding the ship's square stern and installing a boiler, engine, tailshaft, propeller, and rudder. Simpler tasks included removal of the ship's bowsprit and her after (main) mast, relocating the foremast, and erecting a small forecastle at the bow. A cabin was also constructed on a raised poop deck at her stern (Figure 3). Following her rebuilding, Inland Lloyds Vessel Register (1897) listed the vessel's insurance evaluation as $6,000.

Essential machinery consisted of a small, single-cylinder high-pressure vertical steam engine salvaged from the steam barge HANDY BOY and a boiler from the tug MYRTLE (Figure 4). The engine, with a 16-inch cylinder and an 18-inch stroke, had been fabricated in 1881 by Phoenix Iron Works at Port Huron, Michigan, and used in the HANDY BOY until that craft was destroyed by fire at Huron, Ohio on September 4, 1888. The HANDY BOY was very nearly the same size as the ADVENTURE, measuring 104.6 x 25.9 x 7.5 feet, and 136 gross tons and was last owned by the Kelley Island Lime & Transport Company. The boiler used in the ADVENTURE came out of the 50-foot tug MYRTLE, which was built in 1875 at Black River [Lorain, Ohio] and owned by Fred Groch, the same man who purchased an interest in the ADVENTURE shortly before her 1897 rebuilding. Although the tug was abandoned at Sandusky around 1892 (Wendt 1984:129), she may have been out of service for some time previous to that date: the Marquette, Michigan Daily Mining Journal advertised on December 17, 1887: "The tug MYRTLE [sic] of Sandusky - for sale cheap; in first-class condition. Write to Fred Groch, Sandusky, for particulars." According to the 1902 edition of Beeson's Marine Directory, the boiler was the firebox type and measured 5½ feet in diameter and 12 feet in length; its manufacturer is unknown.

Following her 1897 reconstruction for owners Robinson and Groch, the ADVENTURE measured 108 feet in length, 26 feet beam, and 8.3 feet depth of hold. Her draft would have been about 8 feet aft and 6 or 7 feet forward. Her register tonnage was changed to 141.72 gross tons and 95.37 net tons. Because of the space taken up by her machinery and coal-bunkers, the ship's cargo capacity was somewhat reduced. No revised capacity figure has yet been found, but it may be estimated from 170 to 200 tons or approximately 150,000 board feet, based on a comparison with similar vessels. The 1902 edition of Inland Lloyds Vessel Register noted that she was approved for deck loads of lumber up to 7½ feet high.

Steam barges were developed on the Great Lakes following the Panic of 1857, when low freight rates and an overdeveloped merchant fleet drove most vessel...
ARCHAEOLOGICAL INVESTIGATION OF A GREAT LAKES STEAM BARGE

owners out of business. Around 1862 a Buffalo ship owner took idled passenger steamers, made huge barges of them, and used large tugs to tow them from port to port (Mills 1910:186-188). He reasoned that a freight steamer could be designed which would serve the same purpose: towing barges and at the same time carrying a cargo on its own deck—the steam barge was the result (Labadie 1989:25-28; Labadie and Murphy 1987:55-57; Mills 1910:188-190). The TRADER, built at Marine City, Michigan in 1865, is believed to have been the first steam barge.

Steam barges, at times called “lumber hookers,” were single-decked steamships whose basic hull construction differed little from contemporary schooners, except that they were self-propelled, with boilers and engines, and had cabin accommodations necessary for larger crews. The earliest steam barges had their cabins aft as did the ADVENTURE, although the larger steam barges which evolved after 1880 often had a pilothouse and some of their cabins on a raised forecastle at the bow; this feature was advantageous in larger craft since it improved visibility for the master and wheelsman. Most vessels of this type ranged between 90 and 175 feet in length with capacities from 150,000 to 1,000,000 board feet (up to 800 tons) of lumber. Between 1865 and 1910 there were 800 steam barges built on the Great Lakes (Labadie 1982). This type of vessel was adopted in the Pacific Northwest as the lumber industry moved there in the late 1800s, where it was referred to as a “steam schooner.”

These sturdy vessels carried their cargoes on deck as well as below, but because their below-decks capacity was limited, they were particularly suited for products which could be exposed to the weather and piled high on deck. These products included lumber, coal, sand, stone, or barreled salt. Steam barges were also good money-makers because they had the horsepower to tow two, three, or more loaded barges behind, multiplying their payloads several fold on any given trip. Some of the more powerful “hookers” routinely towed six barges back and forth between Saginaw, Michigan and Toledo, Ohio or Buffalo, New York during the 1870s and 1880s. The relatively small engine and boiler inherited by the steamer ADVENTURE would not have been sufficiently powerful to tow more than one or two barges.

Steam barges proved essential to the development of the lumber industry on the Great Lakes, providing access and cheap transportation for forest products. Moreover, they were the prototypes for the Great Lakes’ unique “bulk freighters” which soon followed them in the grain and iron ore trades and persist to the present day with little change (Labadie and Murphy 1987:57-60). Steam barges disappeared not long after the collapse of the lumber industry in the Great Lakes region around 1920, but their double-decked descendants have served America’s economy for more than 130 years by hauling mountains of grain, coal, and iron ore inexpensively. The bulk freighters of the Great Lakes are known the world over for their efficiency and economy, and they are direct descendants of modest little steam barges like the ADVENTURE.

The initial enrollment was issued to the schooner ADVENTURE October 1, 1875 at Detroit, Michigan by special surveyor J. E. Parry. It describes the vessel as having one deck and two masts, plain head and a square stern, with measurements 104 x 24 x 8 feet, 148.97 gross tons, and 141.53 net tons. The official number assigned her was 105567.

The ship’s official documents indicate that she was built for enterprises of the John Oades family; for the first two and a half years of her existence, she was owned by John Oades (1/4 interest) and son Walter H. Oades (1/4 interest). Her first master was George H. Collins. In 1876, the Board of Lake Underwriters assessed the value of the ADVENTURE at $8,000 (Figure 5). It may be speculated that Oades used the craft to transport oak from Ohio ports to his Detroit shipyard property, although no substantiating evidence has yet been found. John Oades constructed 14 ships on the Detroit waterfront between 1868 and 1890, but he is best known for the 36 vessels he built at Clayton, New York between 1846 and 1865. The earlier vessels included some of the largest and finest passenger steamers on Lake Ontario, along with many barns and schooners. Oades was born at Sackets Harbor, New York in 1815 and came to Clayton in the early 1840s. He relocated to Detroit in 1865, where he superintended the highly successful Campbell & Owen shipyard before resuming business on his own two years later (Wright 1969:49,95).

Enrollment documents dated April 2, 1878 (Detroit, Michigan) show a change of ownership to Edward Cunningham (1/2) and F. B. Wallace (1/2). Both men were from Detroit, and Edward Cunningham was listed as master. Little is known of the schooner’s activities during this time. Inland Lloyds Vessel Register for 1884 lists the ADVENTURE with a valuation of $5,000. Another enrollment was issued at Detroit on April 13, 1846, showing a change of ownership to Edward Cunningham (1/4), F. B. Wallace (1/2) and J. E. Wallace of Chicago, Illinois (1/4); Edward Cunningham continues to be given as master. The 1886, 1888, and 1890 editions of the annual List of Merchant Sailing Vessels of the United States list Detroit, Michigan as her home port.

Figure 4. Small, single-cylinder high-pressure vertical steam engine similar to the one believed to have been salvaged from the steam barge ADVENTURE (courtesy of Great Lakes Historical Society).

Figure 5. Insurance values of merchant vessel ADVENTURE 1875 to 1903.
In 1891, enrollment documents issued on February 13 show a change of district to Cleveland, Ohio, and a change in ownership to H. C. Case of Sheffield, Ohio (1/2) and J. F. Padley of the same place (1/2); Case is given as her master. On May 25, 1894, ownership interest was shifted to H. C. Case (1/4) and J. H. Padley (1/4), with Case remaining in command. April 11, 1895, documents show J. F. Padley (1/4) and J. M. Robinson of Lorain, Ohio (1/4) as owners and Robinson as her master. J. M. Robinson became sole owner of the schooner early in 1896 as reflected in an enrollment at Cleveland, Ohio dated February 4. Erroneously, the 1897 edition of Inland Lloyds Vessel Register continues to list Detroit as port of hail and the owners as Cunningham et al. The insurance value listed in this edition of Lloyds is only $1,500 (Figure 5). At some time during the winter of 1896-1897, Robinson took in a partner. A new enrollment issued at Sandusky, Ohio on April 20, 1897 shows the vessel owned by Robinson (1/2) and Frederick Groch of Sandusky (1/2).

Temporary enrollment documents for April 20, 1897 [Sandusky] show master carpenter H. D. Root of Lorain as the rebuild of the vessel in Sandusky. She was rebuilt as a screw steamer with one deck and two masts, plain head, and a round stern. The new dimensions were length 108 feet, breadth 24 feet, and depth 8.3 feet. The new tonnage was 141.72 gross and 95.37 net. Ownership is given to J. M. Robinson of Lorain (1/2) and Frederick Groch of Sandusky (1/2) with J. M. Robinson remaining as master.

Later that spring, permanent enrollment documents issued in Cleveland (May 26, 1897) list the owners as Frederick Groch of Sandusky (1/104), J. M. Robinson of Lorain, (3/104), and A. C. Moss of Sandusky (7/104). The home port is given as Lorain, and the master is listed as S. J. Putnam [or S. J. Batman]. During 1897, William H. McNalley, George Beth, and John M. Robinson also served as her masters.

The Groch Coal Company likely ran the ADVENTURE from Sandusky to Lorain and Cleveland in the stone, lime, and cement trade from 1897 until 1901 when she was sold to parties from Port Huron, Michigan. The 1897 edition of Inland Lloyds Vessel Register for side-wheel steamers and propellers lists her port of hail as Sandusky and the owners as Robinson et al. The 1897 edition of Lloyds lists a value of $6,000, reflecting her conversion to a steamer (Figure 5). The 1898 edition of Lloyds shows a decrease to $5,500 and the 1900 edition reveals a marked, further decline to $1,500. Enrollment documents for June 8, 1898 show Frederick Groch as sole owner and master.

Frederick Groch, listed as both owner and master, surrendered enrollment for the ADVENTURE in the Sandusky District on May 31, 1901 to new owners Charles Byschlag (1/2), Joseph Lowes (1/2), and John Byschlag, Jr. (1/2), all of St. Clair, Michigan. They enrolled the vessel at Port Huron, Michigan, giving Charles Byschlag as master. In 1901 a new deck was installed and she was refitted. Correspondingly, Lloyds upgraded the value of the vessel to $5,000 (Figure 5). From 1901 until 1903 the ADVENTURE was engaged in the transport of lime and limestone from Kelleys Island and the delivery of salt to Sandusky, as well as handling cargoes of gypsum from Tawas Bay, Michigan on Lake Huron (Dorr and Eschman 1970:125,126). The 1902 edition of Merchant Sailing Vessels of the United States listed a crew size of four and the home port as Port Huron and the 1903 edition of Beeson's List of American Steam Vessels on the Lakes gives owner or manager as Charles Byschlag of St. Clair, Michigan. The October 8, 1903 edition of the Sandusky Daily Register reported that the ADVENTURE "...had been in port at Sandusky ... a day or two ago and discharged a cargo of salt at the Big Four docks." On the same date the Sandusky Evening Star stated that the ADVENTURE was owned by "Charles Byschlag of St. Clair, Michigan" while the Port Huron Daily Times and Cleveland Plain Dealer gave the owners as "Byschlag, Schlinkert and Lowes of St. Clair."

On October 6, 1903, the ADVENTURE sailed from Sandusky to Kelleys Island, Ohio. During this voyage the ADVENTURE was commanded by Captain John Lowes who had his wife and young daughter on board. By 4:00 in the afternoon of October 7, she had taken on a cargo of burned lime at the Kelleys Island Lime & Transport Company's North Bay dock when disaster struck. While lying at the dock she caught fire. The Cleveland Plain Dealer (October 8, 1903) noted that flames were first discovered just forward of the boiler in the hold and soon the ship was ablaze.

The Sandusky Daily Register (October 8, 1903) reported that the fire "...spread so rapidly that the sailors were glad to escape with their lives" and the Sandusky Evening Star (October 8, 1903) stated "it is reported that the lime became wet and was set afire, but this report is not confirmed." When it was seen but narrowly escaped death; most of their belongings were destroyed (October 8, 1903). The steamer and its cargo were a total loss as the vessel burned to the water line and sank in about 15 feet of water off Long Point in North Bay. The estimated value of the loss in 1903 was $2,500 for the vessel and $1,500 for the lime cargo (Figure 5). The Sandusky Daily Register (October 8, 1903) noted that the vessel and its cargo were uninsured.
**Kelleys Island Limestone Industry**

**Geologic Setting**

Kelleys Island, a rocky outpost of less than 5 square miles, lies in western Lake Erie some 12 miles north of Sandusky, Ohio. The limestone quarries on Kelleys Island have long been known to science because of remarkable glacial grooves carved on the rock surfaces (Figure 9) and the well-preserved fossils of a Devonian coral reef (Bowe and Herdendorf 1990:1-8). For decades high-quality building stone, lime, and crushed rock were produced from these quarries (Stauffer 1909:136-142). Vessels like the ADVENTURE were essential in the transportation of these products to mainland markets.

Columbus Limestone (Middle Devonian age) bedrock underlies the major portion of Kelleys Island. This formation is covered by only a thin layer of glacial drift, thus rock outcrops are common, particularly along the shores. Outcrops are of two types: (1) broad shelf areas with gentle dip slopes, common along the south and east shores and (2) vertical to overhanging cliffs up to 25 feet high, especially along the north and west shores (Fisher 1922:7). An uplift in the bedrock west of the Bass Islands, known as the Cincinnati Arch, gives the rock formations of western Lake Erie a regional dip toward the southeast. As a result, most of the islands of western Lake Erie, including Kelleys Island, have a cuesta or hogback shape with steep cliffs on the side toward the arch and gentle, shoaling coasts away from the arch (Figure 10). Long erosion of adjacent areas has left the resistant rock of Kelleys Island as a remnant of a limestone ridge that once divided preglacial river valleys. The Columbus Limestone is underlain by Lucus Dolomite, which is exposed in the bottom of the deepest quarries on Kelleys Island (Stauffer 1909:136-142).

Columbus Limestone consists of three lithologic units on Kelleys Island: (1) a basal, thick-beded, magnesite limestone layer, (2) a middle layer of cherty limestone, and (3) an upper sequence of thin-beded highly calcareous limestone (Fisher 1922:9). The basal beds are well exposed in the North Bay and South Side quarries where they present a massive, vertical face of grayish-brown fossiliferous limestone, 22 feet thick...
Figure 10. Geological cross-section through the islands of western Lake Erie, showing the bedrock formations (modified from Curman 1946:282).

Figure 11. Kelley Island Lime & Transport Company's North Bay quarry, circa 1900 showing use of steam drill to bore blasting holes (Capt. Frank E. Hamilton Album, Charles E. Frohman Collection, Rutherford B. Hayes Presidential Center at Fremont, Ohio). Note Shay engine and cars (upper right) transporting quarry stone.

Quarry operations and lime production
For seven decades, starting in the 1870s, quarrying was the leading industry on Kelleys Island. Earlier, around 1830, the first quarry was opened by John Clemons (Martin 1990:18). He and his brother exploited rock from the north shore of the island where limestone ledges rise 25 feet above the lake (Myers et al. 1992:22). The first shipments of limestone were made from a dock on North Bay (Ver Steeg and Yunck 1935:432). The potential for developing a limestone quarry industry on Kelleys Island was one of the factors which prompted Datus and Ira Kelley to purchase the island in the 1830s. The Kelley brothers continued to use the North Bay dock to ship stone, making their first shipments to Cleveland and other markets in 1834. They shifted their quarrying activities to the southern side of the island in 1835 and use of the North Bay quarry and dock were discontinued (Myers et al. 1992:22).

Quarrying activities resumed again on the north side of the island in 1872 when G. W. Calkins & Company of Cleveland, Ohio purchased 162 acres of quarry land from William D. Kelley and others to complement their southern holdings on the west side of the island. Until the purchase of the North Bay quarry, G. W. Calkins & Company shipped stone extracted from their West Bay quarry to Cleveland to be burned for lime (Myers et al. 1992:22). Soon after the land acquisition the company initiated an expansion which included a new dock, enhanced facilities for extracting and processing stone, and housing for quarry workers. In 1875 the company brought several lime kilns to the island from their Cleveland operation and erected them near the new North Bay dock. The same year an extensive cooper shop was built and an elevated wharf was added to the North Bay dock (Myers et al. 1992:23). At this time the company was owned by G. W. Calkins, M. C. Younglove, and Charles Hocking.

In December 1886, G. W. Calkins & Company was reincorporated as the Kelley Island Lime & Transport Company (KIL&T Co.) with M. C. Younglove, Caleb E. Gowen, and E. B. Merriam as partners. KIL&T Co. consolidated the holdings of the island's smaller operations into three "theaters" of operation: North Bay, West Bay, and South Side. KIL&T Co. became the largest employer and landowner on the island between 1886 and 1942, and eventually became the largest producer of lime in the world (Page 1988:811). In describing the island at the turn of the century, Thordale (1898:215) noted that "...after a glance at the vast area of quarries and cored stone, and the outcropping ledges remaining, the island as a whole suggests itself as a single big lime rock, with a layer of earth spread over it." In 1918 KIL&T Co. reached peak production on Kelleys Island as 3,989,339 tons of stone were shipped on 316 boats (Myers et al. 1992:24).

When completed in the early 1900s, the North Bay complex (Ohio State Archaeological Site #OHIO336) included an extensive quarry, 16 lime kilns (Figure 13), a cooper shop, warehouses for barrel storage, a stone crusher for production of flux stone, boarding houses and other facilities for the resident labor force, horse barns, carpenter and blacksmith shops, a locomotive shop, a water tower, and several other structures. A constantly changing network of roads and narrow gauge rail lines linked these facilities to the two docks on the North Bay of Kelleys Island (Figure 6).

Quarrying was easy and economical on Kelleys Island because the loose thin soil could be rapidly removed from above the limestone. Because the basal beds of the Columbus Limestone were best suited for dimension stone, deep quarries were the first to be developed. These quarries produced massive stone used for buildings, piers and breakwaters. In addition to building stone, the early quarries were soon organized to produce lime (calcium oxide). Lime replaced dimension stone as the main product in the
1870s with the construction of large kilns and dominated operations for three decades. By the early 1900s the focus changed from the production of lime to that of flux stone, an important ingredient in the manufacture of steel. To produce this type of stone, large stone crushing complexes were built on the island. With the decline in demand for dimension stone, and the expense of deep quarrying for lime rock, the deeper parts of the quarries were abandoned. By the 1920s, only the thin-bedded upper zone was being utilized and that for crushed stone (Figure 12).

**Dimension Stone.** Kelleys Island dimension stone was sold by the cord, a cord being equivalent to 5.5 tons. Several docks were built and used for shipping both stone and cedar wood. Thus, numerous boats were able to dock at the island to purchase stone. A typical early cargo would amount to 50 or 60 cords of stone. The breakwaters at Cleveland and Cedar Point, Ohio were constructed with Kelleys Island limestone, as well as the piers for the Cleveland High Level Bridge. The first American lock at Sault Ste. Marie, Michigan (1874-1876) was also built with Kelleys Island stone (Martin 1975:25). Ross (1949:39) points out that "...the islanders are proud of the fact that many churches in Detroit, some of the finest office buildings in Cleveland, and the Poe lock at the Soo were built of stone taken from the island."

The early methods of quarrying on Kelleys Island were largely performed by hand. Until the 1880s the steps in the stone extraction process included drilling, black power blasting, and hand sledging. Blast-hole drilling was done with a single-jack (one man with a chisel and 4-pound hammer creating a 3-foot deep hole) or a double-jack (team of three laborers, one to hold drill and two to alternately strike it with 20-pound hammers). Hand-chum drills and hand augers that could reach a depth of 8 feet were also used. Dimension stone, stone for lime burning, and flux stone were all quarried with the same tools (Myers et al. 1992:27). The difference in their extraction was related to the size of the rock to be removed and this was controlled by the spacing and depth of the blast holes.

In the late 1880s the mode of quarrying was mechanized with the introduction of the steam drill. Once the holes were filled with powder a single set of blasts would free as much as 400 cords of blue-white stone, remarkably free of spots or impurities (Nichols 1888:22). Steam drills at that time consisted of a piston drill that was an extension of the cylinder of a steam engine. These drills were powered by steam supplied by piping from a remote boiler (Myers et al. 1992:27). Piston drills were capable of drilling holes up to 15 feet deep.

**Lime Production.** As a secondary product of dimension stone quarrying, the broken blocks of the lower beds were burned for lime. These pieces had a higher magnesium content which required less heat to burn than the more calcareous upper beds (Fisher 1922:21). The north shore quarry (Ohio State Archaeological Site #33ER343) furnished both the magnesium-rich portion of the Columbus Limestone and underlying beds of Lucas Dolomite, also rich in magnesium, for the lime kilns.

The first lime kilns on Kelleys Island were built on the south shore by George Kelley in 1855 (Pape 1988:81; Myers et al. 1992:30), and by G. W. Calkins & Company on the north shore in 1875 (Bolhke 1974:7). In 1886 a huge complex of lime kilns was positioned at North Bay by the KIL&T Co. when the demand for building stone declined, Nichols (1888:23, 24) describes the early operations of the KIL&T Co. in vivid detail. Within two years, KIL&T Co. laid five miles of railroad track on the island and operated two locomotives and 15 cars to haul the stone to the kilns and to the docks for shipment to commercial centers. At the quarries KIL&T Co. employed a stationary engine and two diamond drills while at North Bay it built 6 state-of-the-art iron kilns to burn the limestone. KIL&T Co. also constructed residences for its employees and established a general merchandise store because the center of Kelleys Island village was 1.5 miles distant. In all, KIL&T Co. invested about $300,000 during its first two years of operation.

By 1907, KIL&T Co. holdings covered over 1,000 acres, they had invested over $8,000,000, and advertised their company as the "largest of its kind in the world" (Hatcher 1949:304). To work the quarries and kilns, KIL&T Co. imported foreign workers from central and eastern Europe—Italians, Slavs, Greeks, Hungarians, Portuguese, Poles, Macedonians, Bulgarians, and Germans. A large group of them lived on Kelleys Island, and others in the vicinity of Marblehead. The population of Kelleys Island from the mid-1800s to the mid-1900s fluctuated largely in response to quarrying operations on the island, with the peak island population of nearly 1,200 corresponding to the peak period of limestone production—from about 1870 to
20th century (Figure 14). At the turn of the century over half of the occupations on Kelleys Island were directly related to the limestone industry (Myers et al. 1992:235). In the late 1900s, the workings on the island began to dwindle along with the population. Thereafter, KIL&T Co. concentrated its operations on Marblehead Peninsula.

The Kelleys Island lime kilns were so constructed that the stone was conveyed by car or wagon to the mouths of the kilns which were constructed on the same level as the quarry floors (Figure 13). The kilns burned about 80 cords of stone and 48 cords of wood per day. Once the supply of wood on the island was used up other sources were developed. Nichols (1888:24) noted that "...an inexhaustible supply of wood being obtained from the Canadian shore, just across the lake." Wood for the kilns was also obtained from Oak Harbor on the Portage River in Ottawa County, Ohio.

After burning to drive off carbon dioxide, the lime (calcium oxide) was drawn out at the base of the kiln onto a substantial stone floor where it was packed into wooden barrels (Figure 15). The barrels were then rolled to an adjacent warehouse (which had a 6,000-barrel capacity) or on shipboard as vessels layed along side the warehouse dock. The kiln-dock complex included a large cooper shop where 22 men were employed in making and repairing barrels (Figure 16). The annual lime production by KIL&T Co. in the late 1880s was about 65,000 barrels and involved some 275 workers. Nichols (1888:23) observed that "...the lime produced by this firm is singularly white, strong and pure, being used almost exclusively for building and plastering purposes."

When limestone, a carbonate of calcium (CaCO₃), is heated sufficiently it undergoes a decomposition which yields calcium oxide and carbon dioxide (CaCO₃ = CaO + CO₂). The temperature required to maintain this conversion at one atmosphere of pressure is about 1,250° F (Nebergall et al. 1963:650). The manufacture of calcium oxide or "quicklime" on Kelleys Island was carried out in tall chimney-like furnaces known as kilns. In a continuous process, the limestone, which was fed in at the top of the kiln, was heated and decomposed by a draft of hot gas, and the lime was drawn off at the bottom of the kiln (Figure 17). The blast of hot gases through the furnace kept the partial pressure of the carbon dioxide at a minimum and permitted the reaction to go to completion at a much lower temperature than would otherwise have been required (Nebergall et al. 1963:650). In the furnace, carbon dioxide began to dissociate at 700° F and was completely freed at 900° F. Operators attempted to maintain a constant temperature of 800° F in the kilns for optimal processing (Myers et al. 1992:30). Wood was typically used to fuel the Kelleys Island kilns.

Pure calcium oxide is a white amorphous substance that emits an intense light, called "limelight" when heated to a high temperature. Lime reacts vigorously with water and exothermally (releasing heat), forming a hydroxide (CaO + H₂O = Ca(OH)₂ + 15,500 calories) which is known as hydrated lime or slaked lime (Nebergall et al. 1963:651). Because lime is a perishable product, particularly susceptible to the deleterious effects of moisture, the most convenient and safe way to ship the product from Kelleys Island was in watertight barrels.
At the turn of the century, the 16 North Bay kilns were running at full capacity, producing 1,800 barrels of lime per day plus large volumes of crushed stone. KIL&T Co. then employed about 500 men and 50 horses. However, by the second decade of the century, the company found it cheaper and more convenient to ship the stone, and then burn the lime at its plants in Duluth, Minnesota. Thus, on Kelleys Island the focus of its operation changed from the production of lime to the production of flux stone and the kilns and cooperage on North Bay were torn down (Ryall 1913:188).

Crushed Stone. The introduction of the Bessemer converter to the steelmaking process began to affect the limestone industry by 1870. In this process, flux stone is added to molten iron to draw off impurities, thus creating a new demand for crushed stone from the Kelleys Island quarries. To produce flux and other types of crushed stone, two large stone crushing complexes were built, one at North Bay and one at South Bay. Crusher plants, storage bins, and railroad grades are still extant at these two sites. The large scale production of flux stone also required a sizable inventory of narrow gauge rolling stock and steam cranes. A machine shop, blacksmith shop, locomotive shed, and ancillary sheds were established at West Bay to accommodate maintenance and repair of these components and an office building/general store were built at the North Bay quarry (Figure 18).

Flux stone requires a fairly high content of calcium carbonate and a correspondingly low amount of silica and alumina, while a higher content of magnesium carbonate can be tolerated for stone burnt for lime (Fisher 1922:21). The following analyses were performed by the Ohio Geological Survey (Lord 1884:534; Orton 1888:753) in the 1880s on Kelleys Island stone destined for these two purposes:

<table>
<thead>
<tr>
<th>Component</th>
<th>Flux stone for iron smelting</th>
<th>Stone to be burnt for lime</th>
</tr>
</thead>
<tbody>
<tr>
<td>silica</td>
<td>1.81%</td>
<td>1.65%</td>
</tr>
<tr>
<td>alumina and iron</td>
<td>0.75%</td>
<td>0.14%</td>
</tr>
<tr>
<td>calcium carbonate</td>
<td>87.50%</td>
<td>77.22%</td>
</tr>
<tr>
<td>magnesium carbonate</td>
<td>9.75%</td>
<td>20.19%</td>
</tr>
<tr>
<td>residue</td>
<td>0.19%</td>
<td>0.80%</td>
</tr>
</tbody>
</table>

In referring to the thinly bedded rock overlying the lime beds, Nichols (1888:23) also pointed out that "...above the famous limestone being a valuable and extensive strata of what is termed 'flux stone' used in the process of purifying metals, which commands a ready market all over the continent." This upper part of the Columbus Limestone is a very pure limestone and therefore was valuable for use as lime and flux. Analyses indicate increasing proportions of magnesium carbonate (MgCO₃) and decreasing portions of calcium carbonate (CaCO₃) from the top to the bottom. In the upper beds the amount of CaCO₃ was as high as 97% and the amount of MgCO₃ was as low as 27%, whereas the lower massive beds ran as low as 78% CaCO₃ and as high as 20% MgCO₃. Alumina, iron oxide, and silica made up the remainder (Ver Steeg and Yunck 1935:431). The lower massive beds best served dimension and building stone needs.

In the early 1920s, the upper part of the Columbus Limestone was quarried by drilling a row of holes 25 feet back from the working surface, 25 feet apart, and 15 feet deep. Charges of dynamite were set in these holes and the entire mass was "shot down" (Fisher 1922:22). The stone was loaded by steam shovels into dump cars and hauled to crushers where it was broken and graded according to size. At that time crushed limestone had three primary uses: (1) flux, (2) road ballast and metal, and (3) the main constituent of concrete. As flux, the stone was used in smelting iron and copper, and in the manufacture of bottle and window glass. Flux stone had to pass through a 4-inch ring, but be retained on a 2-inch ring; ballast stone had to pass through a 2-inch ring, but be retained on a 0.75-inch ring; concrete stone had to pass through a 1.25-inch ring; and for surfacing roads, all that passed through a 0.75-inch ring, including dust, was used (Fisher 1922:21).

The rapid falling off in demand for building stone in the late 1800s and the increase in demand on crushed stone for lime, flux, and road building made it more economical to quarry only the thin bedded upper rock and just some of the "bottom rock" of the Columbus Limestone. Ver Steeg and Yunck (1935:432) noted that "...as a result almost the whole top of the island is being removed from west to east; the average depth of the vast quarry is twenty-five feet."

Because the upper thin-bedded stone was generally less than 20 feet thick, the later quarries tended to expand over great areas without attaining much depth. By the early 1920s KIL&T Co. owned about 40% of the island and most of its holdings had been opened to quarries of the upper strata (Figure 19). The islanders began to resist any attempts on the part of KIL&T Co. to obtain more land, fearing that practically the whole island would be devastated by extension of the quarries (Fisher 1922:23). Thus, quarry operations began to dwindle and KIL&T Co. went out of business on the island in the 1940s (Figure 20).
MARITIME TRANSPORTATION

The transport of limestone and lime products contributed greatly to the early commercial traffic on the Great Lakes and has traditionally ranked among the top five commodities in shipping tonnage. Because of its offshore location, limestone operations on Kelleys Island were totally dependent on maritime transportation to carry products to mainland markets. Initially, much stone, well adapted to building purposes was shipped from Kelleys Island, but in the later years all the limestone was crushed and shipped to Lorain, Cleveland, Buffalo, and Gary for flux, or to Duluth to be burned into lime. When the KIL&T Co. was formed in 1886, one of the company’s first requirements in developing the vast deposits of limestone on Kelleys Island was the establishment of terminals for mainland distribution. These were created in Buffalo, Cleveland, Detroit, and Duluth (Nichols 1888:23). In the late 1800s the quarry operators burned lime on the island and shipped it throughout the Great Lakes region until it was found to be more economical to burn stone near the markets or near sources of fuel (Ver Steeg and Yunck 1935:433).

In 1875 the Kelleys Island and Sandusky Cable Company successfully laid a submarine cable on the bed of Lake Erie between the island and the mainland. The cable was attached to an instrument in the Atlantic and Pacific Telegraph office in Sandusky and on July 8 the first message was sent from Erastus Huntington on the island to George Daniels, mayor of Sandusky (Peek 1916:341). This communication link greatly facilitated orders for limestone products and dispatching vessels to distant markets.

During the decade before and following the turn of the century, North Bay lime kilns produced up to 1,780 barrels of lime per day (Figures 21 and 22). The peak of the limestone business on Kelleys Island occurred during this period when mechanization stepped up production, creating a boom. KIL&T Co. grew to be the largest limestone producer in the country and its stone was reputed to be the best (Gilfillan 1959:20). With the construction of the West Bay loading dock in 1910 (Figure 23), KIL&T Co. was able to increase its production of stone. For the next decade the company shipped over half a million tons annually in some 600 lake carriers (Linhardt 1995:35). The company continued to expand and eventually the opening of new quarries on the mainland led to the abandonment of those on Kelleys Island in the 1940s.

Dock Facilities. In the 1883 quarried stone was sorted into 8 to 10 grades and then conveyed to waiting vessels or corded on the docks. The stone was loaded onto vessels by horse-drawn wagons from an elevated platform, through aprons or chutes lying on either side. The docks had sufficient facilities for expeditiously loading a number of vessels at a time. Nichols (1888:22), writing of the scene at the South Side dock, reported that "...vast walls [of stone] may be seen from passing steamers" and "...no rubbish or loose stone is allowed to accumulate, and everything about the dock has a neat and orderly appearance seldom met with." At that time market for the limestone extended from the lower end of Lake Erie to Duluth.

At the North Bay quarry, burned lime was the dominant product in the 1880s. The lime was packed into wooden barrels for storage in an adjacent warehouse or loaded directly on waiting vessels. Maritime facilities also included a concrete pocket dock which consisted of an extended jetty with an elevated track and chutes for loading boats. Barges, steamers, and other vessels of 8,000- to 10,000-ton capacity could be easily loaded from this dock in a matter of two to three hours (Ryall 1913:186).

By 1898, KIL&T Co. operated several Shay locomotives (built by Lima [Ohio Locomotive Works] and 150 cars in the quarries. Four steam shovels were used in connection with the crushing plant and 8 large derricks were employed in loading the large sections of stone blasted from the limestone beds. Four docks, lying on the north, west, and south shores, were owned by KIL&T Co. and afforded ample facilities for loading vessels with stone. A railway system connected all of the quarries to the docks; light engines, drawing 10 to 12 cars, were used to transport the stone. In describing the scene, Ryall (1913:186) commented that "in noise, and importance, these little engines resemble the small but mighty harbor tug. They draw heavy loads and are very busy."

Flux stone had become the major focus of the island’s limestone industry by the first decade of the 20th century. The increased production of flux stone necessitated the construction of improved dock and loading facilities. Because crushed stone was sold by weight, in 1907 a scale house was constructed along the rail grade connecting the stone crusher with the North Bay dock. This facility permitted large volumes of flux stone to be weighed in an expeditious manner (Myers et al. 1992:31).
The stone loading docks on the north and south shores were less used after 1910 when a central facility was constructed on the west shore. Built on the same pier site as the first Titus quarry dock of 1842, West Bay dock was designed to accommodate narrow gauge dumping cars via a 600-foot-long overhead trestle (Myers et al. 1992:24). In the 1920s, stone was loaded by steam shovels into dump cars and hauled to crushers where it was broken and graded according to size. It was then reloaded into dump cars for transport to great storage bins (Figure 23). From the bins the stone was loaded directly by gravity into bulk freight boats. At the South Side dock the stone was hauled directly from the cars into boats (Fisher 1922:22). By the 1930s, the north and south loading docks were abandoned and all stone was dumped into freighters and barges from an elevated pier on the west shore.

Merchant Vessels. One of the earliest steam vessels associated with the limestone industry, ISLAND QUEEN, was built on Kelleys Island in 1854. She was a 169-ton wooden sidewheel steamer with an overall length of 151.5 feet, beam of 20.6 feet, and draft of 7 feet (Frohman 1965:77). This vessel was owned by a stock company formed by Addison Kelley to meet the transportation needs of the Ottawa City Cement Company on Catawba Island. Investors on Kelleys Island contributed $7,000 and José DeRivera St. Jurgio of Pat-in-Bay $2,000 toward the original stock subscription. When completed the total cost was about $18,000, twice the amount estimated and subscribed, and she "...did not pay out for five years" (Hills 1925:134,135).

The cement works at Ottawa City, located about five miles west of Kelleys Island at the northern extremity of Catawba Island, was then in full operation and shipping cement to various lake ports. The management of the company made liberal offers, in the way of freight guarantees, as an inducement to build the ISLAND QUEEN. The keel was laid in July on George Kelley's shore dock and she was launched in late November. After being frozen in for over a month at the island, on January 7, 1855 she was towed to Sandusky by the steamer ARIEL where her machinery was installed. She was powered by an upright or "Sawgate" high-pressure engine. She was ready for service in the Spring of 1855. Her route included Fremont, Plaster Bed, and other Sandusky Bay ports, besides Sandusky, Ottawa City, and the Lake Erie.
islands. She also went once a week to Cleveland and
Toledo with cement from Ottawa City and made part
of her earnings by towing sailing vessels in and out of
Sandusky Bay (Hills 1925:134). She was commanded
by Captain George W. Orr (Peek 1916:340).

When the Civil War broke out the economy of
the region improved and the ISLAND QUEEN made
money. She gave up going to Fremont and began daily,
instead of tri-weekly, trips to the islands except when
she carried freight to Huron, Black River, or some other
port along the Ohio shore after completing her
excursions. Only two vessels were owned by Kelleys
Islanders in 1863, the ISLAND QUEEN valued at
$5,000 and a sailboat at $153. Seven men were
employed as crew for these vessels out of a total island
population 600 for that year. Peek (1916:340) reported
the coastwise exports from Kelleys Island for 1863 as
follows:

- Red cedar (714 cords) $4,291
- Limestone (390 cords) 780
- Steamboat wood (3,248 cords) 4,102
- Corn, wheat, and pork 2,000

The ISLAND QUEEN never met with a serious
accident or suffered anything more than a broken crank
shaft until she was captured by the Confederate
“Rebels” in September 1864, in an ill-fated attempt to
free Confederate officers from the Federal prison on
Johnson Island, and junk on Chickenhole Reef about
eight miles north of Kelleys Island (Frohman 1965:77-
81). She was raised in a few days, comparatively uninjured and put back in service, but sold two years
later because the growing business on the route necessitated a larger boat. She was replaced by the 340-
ton steamer EVENING STAR (Hills 1925:134; Peek
1916:40).

Another class of vessels frequenting Kelleys
Island loading docks after the middle 1860s was the
“steam barge.” This was a single-decked, wooden
steamer of a little more than 100 feet in length, built to
carry lumber cargoes or bulk products such as salt,
stone, coal, or iron ore. The earliest steam barges had
their pilothouses and all of their cabins perched on the
stern along with boiler and engine spaces. After 1880
larger steam barges appeared, some as much as 200
feet in length with raised forecastles and pilothouses
at the bow. Most of the steam barges in the Kelleys
Island stone trade were of the smaller variety, seldom
exceeding 120 feet in length (Figure 24).

Figure 24. Steam barge CHARLES H. DAVIS and scow schooner FX at the South Side dock, Kelleys Island (Capt. Frank E. Hamilton Album, Charles E. Frohman Collection, Rutherford B. Hayes Presidential Center at Fremont, Ohio).

About 1860 the scow ELMINA was lost in a fog
while engaged in carrying stone from Kelleys Island
to Cleveland for her owner, Charles Carpenter (Hills
1925:135). In 1872 the steam barge CHARLES
HICKOX (Figure 9) was built for G. W. Calkins &
Company (owner of North Bay quarry) by Henry D.
Root at Lorain, Ohio to carry lime and limestone from
Kelley’s Island to Cleveland. In 1878 Norman Kelley
bought the screw steamer MONITOR and the schooner
ONEIDA for the limestone trade. Another vessel, the
51-ton schooner Q. A. GILLMORE, carried stone from
the island for many years. She was owned by Erastus
Huntington and her master, Capt. Ort. Moore of
Kelley’s Island. This vessel reportedly leaked so badly
that while in port the crew had to dump bushels of
horse manure into the water around the ship to be
sucked into the seams, thereby caulking the hull (Hills
1925:135). In 1881 the Q. A. GILLMORE was wrecked
on Gull Island Shal.

Figure 25. Kelley Island Lime & Transport Company’s steamer ALBERT Y. GOWEN at North Bay dock, Kelleys Island, circa 1880 (Historical Collections of the Great Lakes, Bowling Green State University). Vessel was built by Henry D. Root for KIL&T Co. in 1888 at Lorain, Ohio and measured 124 x 26 feet, 359 gross tons. Unlike the ADVENTURE, the GOWEN was a double-decked, bulk freighter.

By 1888, KIL&T Co. had procured a fleet of five
steam barges at a cost of $140,000, including the
ALBERT Y. GOWEN (Figure 25), GOOD HIT, HANDY
BOY, JIM SHERIFFS, and TEMPEST for an aggregate
tonnage of 3,200 (Nichols 1888:23). The steamer JIM
SHERIFFS carried stone to Duluth while the steamer
ALBERT Y. GOWEN transported lime to Cleveland and
Detroit. Later, the steamers DESMOND and ISABELLA
J. BOYCE were purchased for the Cleveland stone trade
as was the steamer NORMA for carrying freight
between Sandusky and Kelleys Island. The NORMA
was later succeeded by the steamer EDWARD P.
RECOR. In addition to these vessels, KIL&T Co.
carried two steel barges and a tug, L. P. SMITH, to
tow them to Cleveland loaded with limestone (Hills
1925:137). In 1913, KIL&T Co. operated a fleet of 10
vessels, consisting of wooden and steel barges, tugs,
steamers, and sail-rigged craft that were used to
transport the limestone (Ryall 1913:187).
ARCHAEOLOGICAL SURVEY

WRECK OF THE ADVENTURE

SURVEY METHODS

Although the wreck of the steamer ADVENTURE is relatively well known to sport divers of the western Lake Erie area, no serious efforts had been undertaken to document the features of this archaeological site. During fall semester of 1997, an experimental workshop course titled Shipwreck Archaeology for Recreational Divers was taught by the authors and several colleagues at Firelands College of Bowling Green State University in Huron, Ohio. The goals of the course were to train a cadre of avocational divers in the techniques of shipwreck documentation and then put these newly acquired skills to the test by conducting an archaeological study of the ADVENTURE.

The course was designed to: (1) foster an appreciation of Lake Erie’s underwater cultural resources, (2) offer information on the construction of Great Lakes vessels, (3) provide insight as to the historical and archaeological significance of shipwrecks, and (4) give scuba divers training in underwater techniques for documenting shipwrecks. The experience was a blend of lecture, dry- and swimming pool-simulation laboratories, plotting exercises, and actual shipwreck site mapping. The workshop was sponsored by a grant from the Lake Erie Protection Fund and by in-kind services from the Great Lakes Historical Society and the Ohio Sea Grant College Program at The Ohio State University. The workshop gave a group of 38 students the opportunity to document the wreck of the ADVENTURE, which facilitated the preparation of detailed maps and drawings of the site presented in this paper, as well as allowing them to participate in the restoration of the vessel’s propeller.

The location of the ADVENTURE shipwreck in North Bay of Kelleys Island was generally known (Figure 26), but as with all wrecks in Ohio waters, no record of any previous archaeological documentation was available. After locating the ADVENTURE site based on sports diver tradition, a general reconnaissance dive was performed to determine the basic orientation of the shipwreck and identify the major features to be mapped. Certain artifacts thought to have been removed through the years (most probably the boiler and engine parts by commercial salvagers soon after the sinking and the propeller in the 1960s by a diving club) were indeed found to be missing.

The primary documentation technique selected for the site was the trilateration method. This method required first establishing a baseline coincident with the keel of the vessel. This was accomplished by fastening a durable tape measure longitudinally along the entire length of the shipwreck and extending it some 10 to 20 feet beyond the bow and stern. Major features of the wreck selected for mapping were marked by attaching 2-inch x 2-inch plastic squares (cut from milk cartons) on which identifying numbers were placed with a water-resistant marker. Teams of divers were then sent to specific segments of the wreck to locate such features. The precise location for each significant point on the feature was achieved by recording the distance to that point from two positions on the baseline, thus forming a triangle with the feature at the apex.

Once the locations of the major features were determined, teams of divers were assigned specific details to measure and sketch (Figure 27). A
The ship's hull is 102 feet long, extending from the sternpost to a point near the bow, with a maximum width of 24 feet. The wreck lies on a heading of N23°E, with the stern at the northern extremity, in depths ranging from 10 to 15 feet. The 19-foot stem and forecastle structure is detached and separate, lying 155 feet northwest of the forward end of the hull and 160 feet west of the sternpost, in approximately 18 feet of water (Plate 1). The position of the shipwreck components was determined using standard land surveying techniques once divers had placed buoys to mark the extremities of the sections. A 228-foot-long

base line was established along the shore with its center near the projected offshore center of the site. Horizontal angles from the baseline to the various buoys were then measured with a theodolite. The position of the baseline was located in relation to the Long Point gate (visible on aerial photographs of Kelleys Island). This permitted the position of the shipwreck to be transferred to an aerial photograph (Figure 8).

Interestingly, a second shipwreck was observed very near the ADVENTURE site. About 50 feet southeast of the stern of the ADVENTURE are the remains of an 80-foot-long wooden schooner, laying along an east northeast axis, and laden with rough cut limestone blocks of irregular sizes. While this was at first believed to be part of the ADVENTURE wreck, its size and characteristics soon established that it was a separate but unidentified vessel. No attempt was made to document this wreck. Additional work on the second shipwreck in October 1998 revealed that it was the schooner W. R. HANNA, which sank in an October storm in 1886 (Labadie and Herdendorf 1999:5).

The remains of the steamer ADVENTURE are largely intact, although the fire that ended the ship’s career reduced her hull to the waterline, and only her framing and bottom features survive to the present time. The hull is entirely white oak, and most of her structural features are well preserved and solid, although there are clear indications of the fire that consumed the remainder of the ship. The iron fastenings are also well preserved, as are numerous machinery parts. The ship’s hull is characterized by a heavy oak backbone composed of several longitudinal keelsons, together with transverse ribs (frames), and longitudinal oak planking both inside and outside the frames (Figure 29). The keel of the ADVENTURE has been designated as Ohio State Archaeological Site #33ER481 (41°37.085’N, 82°40.867’W).

Framing. The backbone of the vessel is made up of four individual keelsons, each 9 x 9 inches in cross-section, with three fixed to the frames and a fourth “rider” keelson along the centerline on top. The outermost of the lower keelsons are reinforced by bands of 3½-inch iron 9 inches wide, running much the length of the hull, i.e. from position 53 on the baseline all the way forward to position 101. These reinforcing elements would have the effect of adding another oak keelson on each side (Inches 1962:32; Slyker 1958:11,12). The keel itself is far less significant than the keelsons. It is fixed to the underside of the frames, and it measures 9 inches in width and 5 inches in depth. The keelsons run from the sternpost all the way forward to the point where the forefoot and stem once connected, a length of 102 feet, although not all of the four individual members have survived intact.

The framing structure is intact from the engine bed near the stern (14 feet forward of the sternpost) to a point some 83 feet forward; only portions of the lower keelsons remain the remainder of the hull’s length.

The keel structure is pierced at mid-length by the trunk for a centerboard, which undoubtedly survived from the ship’s schooner days, although centerboards were also used in many steam barges. Centerboards were basically a feature required in sailing vessels. They were a form of adjustable keel, used to keep a ship on course when a beam wind tended to drive the bow sideways, especially when the ship was "light" and without cargo (Barkhausen: 1900:1-43; Cuthbertson 1931:235-237; Inches 1962-31; Wilson n.d.:40-42).

The centerboard was lowered through a slot in the ship’s keel, thus the opening or “trunk.” ADVENTURE’s centerboard trunk was 33 feet long, extending from the 52-foot mark on the baseline forward to the 85-foot point. The trunk originally would have stood at least eight feet high, reaching right up to deck level (Figure 30). Its opening was 4½ inches wide and 3½ feet long. The centerboard itself was pivoted on a pin at the forward end of the trunk and raised by means of a small winch on deck with a chain leading to the after end of the board. No evidence of the pivot-pin was found in the wreck, but a portion of the winch was located in the starboard side of the wreck abreast of baseline point 65. In the way of the centerboard trunk, the ship’s frames were strengthened by a third “futtock” extending outboard some four feet from the centerline, while the remainder of the ship’s frames were made up of only two futtocks. The highest points of the centerboard trunk are presently no more than three or four feet from the ship’s bottom due to fire damage and decades of erosion by water and ice.

The common method of fabricating ship’s frames in 19th century America was to build them up or laminate them, using overlapping sections or futtocks (Estep 1918:35-44; Greenhill and Manning 1988:103-109). Each of ADVENTURE’s bottom futtocks is 8 inches wide—made up of two, 4-inch-wide futtocks. The frames extend from rail to rail, right across the ship's
bottom, with the keelsons fixed to their upper surface and the keel underneath. They taper in their depth from 8 inches at the centerline to 6 inches at the bilge; although no frames have survived above the bilge-line, it is estimated that they would have been no more than 4 or 5 inches deep at deck level. The frames are spaced at 22-inch intervals, leaving 14 inches of space between adjacent frames. A frame spacing of 22 inches was typical in ships of the ADVENTURE’s era, although with their 8-inches width, her frames are somewhat lighter than average.

One element of the ship’s construction that is not entirely typical is the arrangement of the stern framing. Most wooden ships have “cant frames” at the ends, both forward and aft. These are half-frames which do not run continuously all the way across the hull of the ship, as do the frames in the midships portion of the hull, but instead they are fixed to either side of the stempost and the sternpost (Paesch 1890:14, appendix pl. 2). In the case of the ADVENTURE, the stern frames do run all the way across the hull, right through the “deadwood” at the sternpost. Instead of the more common tapering of the “run” into the sternpost, ADVENTURE’s hull is very full and round aft, with a flat underside and a projecting “keg” sternpost. Although this configuration has been observed in other wooden ships, it is not common. Interestingly, in at least one other case where this pattern was observed, the steam barge SIDNEY O. NEFF, the vessel had originally been built as a schooner (Jackson 1983:107-114), like the ADVENTURE. It is assumed that this unusual method of framing the stern had to do with its transformation from the original square transom design of schooners to the round overhanging stern typical of steam vessels.

The ship’s fastenings are typical of the period. Keelsons and frames are fastened together with 1-inch round iron “treenails.” Frames have their individual futlocks fixed together with 3/4-inch treenails. Planking is fastened with a combination of 7/8-inch square nails and 5/8-inch round treenails; in the thick strakes, “cleech rings” or “rove washers” are used on the treenails to make the fastenings doubly secure (Desmond 1919:58-61). Most of the fastenings in the

Figure 29. Reconstructed cross-section (above) of the ADVENTURE based on observations at the shipwreck site and reconstructed arrangement plan (below) showing the surviving features (darkened).

Figure 30. Photograph taken inside the hold of the 105-foot schooner ALVIN CLARK showing a prominent centerboard trunk extending from the keelsons up to the deck (C. P. Lohadle Collection). Built in 1846 at Truage, Michigan, this vessel had a centerboard trunk similar to the one found in the ADVENTURE wreck.
ADVENTURE wreck are solid and little deteriorated. Few loose fastenings were observed, while most wooden vessels that suffered similar fire damage are littered with them; it may be assumed that through the years divers have removed many loose treenails, bolts, and nails.

At the forward end of the wreck, the stem has been separated from the keelsons where it was once attached, and it lies flat on the lake bottom some 155 feet away, with its bottom oriented roughly to the north and its upper end to the west. The stem is built up of several oak timbers. It is 19 feet long and tapers from 24 inches depth at the bottom to 15 inches depth at its top. The stem is "arcuate" or bow-shaped, forming an arc of approximately 75°. The upper portions of the stem are much deteriorated, and it is suspected that it suffered fire damage. The ends of several planks are still attached to the rabbet (groove) on the underside of the stem.

Planking. Like all of her contemporaries, the ADVENTURE was double-planked. She had 5-inch oak planking both inside and out, securely fastened to each frame with iron "treenails" and spikes (Desmond 1959:56-61; Estep 1918:64-71). The planking was from 8 to 14 inches wide and up to 40 feet in length. On the inside of her hull, the ship also had 4-inch "thick stakes" to reinforce critical areas (Desmond 1919:63). Thick stakes were bands of three or four planks at the tur of the bilge and just under the deck beams at the ship's sides; these bands of heavier planking acted as trusses to contribute longitudinal stiffness to the hull.

Much of the exterior planking has survived as well as some of the interior "ceiling." A particular 60-square-foot area on the port side about 20 feet forward of the engine mount shows extensive fire damage. This is thought to have been the location of the coal-bunker, and it may have been the source of the fire that destroyed the ship.

Machinery. A very visible assembly at the stem of the ship is the engine bed with its adjoining shaft- log and sternpost. This structure is the most tangible remnant of the ship's power plant, which at one time consisted of a boiler, a single-cylinder reciprocating steam engine, crankshaft, tailshaft, propeller, and rudder, plus smaller engine-room auxiliaries (Figure 29). While the boiler is gone and the cylinder-head has been removed from the engine, numerous artifacts still remain in the wreckage, including broken castings, bent rods and eccentrics, piping, and the ship's 5-foot-long condenser. The rectangular engine bed is built up of thick 12-inch oak timbers tied securely into the ship's keelsons and frames at a point some 15 feet forward of the sternpost, measuring 41 inches in length and 51 inches in width. The cast iron engine frame is detached, but laying on the port side of the vessel about 15 feet forward of the engine bed. Eight 1 1/2-inch studs used to bolt down the engine are still standing in the engine bed, but the nuts are all gone, perhaps indicating an effort to salvage the engine.

The distinctive cast-iron flywheel measures 3 1/2 inches in thickness and 26 inches in diameter; it stands at the forward end of the engine bed, still fixed to the crankshaft (Figure 31). The crankshaft itself, with its associated journals, piston rods, and eccentrics lies intact in its bearings, although all of the connecting rods are twisted and broken off. The crankshaft measures 6 inches in diameter. The tailshaft is still coupled to the crankshaft; it too, measures 6 inches in diameter and 12 1/2 feet is length from the coupling to the point where it has been cut off flush with the stern bearing at the after end of the sternpost. The tailshaft runs through a 9 1/2-foot oak shafting of 15 x 15-inch cross-section. The ship's 5-foot diameter, four-bladed, cast-iron propeller wheel was removed by divers in the 1960s, and while it was not at the site during the 1997 investigations, it has since been restored to its original position. The propeller has fixed "buckets" or blades. It is not clear whether or not it was also salvaged from the steam barge HANDY BOY when her engine was removed. The ADVENTURE's rudder was not found, but the 1 1/2 inch thick iron rudder shoe is still fixed to the sternpost, with its trailing edge projecting 4 1/2 feet into the sand.

An interesting feature found in the ship's wreckage is a large iron casting believed to have been one of the support frames for a deck winch. This artifact was found on the starboard side of the wreck near the turn of the bilge, at the 66-foot position on the baseline. It is of heavy construction, roughly triangular in shape, and measuring 31 x 34 x 42 inches. The casting has numerous holes for bolts and shafts. The winch may have been used for mooring lines and for lowering and raising the ship's centerboard. A second large artifact associated with the wreck is the cylindrical condenser, which was observed laying near various engine parts on the port side at the 30-foot position on the baseline. This apparatus captured the steam exhaust from the engine and turned it back into water by cooling it. The water was then recycled back into the ship's boiler.

The condenser consists of a riveted-steel drum with steam piping coiled inside. The drum measures 18 inches in diameter and 60 inches in length. A third large artifact is the lower portion of the ship's main engine, which consists of a four-legged, cast-iron pedestal. This feature lays on the port side opposite the 40-foot position on the baseline, just forward of the condenser. It measures 42 inches in height and has an upper surface 2 inches thick and 32 inches square. The cylinder would have been fixed to this surface.

INTERPRETATION OF CARGO

In addition to the high quality of the stone, economical water transportation has been noted as a prime factor in the growth of Kelleys Island into the largest limestone producing center in Ohio and the lower Great Lakes region in the turn of the century (Orton and Peppel 1906:212). At that time Ohio limestone was sold by weight and a ton of dimension stone was marketed between $1.00 and $2.00 a ton, whereas lump lime in barrels ranged from $5.50 to $6.00 per ton. In 1905 the cost of barrels ready to fill was about $0.21 each. Barrels of "ordinary size" were used—15 to 16 1/2-inch heads and 28 1/2-inch staves. An empty barrel weighed 15 to 16 pounds and could hold 185 pounds net of lump lime or nearly 400 pounds of ground lime. The cost of producing a barrel of lump lime from quarry to loaded aboard a vessel was $0.46, which included: quarrying and transport to kiln $0.05, fuel $0.07, labor $0.09, fixed costs $0.04, and barrel $0.21. In 1905 the F.O.B. Socksie sales price was about $0.56 per barrel (Orton and Peppel 1906:232).

The net tonnage of the ADVENTURE following her 1897 reconfiguration was 95.37 (equivalent to 9,537 cubic feet), which yields an estimated cargo weight capacity of about 170 tons. The ship's final cargo was reported as lime, most probably packed in wooden barrels (Figures 32 and 33). Small accumulations of a grayish-white slurry were found in the ship's hull adjacent to the keel and...
approximately 20 feet forward of the engine bed. Samples were obtained from the site, and after drying, this material effervesced freely when drops of dilute hydrochloric acid were applied, suggesting that the samples represented the remnants of a lime cargo, perhaps the residue of numerous cargoes carried by the steamer. The hydrated lime deposits were found adjacent to the keelsoins on the starboard side of the ship, but no evidence of barrels was noted, such as staves, iron hoops, or flat ends.

The precise size and capacity of the barrels produced at the KIL&T Co. cooperage has not yet been determined because physical evidence is lacking. However, some approximations can be given based on published material and period illustrations. Heisler (1941:533) gives the weight of a barrel of dry cement (mixture of calcined limestone and clay) as 376 pounds. Using the density of bulk quicklime (55 pounds per cubic foot), such a barrel would have a volume of 6.8 cubic feet or approximately 51 gallons (Eisbach 1952:146). Considering a 170-ton cargo capacity for the ADVENTURE, which equates to about 340,000 pounds, she could carry about 900 barrels. Volumetrically, allowing for a 20% loss of space for packing cylindrical barrels (Leeming 1942:431), a 900-barrel cargo would occupy 7,340 cubic feet or about 77% of the available 9,537 cubic feet of cargo space.

REPLACEMENT OF PROPELLER

The 1,600-pound propeller of the ADVENTURE was salvaged by the Poseidon Diving Club of Newark, Ohio in 1964. Divers from the club spent several weekends cutting the shaft by hand with hacksaws. The massive cast-iron propeller had four blades and measured five feet in diameter. For many years the propeller was displayed at the Newark YMCA as a trophy, welded to a flagpole. In 1992, the flagpole was dismantled and the propeller was relegated to a scrap pile behind the city maintenance garage in nearby Heath, Ohio. Detective work by workshop students Greg and Lynda Myers led to the recovery and eventual return of the propeller to the ADVENTURE shipwreck site in North Bay (Figures 34 and 35).

With the cooperation of the Poseidon Diving Club and the City of Heath Street Department, the propeller was released to the workshop project, loaded on a trailer, and transported to Lakeside, Ohio on October 17, 1997. The following day the propeller was suspended from an A-frame mounted on the 45-foot-long salvage vessel CHARLOTTE MARIE (operated by Neil Shrock Towing and Salvage, Inc.) and escorted to North Bay of Kelleys Island by the rescue boat DIVE 1 of the Lakeside Fire Department. Arrangements for this phase of the replacement effort, including the donation of vessel and personnel time, was coordinated by workshop student Fred Rhoda.

At the shipwreck site, divers from the fire department, workshop participants, and instructor Joyce Hayward positioned the stern of the CHARLOTTE MARIE over the stern of the ADVENTURE and the propeller was slowly lowered to its approximate original position (one of the propeller’s four blades had been lost during its period in the Newark area, but students learned of its possible location and plan to replace it on the shipwreck). This marks the first time a major artifact has been replaced on a shipwreck in the Ohio waters of Lake Erie and hopefully it is an action that will encourage divers to preserve Ohio’s underwater heritage and perhaps return other artifacts to their original location on wreck sites.
Figure 35. Cast-iron propeller being replaced on wreck of the steamer ADVENTURE after being missing for 33 years (photo by Rick C. Herrendorf).

CONCLUSIONS

The ADVENTURE was one of dozens of steam and sailing vessels that serviced the limestone industry of Kelleys Island in the late 1800s and early 1900s. Although the ADVENTURE was among the smaller vessels calling at the island, she was capable of carrying a cargo of 900 barrels of burnt lime. However, the only known record of the ADVENTURE taking on a cargo at Kelleys Island is the day she caught fire at the lime kiln dock and sank in North Bay. The sinking took place in the midst of peak lime production on the island, a period when KIL&T Co. was one of the leading crushed limestone and lime producers in the world. Perhaps the high demand for lime products in 1903 was the reason the ADVENTURE was pressed into service to augment the vessels operated by KIL&T Co.

Archaeological investigations of the shipwreck site have provided a likely answer to the question of the fire's origin. Contemporary newspaper accounts mention both flames from the boiler and wetting of the lime as possible causes of the tragic fire. Because a large area on the port side of the vessel, forward of the engine bed, shows extensive fire damage the first possibility is most likely. The fire-damaged area is thought to have been the location of the coal-bunker, therefore the bunker may have been the source of the fire that destroyed the ADVENTURE, and not wetted lime.

A number of research questions remain unanswered after the field investigations and data analysis, one of the most baffling being the fate of the 900 barrels of lime that were thought to be on board at the time of the sinking. Contemporary newspaper articles report that the vessel was fully loaded with a lime cargo and that the entire cargo was lost in the fire and subsequent sinking. Yet no evidence of any barrels, particularly their metal hoops, was found on the site. Open questions like these can only be answered by further documentation of the site and surrounding areas. Given proper training and supervision, recreational divers can undertake projects, such as the ADVENTURE documentation, that can contribute significantly to our knowledge of maritime culture, and at the same time be enjoyable and rewarding for the divers.

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ABOUT THE AUTHORS

C. PATRICK LABADIE
Mr. Labadie is historian and exhibit coordinator at the Thunder Bay National Marine Sanctuary in Alpena, Michigan. He is the former Director of the U.S. Army Corps of Engineers' Lake Superior Visitors Center (formerly the Canal Park Marine Museum) in Duluth, Minnesota, a position he held from 1973 to 2000. He is well known in the Great Lakes region as a maritime historian and for his special interest in 19th century wooden shipbuilding technology. Mr. Labadie started his maritime career in 1960 as exhibits preparator and assistant to the Curator at the Dossin Great Lakes Museum in Detroit, Michigan. In 1968, he was appointed Director of the Saugatuck Marine Museum which is housed on board the retired passenger steamer KEEWATIN in Douglas, Michigan. Mr. Labadie has served as a consultant on submerged cultural resources and maritime history to numerous organizations, including the Great Lakes Historical Society, U.S. National Park Service, Minnesota Historical Society, Illinois Historic Preservation Agency, State Historical Society of Wisconsin, Michigan Department of Historic Preservation, and Tidewater Atlantic Research. Mr. Labadie is an active member of the Association for Great Lakes Maritime History and lectures widely on maritime topics.

CHARLES E. HERDENDORF
Dr. Herdendorf is Professor Emeritus of Geological Sciences and Zoology at The Ohio State University. He started his Great Lakes career as a geologist with the Lake Erie Section of the Ohio Geological Survey in 1960, then joined the faculty of The Ohio State University in 1971 where he was the founding director of the Center for Lake Erie Area Research (CLEAR) and the Ohio Sea Grant College Program; from 1973 to 1988 he also directed the Franz Theodore Stone Laboratory, Ohio's biological field station on Lake Erise at Put-in-Bay. Dr. Herdendorf is a certified geologist, fisheries scientist, and underwater archaeologist; he served as science coordinator of the SS CENTRAL AMERICA Project, a 5-year expedition to explore the 1857 shipwreck of a gold-rich steamship that sank in a hurricane nearly 200 miles off the Carolina coast, in water 8,000 feet deep! He teaches courses in oceanography, marine biology and geology, Great Lakes studies, and nautical archaeology. He currently serves as trustee of the Great Lakes Historical Society and coordinator of its Peachment Lake Erie Shipwreck Research Center in Vermilion, Ohio. He also operates a Great Lakes and oceanographic consulting firm, EcoSphere Associates, located at Garfield Farms in Sheffield Village, Ohio.

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APPENDIX

CHRONOLOGY OF MERCHANT VESSEL ADVENTURE

1875
United States Enrollment
October 1, 1875: Detroit, Michigan. Vessel enrolled as a schooner with one deck and two masts, plain head and a square stern. Built in 1875 at Detroit by John Oades, master builder. Dimensions: 104.0 x 24.0 x 8.0 feet, 148.97 gross tons (139.86 below decks and 9.11 trunk cabin) Owned by John Oades of Detroit (1/4) and Walter H. Oades of Detroit (1/4); Geo. H. Collins, master Official number (US) 105567

1876
Board of Lake Underwriters
New Tonnage 149
Where Built Detroit, Michigan
By Whom J. Oades
When Sept. 1875
Owners J. Oades
Port of Hail Detroit, Michigan
Value $8,000
Class A2

1877
List of Merchant Vessels of the United States
Y/E June 30, 1877, Merchant Sailing Vessels of the United States, &c.
Official No. 105567
Rig. Sch. [Schooner]
Dimensions 104.0 length, 24.0 breadth, 8.0 depth
Tonnage 148.97 gross, 141.53 Net
When built 1875
Where built Detroit, Michigan
Home port Detroit, Michigan

1878
United States Enrollment
April 2, 1878: Detroit, Michigan. Change owners to Edward Cunningham of Detroit (1/2) and F. B. Wallace of Detroit (1/2); Edward Cunningham, master

1879

1880

1881

1882

1883

1884
Inland Lloyds Vessel Register—SCHOONERS
[Date 1884- not listed]
New Tonnage 149
Where Built Detroit, Michigan
By Whom J. Oades
When 1875
Owners Cunningham et al.
Port of Hail Detroit, Michigan
Value $5,000
Class A2

1885
United States Enrollment
April 13, 1886; Detroit, Michigan. Change owners to Edward Cunningham of Detroit, Michigan (1/4), F. B. Wallace of Detroit (1/2), and J. E. Wallace of Chicago, Illinois (1/4); Edward Cunningham, master

List of Merchant Vessels of the United States
Y/E June 30, 1886, Merchant Sailing Vessels of the United States
Official No. 105567
Rig. Sch. [Schooner]
Dimensions 104.0 length, 24.0 breadth, 8.0 depth
Tonnage 148.97 gross, 141.53 Net
When built 1875
Where built Detroit, Michigan
Home port Detroit, Michigan

1887

1888
Twentieth Annual List of Merchant Vessels of the United States
Y/E June 30, 1898, Merchant Sailing Vessels of the United States
Official No. 105567
Rig. Sch. [Schooner]
Gross tonnage 148.97
Net Tonnage 141.53
Length 104.0
Breadth 24.0
Depth 8.0
When built 1875
Where built Detroit, Michigan
Home port Detroit, Michigan
1894 United States Enrollment
May 25, 1894; Cleveland, Ohio. Change owners to H. C. Case of Sheffield, Ohio (1/4) and J. H. Padley of Sheffield (1/2); H. C. Case, master.
Tonnage: 148.97 gross tons and 141.53 net tons.

1895 United States Enrollment
April 11, 1895; Cleveland, Ohio. Change owners to J. H. Padley of Sheffield, Ohio (3/4), and J. M. Robinson of Lorain, Ohio (1/4); J. M. Robinson, master.

Twenty-Seventh Annual List of Merchant Vessels of the United States
Y/E June 30, 1895, Merchant Sailing Vessels of the United States.

| Official No. | 105567 |
| Rig. | Sch. [Schooner] |
| Gross tonnage | 148.97 |
| Net Tonnage | 141.53 |
| Length | 104.0 |
| Breadth | 24.0 |
| Depth | 8.0 |

When built 1875
Where built Detroit, Michigan
Home port Cleveland, Ohio.

1896
United States Enrollment
February 4, 1896; Cleveland, Ohio. Change owners to J. M. Robinson of Lorain, Ohio; J. M. Robinson, master.

Sandusky, Ohio Newspaper (Winter 1896):
(Percol, personal communication, Gordon Wending, January 26, 1998)

Newspaper reported that conversion of ADVENTURE to a screw steam was planned by the owners for the Spring of 1897 in Sandusky, Ohio. David Dewasatt, who operated shipyards at the Baltimore & Ohio Railroad dock (foot of Warren Street) and at the foot of Meigs Street in Sandusky, was mentioned as the probable shipbuilder to do the conversion work. The conversion was to take place after partial ownership of the vessel was transferred to the Grosh Coal Company of 505 Water Street, Sandusky, Ohio, Frederick Grosh, president. The steam engine was to come from the tug FANDY BOY and the boiler from the tug MYRTLE of Sandusky.

1897
United States Enrollment
April 20, 1897; Sandusky, Ohio. Vessel rebuilt at Sandusky in 1897 as a screw steamer with one deck and two masts, plais head and a round stern; H. D. Root, master carpenter.
Dimensions: 108.0 x 24.0 x 8.3 feet, 141.72 gross tons and 95.37 net tons.
Owner: J. M. Robinson of Lorain, Ohio (1/2), and Frederick Grosh of Sandusky, Ohio (1/2); J. M. Robinson, master.

Milwaukee, Wisconsin Newspaper (May 3, 1897):
"During the past winter the schooner ADVENTURE was transformed into a steamer at Sandusky."

United States Enrollment
May 26, 1897; Cleveland, Ohio. Permanent document, vessel having arrived at her home port: A. C. Moss of Sandusky, Ohio (2/4), J. M. Robinson of Lorain, Ohio (1/4), and Frederick Grosh of Sandusky (1/4); S. J. Batman, master.

1899

1900

Inland Lloyds Vessel Register—SCHOONERS
Net Tonnage 142
Built of Wood
When Built Detroit, Michigan
Owner Cunningham et al.
Port of Sail Detroit, Michigan
Value $1,500
Class A2/2

Inland Lloyds Vessel Register—SHEER WHEEL STEAMERS/PROPULSERS
Supplement No. 2, June 1, 1897
Net Tonnage 95
Built of Wood
Gross Tons 141
When Built Detroit, Michigan
Owner Robinson et al.
Port of Sail Sandusky, Ohio
Value $6,000
Class A2
Remarks Nee. Sch. [Schooner]

1898

United States Enrollment
June 8, 1898; Sandusky, Ohio. Change owners to Frederick Grosh of Sandusky; Frederick Grosh, master.

Inland Lloyds Vessel Register—SHEER WHEEL STEAMERS/PROPULSERS
Net Tonnage 95
Built of W
When Built Detroit, Michigan
Owner Robinson et al.
Port of Sail Sandusky, Ohio
Value $5,000
Class A2/2
Remarks Nee. Sch. [Schooner]
Cleveland Plain Dealer (October 8, 1903)

"BOAT AND CARGO A TOTAL LOSS. Steamer ADVENTURE Destroyed by Fire at Kelleys Island.

All Members of the Crew Rescued KELLEY'S ISLAND, O., Oct. 7 — The steamer ADVENTURE loaded with lime caught fire at 4 o'clock this afternoon while lying at the north dock. The tug L. P. SMITH towed the steamer away from the dock into shoal water. The steamer and cargo are a total loss. The prompt action of Capt. John Lowes in getting a line to the burning steamer and towing her out saved the schooner ANDERSON which was lying at the dock from burning also. The ADVENTURE was owned by Bayschlag Schlinkert and Lowes of St. Clair. She was commanded by Capt. John Lowes who had his wife and little daughter on board. All including the members of the crew were rescued. The fire was first discovered just forward of the boiler in the hold."

Port Huron Daily Times (Thursday, October 8, 1903)

"The steamer ADVENTURE caught fire while lying at the dock at Kelley's Is. on Wednesday afternoon with her cargo of lime and was totally destroyed. The fire originated near the boiler, when it was seen that the steamer could not be saved, she was taken in tow by the tug SMITH and pulled away from the dock in order to save the schooner ANDERSON which was lying dangerously near the burning craft. The ADVENTURE was owned by Bayschlag, Schlinkert and Lowes of St. Clair."

Sandusky Daily Register (Thursday, October 8, 1903)

"ADVENTURE TOTAL LOSS. Steamer Burns at Kelley’s Island.

Took Fire While Lying at Docks — Whole Crew Saved. The steamer ADVENTURE, loaded with lime, took fire at Kelley's Island at 4 o'clock Wednesday afternoon while lying at the north dock, and burned to the water's edge. Both cargo and vessel are a total loss, with no insurance. The tug SMITH toved the burning steamer into the lake, thus saving the schooner ANDERSON and the dock from burning also. Captain John Lowes was in command of the ADVENTURE. He had his wife and little daughter on board, but they, with the rest of the crew, were saved. It is not known how the fire originated. It was discovered in the hold just forward of the boiler, and spread so rapidly that the sailors were glad to escape with their lives. The burned steamer was 108 feet long, 24 feet beam and 8 feet deep. She was built in 1875. The ADVENTURE was in port a day or two ago and discharged a cargo of salt at the Big Four docks. The vessel was formerly owned in Sandusky."

Sandusky Evening Star (Thursday, October 8, 1903)

"STEAMER BURNED: Total Loss of the ADVENTURE at Kelley HAD NARROW ESCAPE. Captain and His Wife and Child Barely Reached Dock — Vessel is Towed to Shoal Water. The steamer ADVENTURE, owned by Charles Bayschlag of St. Clair Mich., and whose master was Capt. John Lowes, was burned to the water's edge at Kelley Island about 4 o'clock Wednesday afternoon. The boat was loaded with lime, and was at the north dock. It is reported that the lime became wet and was set afire, but this report is not confirmed. The steamer and cargo are a total loss, and Captain Lowes, his wife and little daughter had narrow escapes from death.

The tug L. P. SMITH, towed the burning vessel into shoal water and thus saved the schooner ANDERSON from being set afire. The crew managed to escape, but most of their belongings were destroyed. The ADVENTURE was formerly owned by Fred Grech, of this city, but he sold her about a year and a half ago. She is 108 feet long, has a 24 foot beam and is 8 feet deep. She was built in 1875."

United States Enrollment

October 12, 1903; Port Huron, Michigan. Documents surrendered: burned; total loss at Kelleys Isl., Lake Erie, Oct. 7, 1903

1904 Beeson's List of American Steam Vessels of the Lakes Vessels Lost During Season of 1903 Propeller ADVENTURE, 141 tons, burned at Kelley's Island, Lake Erie, October 7th. Value of vessel, $2,500, cargo $1,500.

Nautical Archaeology Workshop participants practicing mapping techniques.
Locations of shipwrecks and wrecking events in the eastern portion of the islands region of western Lake Erie, showing boundary of Kelleys Island Port Authority (base map from chart no. 14664, National Ocean Service, NOAA; illustration prepared by Charles E. Hedendorf).