



Beneath the Surface: Maritime Cultural Landscapes at Wisconsin Shipwreck Coast National Marine Sanctuary

Part II: Commercial Fisheries Maritime Cultural Landscape Approach, Historical Overview, and Resources



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Cover photo: Historic image of commercial vessels on the Manitowoc River. Photo: Wisconsin Maritime Museum Collection

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Abstract

The maritime cultural landscape (MCL) approach, as an analytical tool, provides a comprehensive framework for better identifying, understanding, and interpreting the variety and significance of archaeological, cultural, and historical resources in marine protected areas. This approach was first defined in 1992 by Christer Westerdahl, and since then has been adopted and advanced by management agencies such as the National Park Service, Bureau of Ocean Energy Management, and NOAA’s Office of National Marine Sanctuaries (ONMS). The National Marine Sanctuary System’s adaptation of MCL as a tool for management has focused on meeting resource information needs for the inventory of historic properties, as well as for site condition reports and management plans. More broadly, the approach must also consider the cognitive landscape, how places are perceived, valued, and connected to individuals and communities, which is essential to resource conservation and heritage preservation efforts. The MCL initiative was prioritized in the ONMS strategic plan for FY2017–2022: “Improve understanding and management of heritage resources by completing maritime cultural landscape-focused surveys in at least four sites.”

The Great Lakes are a vast natural highway, essential to Indigenous communities prior to European contact and utilized by Euro-Americans for hundreds of years as one of the world’s most significant industrial waterways. Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS) protects a nationally significant collection of historic shipwrecks, resources central to understanding the many cultural and historical connections between Great Lakes communities and the sanctuary’s location. These wrecks and the shoreline landscape itself preserve the personal stories of entrepreneurship, innovation, tenacity, and hardship of the past. This MCL assessment was designed to provide a scholarly, comprehensive site characterization, a baseline of useful cultural landscape information closely following designation of the new site. This report, Part II of a two-part series, implements the MCL approach in greater detail for the maritime landscape of fisheries, a common “biophysical pillar” of both the Indigenous and Atlantic cultural landscapes and pasts. The MCL understanding of this history reveals, at every turn, the dynamic interactions between individuals, communities, and their environments within WSCNMS.

Key Words

Great Lakes commercial fishing, cultural landscapes, maritime history, maritime archaeology, Great Lakes.

Chapter 1: Introduction

This report details the second part of a project aimed at applying a maritime cultural landscape (MCL) approach to study known and potential MCLs or landscape themes associated with Wisconsin Shipwreck Coast National Marine Sanctuary (WSCNMS). This portion of the study details mainly the MCL thematic history of commercial and Indigenous fisheries relevant to WSCNMS. The region's long history of fishing provides examples of and reveals, in many ways, the changing interactions between humans and marine and Great Lakes environments. Notably, the MCL approach emphasizes not just the species populations, or solely the evolution of fishing technology and changing catch data, but the cultural importance of fishing to individuals and communities over time.

Fish are one of the three biophysical pillars of the WSCNMS Indigenous and Atlantic MCLs. An in-depth historical analysis of fish and fisheries provides a powerful lens for observing ecological continuity and change in the sanctuary. Fish are the most economically and culturally important of the sanctuary's ecological resources. In 2022, as it was two centuries ago, most of the boats entering sanctuary waters are likely engaged in fishing. Although often reduced to discrete and often oppositional categories of commercial and recreational, all fishing is a human activity with multiple layers of meaning and values: economic, subsistence, cultural, and leisure (values discussed in the first report in this series [Jensen et al., 2023]). Commercial fishers sell fish caught within sanctuary boundaries to a consumer market. Charter fishing companies provide recreational fishers access to fish in sanctuary waters as a commodity. The purchase of goods and services by charter and private recreational fishers contribute millions of dollars to the sanctuary region's economy.

Despite differences, commercial and recreational fishing figure prominently in living family traditions and historical memory of sanctuary region residents and visitors. The nearly 200-year, uninterrupted history of commercial fishing provides a powerful lens to examine the interactions of people and ecosystems shaping the sanctuary's historic and contemporary Indigenous and Atlantic MCLs. This document provides historical overviews and resources that help place the sanctuary's commercial fishing history into local, state, regional, and national contexts. Although incomplete, the highly detailed and multi-layered local historical coverage illustrates many connections between fish, commercial fishing, forests, maritime businesses, social identity, and other known and potential sanctuary MCL themes. This document serves as a resource and reference for future sanctuary research, education, and public outreach.

At the time of American settlement, the Indigenous and Euro-American people living along Lake Michigan's coast particularly valued lake trout, yellow perch, sturgeon, and lake whitefish. These abundant, easily harvested, readily preserved, nutritious, and tasty species were staples in Indigenous and early settler diets. American settlement, however, attracted individuals and families knowledgeable in commercial harvest and sale of fish. For these people, fish were not simply something to eat in an otherwise protein-scarce coastal frontier, they were natural resources to be harvested, processed, transported, and sold as commodities in local and distant markets.

From the nineteenth to the twenty-first century, Lake Michigan's commercial fisheries helped shape the sanctuary's modern shoreline and ecosystems, as well as the cultural and economic history and character of its coastal communities. Abundant fish and expanding markets fostered an Atlantic-style commercial fishing industry that strongly influenced the history, culture, and maritime character of Two Rivers, Manitowoc, Sheboygan, and Port Washington, as well as outlying coastal villages. After World War II, recreational fishing emerged as a popular leisure activity, economic generator, and political force across the Great Lakes region.

Chapter 2: Great Lakes Fisheries History Scholarship

Historians, environmental scientists, and anthropologists have developed a rich body of scholarship surrounding the development of the Great Lakes commercial fishing industry. Some of the earliest examinations of the region's commercial fishing practices come from the United States Commission of Fish and Fisheries, first established in 1871 and later renamed the United States Fish Commission. James W. Milner's 1874 *Report of the Fisheries of the Great Lakes: The Results of Inquiries Prosecuted in 1871 and 1872* and the 1890 *Review of the Fisheries of the Great Lakes in 1885*, composed by Dr. Hugh M. Smith and Merwin-Marine Snell, document the contemporary conditions of the Great Lakes fisheries, identifying the vessels, gear, and manpower employed within the harvesting process while also considering the local, regional, and national economic significance of the industry (Milner, 1874; Smith & Snell, 1890). In 1926, U.S. Bureau of Fisheries aquatic biologist Dr. Walter Koelz prepared the report *Fishing Industry of the Great Lakes*, in which he examined ecological and biological aspects of Great Lakes fisheries. Within the report, Koelz presents statistical data, empirical observations, and oral interviews, identifying critical systemic relationships between human behavior and the health of the region's fisheries (Koelz, 1926).

Mid- to late twentieth-century authors such as Margaret Beattie Bogue, Trygvie Jensen, John Hudson, Susy Ziegler, and Kent Lacombe outline the development of commercial lake fisheries within the context of state- and national-level economics, technology, politics, and public policy from early colonial times to the mid-twentieth century. Employing fisheries catch statistics, contemporary government reports, and ethnographic studies, the authors' works examine the complex relationship between human exploitation of the region's fisheries resources and the degradation of the physical Great Lakes environment (Bogue, 2000; Hudson & Ziegler, 2014; Jensen, 2007; Lacombe, 2015).

Additional scholarship focuses on the materiality and physical construction of Great Lakes fishing communities. Utilizing an anthropological maritime landscape approach, Michael Chiarappa (2005) traces the evolution of Great Lakes fisheries through the development of vernacular architecture and technology, considering how settlement locations and arrangements changed over time in relation to the industrialization of commercial fishing. Other authors such as Howard Chappelle, Owen Cecil, and John Ratcliffe have contributed cultural and technical analyses of early Great Lakes fishing sailboats, considering vessel designs, construction, and use (Cecil, 2001; Chappelle, 1951; Ratcliffe, 2009). Little scholarship exists regarding the physical construction of gillnet fish tugs. While the works of Bogue and Jensen consider the development of fish tugs within the economic and social context of the developing commercial fishing industry, Janet Gilmore's brief article "Fish Tugs" in *The American Midwest: An Interpretive Encyclopedia* provides perhaps the only existing technical analysis of the traditional gillnet and trap-net design. The most detailed discussion of nineteenth century Great Lakes fishing technologies is J.W. Hall's *Fisheries of the Great Lakes in 1885*, published in the 1887 report of the Commissioner of Fish and Fisheries (Bogue, 2000; Gilmore, 2007; Jensen, 2007; Hall, 1887).

Scholarship concerning Indigenous peoples and Great Lakes commercial fishing remains quite limited. Drawing from ethnographic sources collected during the early contact period, Michael Chiarappa's work briefly considers the influences of Indigenous fish camp arrangements and harvesting technology on nineteenth-century Euro-American settlement patterns and fishing practices (Chiarappa, 2005). Frances Densmore's *Chippewa Customs* provides extensive examination of Chippewa tribal fishing practices and technology throughout the Great Lakes region obtained through ethnographic studies and oral interviews (Densmore, 1929). Perhaps the most comprehensive analysis of Indigenous North American fishing technology may be found in Erhard Rostlund's *Freshwater Fish and Fishing in Native North America* (Rostlund, 1952). However, the author's discussion surrounding technology used specifically within the Great Lakes region is general and limited. Archaeologist Charles Cleland argues that scholars have overlooked Indigenous fishing and fishers "because of a cultural predisposition to cast these fishermen in the roles of warriors, hunters, and fur traders" (Cleland, 1982). Complex legal and public conflicts over Indigenous fishing and treaty rights are essential elements in Wisconsin fisheries history (Hudson & Ziegler, 2014; Wrone, 1993; Loew & Thannum, 2011).

Chapter 3: Development of the Commercial Fishing Industry

At the time French explorers, traders, and missionaries arrived in the seventeenth century, numerous Indigenous tribes inhabited Lake Michigan's shoreline, relying on a variety of seasonal subsistence strategies including hunting, fishing, gathering, and seasonal agriculture. Indigenous communities near Beaver Island, such as the Menominee, Ho-Chunk, Ojibwe, and Potawatomi, gathered in groups of up to 200 persons to form seasonal fishing villages, harvesting whitefish, lake trout, sturgeon, and pike (Anthony, 2009). Through intergenerational transmission of cultural traditions and traditional ecological knowledge, Indigenous fishers employed a variety of sustainable netting, trapping, spearfishing, and angling methods to procure fish for both food and inter-tribal trade (Bogue, 2000; Cleland, 1982).

Indigenous Fishing

Gill nets are among the most productive of the Indigenous fishing methods. Weighted with rocks and suspended with wooden floats, gill nets hang like a curtain in the water column. Multifunctional gill nets could be fished from shore, through ice in the winter months, or offshore from watercraft such as birchbark and dugout canoes (Bogue, 2000; Cleland, 1982). Constructed from locally sourced materials like nettle, basswood, and hemp, hand-woven gill nets provided both efficiency and versatility, enabling fishers to harvest a variety of species in large volumes and in any depth of water (Bogue, 2000; Cleland, 1982; Sadler, 2022). The dimensions of the woven squares, or mesh, determined the size of fish that would become entangled, or gilled, as they swam through the net (McCullough, 1989). French explorer Henri Joutel described the use of gillnets by Indigenous peoples in Mackinac in 1687:

They go as far as a league out into the lake to spread their nets, and to enable them to find them again they leave marks, namely, certain pieces of cedar wood which they call aquantiquants, which serve the same purpose as buoys or anchors. They have nets as long as two hundred fathoms, and about two feet deep. At the lower part of these nets they fasten stones, to make them go to the bottom; and on the upper part they put pieces of cedar wood which the French people who were then at this place called floats. Such nets are spread in the water, like snares among crops, the fish being caught as they pass, like partridges and quails in snares (Kinietz, 1965).

Tribal fishers also commonly used seine nets. Like the gill net, the seine net was constructed of natural twine, but with smaller mesh. The seine hung vertically in the water, with the top of the net suspended by wooden floats such as canoe paddles or cedar wood, and the bottom weighted with stones. Typically used near the shore, harvesters used the seine nets to encircle groups of fish (Densmore, 1929; Knoerl, 2020). Weirs and traps were also used along tributaries to harvest spawning migrations of fish.

Indigenous peoples established seasonal and permanent villages along the shores and tributaries of the Great Lakes. The region's smaller lakes and rivers served as highways, providing transportation to and from Indigenous trading and fishing grounds (Quimby, 1966).

Chiarappa (2005) describes the architecture of the fishing villages to include round or oval wigwams, constructed of flexible wooden poles driven into the ground and covered with birchbark or rush matting, as well as A-frame, rectangular structures and “tentlike structures with roofs but open sides.” In addition to wooden poles erected around the camp for the weaving, drying, and mending of gill nets and seines, communities also constructed smoking and drying racks to process their catch.

Quimby (1966) argued that safe canoe landing and launch sites constituted “the most important single criterion of locality” for the development of a fishing village along the shoreline of Lake Michigan. Birchbark canoes, constructed of cedar or spruce frames and sheets of white birch bark sewn together with spruce or white pine roots and sealed with tree pitch, carried fishermen, hunters, warriors, and goods throughout the region’s inland water routes. According to Wayne Valliere, an Ojibwe birchbark canoe maker and educator of the Fond du Lac band of Lake Superior Chippewa, Ojibwe families often stored their canoes over the winter season by lining the vessels with clay and stones and intentionally sinking the craft in the lakes in effort to maintain the bark’s hydration and pliability. With the onset of spring and disappearance of lake ice, families recovered their canoes for the upcoming season (Spoonradvocate, 2012). Ojibwe and other Anishinaabeg people of the Great Lakes employed the double-ended vessels in shallow rivers and nearshore waters to set and tend gill nets, spear fish, and harvest wild rice. Indigenous mariners easily dragged the vessels onshore or carried the craft across portages when necessary (Spoonradvocate, 2012). In areas where birch was unavailable, tribes constructed canoes from hickory and elm bark. The heavier and more durable wooden dugout canoe was also used throughout the Great Lakes, most commonly in areas with no access to appropriate bark (Knoerl, 2020).

From Canoe to Mackinaw Boat

As commercial fishing developed on Lake Michigan, fishers embraced the Mackinaw boat, which combined flat bottom double-ended Indigenous designs with Atlantic construction methods (Peters, 2015). Mackinaw boat design and construction varied by region and echoed the architectural features of Norwegian faerings, French-Canadian bateaus, and the Drontheim boats of Northern Ireland (Jensen, 2007; Peters, 2015; Ratcliffe, 2009). For example, the Mackinaw boats of Lake Michigan were typically 18- to 26-foot-long, double-ended schooners constructed with carvel planking and a raked stern (Jensen, 2007; Ratcliffe, 2009). However, the Mackinaws used in Lake Superior were generally about 30 feet long, double ended, with clinker planking and a gaff schooner rig, while those of northern Lake Huron were generally 28 to 30 feet long and carvel built with a gaff schooner rig (McCullough, 1989). By the 1830s, the “Mackinaw” term was generally used to describe all round-bottomed, double-ended sailing craft (Swanson, 1982).

Fishers favored Mackinaw boats for their practical design and seaworthiness (Peters, 2015; Ratcliffe, 2009). In his report on the Great Lakes fisheries, Milner (1874) characterized the Mackinaw boat as “fast, the greatest surf boat known, and with an experienced boatman will ride out any storm, or, if necessary, beach with greater safety than any other boat.” Powered by sails and rowing oars, Mackinaw boats enabled fishers to fish further offshore, despite unpredictable weather (McCullough, 1989; Ratcliffe, 2009). Functional and easily fished with a

crew of two or three, the Mackinaw boat served as a precursor to the wooden gillnet fish tug (McCullough, 1989; Jensen, 2007).

The Rise of Commercial Fishing in Wisconsin

The introduction of steamboats in the early 1800s and completion of canal systems, including the Erie Canal (1825), Ohio Canal (1832), and Welland Canal (1833), connected fishers and merchants with new market opportunities on the East Coast and in Canada (Alexander, 2009). In the 1830s, the American Fur Company entered commercial fishing; their first station was on Isle Royale, and fishing operations were later established at the Apostle Islands in Wisconsin, Grand Marais in Minnesota, and the Montreal River and L'Anse in Michigan. In 1839, the company employed 33 Indigenous and French fishers and produced 5,000 barrels of salted fish (Rakestraw, 1968).

With limited access to larger markets and limited local demand, Wisconsin's commercial fishing industry developed relatively slowly during the territorial period (Bogue, 2000). The mid-1840s brought statehood in 1846, rapid population growth, and increased supply and demand for Wisconsin fish (FamilySearch, 2022a, 2022b; Bogue, 2000). In 1850, the U.S. Census recorded more than 40 men living at Two Rivers who listed "fisherman" as their occupation. Statehood coincided with a prolonged period of economic expansion across the region.

Aggressive Entrepreneurship and Expanding Fisheries

The late 1850s marked a rise in the Great Lakes commercial fishing industry, fueled by what environmental historian Margaret Beatie Bogue (2000) describes as "aggressive entrepreneurship." Fishers embraced a strategy of maximum harvest, increasing their efficiency by tying nets together to create "gangs" that could be set and retrieved as one net. Some gangs reached up to 4 to 8 miles in length (Chiarappa, 2005).

In addition to seine and gill nets, mid-century commercial fishers employed pound (pronounced "pond") nets. Stationary entrapments used for nearshore fishing, pound nets consist of mesh nets that are fastened to a series of poles or stakes driven into the lake bottom. The trap's design includes a "lead," or a 1000- to 1200-foot line of netted poles placed at a 90-degree angle from the shoreline to form a fence-like structure. The nets, generally set between 30 to 50 feet deep, are tied to the stakes at or above the waterline and are weighted to the lake bottom to create an impassable barrier that runs the entire length of the water column. The lead channels fish to deeper water, through a chamber (referred to as a "heart"), and a tunnel to the trap's pen or "pot" (Bogue, 2000; Chiarappa, 2005; Jensen, 2007).

Pound net fishers tended their nets from small boats such as pound-net boats and Mackinaws. By 1870, pound net boats were relatively inexpensive and simple to construct. Similar to New England sharpies, the flat-bottomed hull and wide beam of pound net boats were designed for nearshore use. Deck planking running forward to aft on either side of the boat's interior hull, about one foot below the gunwale, provided crew members with a platform to stand on while tending their nets (Jensen, 2007). Like Mackinaw boats, pound-net boats typically varied by region. Along the eastern shore of Green Bay, pound net boats were typically operated with oars and cost about \$50 to purchase. On the western shore of Lake Michigan, the work boats featured

one or two masts with a gaff sail and cost around \$200. In his 1874 report, Milner estimated the average value of a pound net rig at \$500. In 1880, Two Rivers pound net boats averaged 24 feet in length (Bogue, 2000; Jensen, 2007; Milner, 1874; Hall, 1887).

By the 1890s, the trap net, a modified version of the pound net, gained popularity in the Great Lakes. Trap nets operated in the same manner as the pound net. Instead of stakes, the lead nets were held in place with floats at the top and anchors and lead weights at the bottom. Sometimes referred to as “submarine nets,” the trap net design allowed for the nets to be completely submerged with the heart, tunnel, and pot completely enclosed to prevent the catch from swimming out (Jensen, 2007; Koelz, 1926; McCullough, 1989; Schroeder et al., 2019). Once set, fishers marked the trap nets with buoys (Jensen, 2007). Unlike with pound nets, trap net fishers could set nets in deeper waters, both nearshore and miles offshore, despite the lake bottom conditions. Trap nets are still widely used in today’s fishery.

Similar in design to a pound net boat, the trap net boat featured a broad, flat working deck. When lifting trap nets, crews raised the main or “king” line over the vessel’s side and attached it to a winch. The winch pulled the net’s pot across the deck toward the stern, concentrating the catch to the front of the net. Crews removed the pot cover and scooped the entrapped fish from the net into the boat’s hull. Trap nets were easily reset by replacing the pot cover, lowering the pot into the water, and removing the king line from the stern (Jensen, 2007).

The number of fishers operating in Wisconsin’s fisheries encouraged state officials to enact state laws regulating fishing grounds in an effort to “protect persons engaged in fishing in Lake Michigan with ‘trap’ or ‘pond’ nets” (Wisconsin Legislature, 1872). Chapter 197 of the General Laws passed by the Legislature of Wisconsin in 1864 required all trap and pound net fishers to “erect and maintain a monument of iron, stone, or timber on the shore or beach” to “stake his claim” to the area of Lake Michigan where they intended to fish and document the location in the “Fish Claims Book” of their local County Register of Deeds office (Wisconsin Legislature, 1872). Scandinavian immigrants represented the majority of Wisconsin’s pound net fishers, many of whom worked as wage labor for larger fishing operations such as A. Booth and Company (Chiarappa, 2005).

Fishing nets and rope required seasonal maintenance to prevent deterioration from rot and mechanical wear. Fishers periodically boiled their nets and floats in tar or a synthetic mixture of water, salt, creosote, and dyes to encase the fibers in a protective coating (Gordon, 1965). In between uses, nets were brought to shore, rinsed of dirt and algae, and stretched over drying reels. Located next to the fisher’s shanty or net shed, each 10-foot-long and 6-foot-wide rotating cubical wooden-framed drying reel dried eight gill nets in less than an hour (C. Cross/Besser Museum for Northeast Michigan, personal communication, July 2, 2021).

Like fishing vessels, fishing gear evolved to meet changing environmental and market demands. By the 1840s, gillnet rig design followed a consistent pattern of suspension with cork or wood floats and lead weights (Jensen, 2007). Milner (1874) reported that nets were being made of fine linen twine with an average mesh size approximately $\frac{1}{4}$ inch smaller in size. By the end of World War II, gillnets were woven from synthetic fibers with mesh sizes following contemporary environmental regulations, and were suspended by aluminum and plastic floats (Jensen, 2007). The flexible utility of the gillnet design allowed fishers to fish in any water depth or location.

Unlike pound or trap nets, gillnets could be easily removed from the water prior to winter storms or relocated according to the seasonal migration patterns of fish species (McCullough, 1989). Carron Net Company in Two Rivers got its start by supplying the fishery with gear.

Steam Power

The introduction of expensive steam-powered vessels gradually revolutionized commercial fishing. Captain J.W. Hall reports that the first steam fishing vessel on the Great Lakes was likely built at Washington Island, Wisconsin in 1869 (Hall, 1887). *Kitty Gaylord* operated briefly out of Two Rivers and Sheboygan, before settling at Milwaukee. Steam helped tip the balance toward highly capitalized businesses. Large-scale, bank-financed outfits such as A. Booth Packing Company of Chicago monopolized regional fishing operations. Steam allowed for more intensive harvests and greater predictability in yields (Bogue, 2000; Jensen, 2007). By consolidating all aspects of harvesting, processing, and distribution, large fish firms effectively controlled markets and fishers (Bogue, 2000). Small family operations and Indigenous peoples who lacked the necessary capital to purchase steam tugs and other expensive equipment often settled for low-wage positions as fishers for larger commercial operations (McCullough, 1989).

Steam-powered boats outfitted for gillnet fishing, also called “gillnet steamers” or “gill tugs,” enabled fishers to travel farther from their home ports and fish with greater intensity (Bogue, 2000). Capable of reaching waters up to 100 miles from port, steam-powered vessels enabled fishers to efficiently move between fishing grounds throughout the fishing season, following targeted species based on their seasonal migration patterns (Jensen, 1997; Smith & Snell, 1890).

Emulating the harbor tug design with heavy framing, thick hull planking, and limited cabin space, steam gillnet fish tugs averaged about 50 feet in length, 12 to 14 feet in breadth, carried between 250 and 400 nets, and cost between \$2,000 and \$10,000 (Bogue, 2000; Gilmore, 2007; Jensen, 2007; McCullough, 1989). Constructed of white oak and cedar, early gillnet tugs were built with flat, open decks, with the steam engine, boilers, and coal bunkers amidship and the pilothouse toward the bow of the vessel (McCullough, 1989; Milner, 1874; Smith & Snell, 1890). Ice boxes were installed below the foredeck to store fish and ice, while net boxes were generally housed below the afterdeck (McCullough, 1989; Smith & Snell, 1890). One of the first known steam-powered gillnet tugs was *Kittie Gaylord*, built by C.S. Fowles in 1870 for commercial fisherman John O’Neil of Washington Harbor, Washington Island, Wisconsin (Bogue, 2000; Jensen, 2007).

Larger and heavier than Mackinaw boats, steam-powered fish tugs could travel greater distances and operate in rougher weather. The largest steam-powered tugs could travel a range of over 100 miles (Koelz, 1926). A typical gill tug crew included a captain, engineer, and five fishers (McCullough, 1989). Traveling at speeds of up to 10 miles per hour allowed crews to retrieve and deploy more nets, leading to larger yields (Jensen, 2007; McCullough, 1989, Ratcliffe, 2009). Steam tug crews deployed nets from the sterns of the slowly moving vessels, and later retrieved the nets from the vessel’s side or bow (Jensen, 2007). Technological advancements, such as the installation of bow mounted net rollers, enabled fishers to retrieve twice as many nets compared to pulling them in by hand (Jensen, 2007). In 1891, automatic net lifters, powered by the vessel’s steam engine, further improved the speed and efficiency at which gillnets could be recovered

(McCullough, 1989; Smith & Snell, 1890). In 1882, Charles W. Smiley of the American Fisheries Society described the impacts of these technological innovations from the years 1870 to 1879:

The apparatus for capture has increased in effectiveness enormously, probably by 500 percent. The increased effectiveness was produced by the introduction of finer meshes in nets, the addition of steam-powered tugs, the increase of pounds, and very great increase in the number of gill nets in use. The number of fishermen also increased (Smiley, 1882).

Steam tugs quickly became popular among fishers who could afford the expensive technology. From 1880 to 1885, the number of steam-powered fishing vessels operating on Lake Michigan increased from 30 to 82 (Smith & Snell, 1890). Companies like A. Booth used steam fish tugs to harvest fish and collect and transport catch from fishing stations to market.

As regional markets continued to grow, large-scale profit opportunities and improvements in transportation fueled the industry. The construction of ice houses enabled growing steamboat fleets to transport both fresh and frozen fish to primary market centers in ports such as Chicago, Milwaukee, Toronto, and Detroit (Bogue, 2000; McCullough, 1989). The expansion of railroad networks into the southern Great Lakes region and innovations in cold storage preservation technology, such as refrigerated railroad cars, allowed dealers to redistribute products to more distant, national markets (Bogue, 2000). During this period of infrastructural growth, a consistent stream of European immigration provided companies with an unending supply of low-cost labor to operate their processing facilities. According to Milner (1874), the Lake Michigan fishing industry employed 1,989 men in 1871. In 1885, the total number of men employed in the Great Lakes was approximately 13,000 (Bogue, 2000).

Overfishing and Economic Consequences

During the 1870s and 1880s, the number of fishing companies and wholesale dealers grew rapidly. In 1886, despite increased demands from the growing population, aggressive harvest created an oversupply of fish, leading to a substantial drop in prices of the most valuable species (Bogue, 2000). Fishers responded to falling prices by increasing, rather than decreasing, their harvest to compensate for the fall in profits. From 1872 to 1889, cumulative commercial harvest for all five Great Lakes increased from 39,300,000 to 146,284,000 pounds (Bogue, 2000). These unsustainable harvests led to decades of decline in both the number and size of whitefish and sturgeon populations. Between 1880 and 1922, the annual catch of whitefish in Lake Michigan decreased from 12,030,000 to 1,547,000 pounds. The annual catch of sturgeon in Lake Michigan fell from 1,406,000 in 1885 to 70,000 in 1908 (Koelz, 1926). As fish supplies decreased, fishers moved to more productive waters, and the number of steam-powered fishing vessels employed on Lake Michigan decreased from 82 vessels in 1885 to 48 by 1890 (Smith, 1893; Smith & Snell, 1890).

Market saturation and overfishing were not unique to Lake Michigan. Fishing firms throughout the Great Lakes experienced similar economic and environmental conditions. An article published by the *Syracuse Herald* in July 1885 describes the plight of Lake Ontario's commercial fishing industry:

As the demand grew beyond the supply capital stepped in. Immense concerns with fleets of boats, hundreds of miles of nets, and thousands of men were soon at work, and even railroads were taxed to carry the products of their labor. For five or six years fishermen coined money. Then came the inevitable reaction. Fish became scarcer, sportsmen began to appreciate the grounds nature had selected for them, the game fish suddenly came under the protection of stringent laws, water always the best for fishermen were freed from nets, and net fishing there was forever proscribed. Steam came into use and Canada became a formidable rival . . . Weaker concerns closed their doors, stronger ones branched farther out, once lively towns became dead and musty, nets rotted on the drying wheels, and idle sails flapped lazily on the masts in the harbors (Syracuse Herald, 1885).

Government Regulation and Science

Declining yields and the destruction of once-fruitful fishing grounds in the northeastern United States led to the creation of the U.S. Commission of Fish and Fisheries in 1871 (Bogue, 2000). The agency was later succeeded by the Bureau of Fisheries under the U.S. Department of Labor and Commerce (in 1903) and the U.S. Fish and Wildlife Service under the Department of the Interior (in 1940; Bogue, 2000). Beginning in the 1870s, the U.S. Commission of Fish and Fisheries established several successful propagation and stocking programs in Wisconsin and Michigan in an attempt to combat declining fish stocks (Bogue, 2000; Chiarappa & Szylvian, 2003).

Government officials attributed declining yields of the nineteenth century to not only commercial overfishing but also pollution (Milner, 1874; Smith & Snell, 1890). The development of major urban areas and growth of industrial activities directly impacted the lakes' ecosystems and fish populations. Dumping of domestic sewage, as well as hazardous waste produced by foundries, chemical factories, mining, and oil production, contaminated river and lake waters (Egerton, 2018; Jensen, 2007; McCullough, 1989). Land-clearing timber and agricultural practices encouraged soil erosion. The resulting agricultural and sediment runoff introduced unwanted nutrients into the Great Lakes watershed, lowering oxygen and light levels essential to the ecosystem. Settlers constructed dams on streams and rivers to power lumber mill operations and unknowingly restricted tributary access to highly migratory fish like lake sturgeon while also contaminating critical spawning grounds with sawdust (Bogue, 2000; Brenden et al., 2013; Egerton, 2018; Milner, 1874). The U.S. Constitution gave state governments the authority to regulate fish and fisheries. In 1853, the Wisconsin legislature passed a law to allow for the inspection of fish in Manitowoc and proposed another to prevent the destruction of fish in Waukesha the following year (Wisconsin Legislature, 1854). Although fish-related legislation became common in Madison by the 1860s, bills directly protecting commercial fish stocks such as those addressing dams and stream pollution usually failed to pass. In comparison to their Canadian counterparts, American fishers faced little government regulation within the commercial fishing industry during the nineteenth century.

Environmental Impacts of Gillnet Fishing

Unintended consequences of gillnet fishing also contributed to declining fish populations and degrading environmental conditions. The use of gillnets inadvertently increased the mortality rates of non-targeted species. Although the manipulation of mesh dimension allowed for size selectivity in harvest, gillnet fishing commonly resulted in undesired bycatch and wasted fish (McCullough, 1989; NOAA Marine Debris Program, 2015). Once entangled in gillnets, fish suffocated and began to decompose. Nets left untended for extended periods of time resulted in harvests of spoiled, unmarketable fish. Poor weather conditions sometimes delayed fishing operations, forcing fishers to leave nets soaking for multiple days. Human error and gear malfunctions often lead to dead or injured fish dropping back into the water as the nets were lifted onboard. Opponents of the gillnet industry viewed the dumping of decaying fish as a form of pollution that damaged fishing grounds (McCullough, 1989; Smith & Snell, 1890).

Unlike fish harvested by gillnet, those caught in trap nets typically remained alive in the net's pot. This allowed fishers to release non-target species and decreased the probability of spoiled harvests. Subsequently, trap net fishers tended their nets less frequently than gillnet crews. As fish populations declined in near shore fisheries, whether from overfishing, pollution, destructive harvest practices, or a combination of the aforementioned, fishers responded by travelling farther offshore to deeper, more productive fishing grounds.

Introduced Species and Hatcheries: Early State Enhancements of Commercial Fishing

By the 1850s, Great Lakes state officials began to acknowledge the failing health of Great Lakes fisheries with legislative measures. Early regulations varied by state, locale, and species and included ordinances on fishing methods, the establishment of closed seasons, and area-specific restrictions of fishing gear use. Enforcement of controversial regulations was handled at the local level (Bogue, 2000). In 1871, the U.S. Commission of Fish and Fisheries was established to provide state legislators with federally funded research to inform restoration and conservation policies and decisions (Bogue, 2000). Fishers, fearful of the negative economic repercussions of such regulations, heavily debated the necessity and efficacy of the ordinances (Bogue, 2000).

In 1874, the Wisconsin legislature established the Fisheries Commission to investigate the conditions of Wisconsin's fisheries and allocated a budget of \$500.00 for "promoting the artificial propagation and introduction into this state of the better kinds of fish" (Thomas, 1991; Welch et al., 1875). Working with the U.S. Commission of Fish and Fisheries, the Wisconsin Fish Commission acquired 100,000 spawn of California salmon, from which hatched 61,000 fry that were later released in the waters of Grant, Crawford, and Lafayette Counties, as well as in the lakes and rivers of Sheboygan, Fond du Lac, and Winnebago (Thomas, 1991; Welch et al., 1875). The following year, the Fish Commission erected a hatching house in Madison equipped with the capacity to hatch 1,000,000 salmon eggs and 2,000,000 trout eggs. Utilizing the state's developing railroad facilities, the commission distributed one- to two-year-old fry throughout Wisconsin's inland streams, rivers, and lakes, as well as Lake Superior, Lake Michigan, and Green Bay (Ludington et al., 1877). By 1932, the state maintained hatcheries throughout Wisconsin, including in Bayfield, Racine County, Brule, Delafield, Eagle River, Eau Claire,

Barron County, Hayward, La Crosse, Langlade, Osceola, St. Croix Falls, Sheboygan, Sparta, Sturgeon Bay, Westfield, and Woodruff; these hatcheries produced over 425,000,000 trout, pike, and other fish annually (Wisconsin Legislature, 1933).

Ecological Decline and Technological Innovation

Steam gillnet tugs evolved in response to the changing market conditions and fluctuating fish populations. The fish tug's speed allowed fishers greater access to a wider range of fisheries. In response to pollution, low fish stocks, and seasonal fluctuations, the vessel's efficient propulsion system enabled crews to move to more productive fishing grounds, often in deeper waters (Chiarappa, 2005). Moreover, the versatility and mobility of the gillnet permitted fishers to combat declining economic conditions by turning to other fish species to bolster profits. While whitefish, sturgeon, and herring catch diminished, gillnet fishers employed nets with smaller mesh sizes to harvest chubs (mix of deep-water species including bloater and kiyi) and yellow perch in immense volumes (Koelz, 1926).

Fishing vessels changed with the technological advancements of the late nineteenth and early twentieth centuries. Small-scale and independent commercial fishers who required greater mobility, but could not afford steam engines, began to install gasoline engines in Mackinaw sailboats (Chiarappa, 2005). The first gas boats, such as those used in 1912 by gillnet fishers in the Isle Royale fishing industry, featured the double-ended and round-bottomed Mackinaw hull, with open fore and aft decks, and an inboard marine gasoline engine mounted amidships (Cochrane & Tolson, 2002). Walter Koelz's report for the U.S. Bureau of Fisheries found that gasoline boats between 25 and 50 feet were active in pound, trap, and gillnet fisheries throughout the Great Lakes (Koelz, 1926). The average gas-powered gillnet boat ranged between 24 and 29 feet in length, operated with a small crew of one to three, and was used for nearshore fishing in relatively shallow waters (Cochrane & Tolson, 2002).

In the spring of 1899, the Kahlenberg Brothers of Two Rivers, Wisconsin, installed their first gasoline engine, a single cylinder, twin stroke, direct reversible internal combustion engine in a fishing vessel owned by John Lafond of Manistique, Michigan (Barry, 2003; Beeson, 1911; Gagnon, 1969; Jensen, 2007). From the 1920s to the 1950s, several other companies successfully manufactured marine gasoline engines. Some of the most commonly used among fishers were two- and four-cylinder engines from companies such as Redwing and Oshkosh in Wisconsin or Chrysler and Grey Marine in Detroit (Jensen, 2007).

Despite their popularity, marine gasoline engines on fishing vessels proved hazardous. The low flash point of gasoline and confined spaces on boats created dangerous conditions for crew members. Gasoline spills and leaks easily vaporized into flammable mixtures when exposed to air and could ignite from a small spark or hot surface, resulting in devastating explosions. Historical accounts describe numerous fishing vessels lost throughout the Great Lakes due to human error and mechanical malfunctions while using marine gasoline engines. Contemporary newspaper articles recount the mishaps of local fishers such as Captain Orin Angwall, whose gas-powered schooner *Hustler* exploded and caught fire in November 1912 while transporting a cargo of fish from Peshtigo, Wisconsin to Menominee, Michigan (*Green Bay Semi-Weekly Gazette*, 1912; Wisconsin Shipwrecks, 2023a). In March 1946, the *Door County Advocate* reported that the 34-foot gas-powered schooner *Louise* burst into flames when a fire in the

vessel's heating stove ignited gas fumes from the engine (*Door County Advocate*, 1946; Wisconsin Shipwrecks, 2023b). Similarly, Haldor Gudmundson's 26-foot gas-powered fish tug *Sea Queen* exploded at the Detroit Harbor dock in 1955 when engine sparks ignited gas fumes in the vessel's bilge (*Green Bay Press-Gazette*, 1955; Wisconsin Shipwrecks, 2023c).

In 1917, the Kahlenberg Brothers patented the first semi-diesel marine engine, a safer and more reliable alternative to gas engines (Kahlenberg, 1917). The first engine manufactured was fitted in *Karlsruhe*, a 43-foot commercial fish tug owned and operated by Arthur Luebke and Hugo Heller of Two Rivers, Wisconsin (Hadland & Mackreth, 2018). The two-cylinder, 50–60 horsepower engine operated on heavy crude oil and was directly reversible at full speed (Kahlenberg Heavy-Duty Crude Oil Engines, 1922). Other companies such as Fairbanks-Morse of Wisconsin and Straubel Machine Company in Green Bay eventually developed their own semi-diesel designs (Jensen, 2007). However, two- to four-cylinder Kahlenberg semi-diesel engines quickly gained popularity among commercial fishers for their dependability, speed, low operation costs, and efficiency. The company eventually came to dominate the Great Lakes industry, installing more engines for commercial fishing vessels than all other manufacturers combined (Beeson, 1911; Jensen, 2007). Kahlenberg stopped producing marine engines in 1960, but the Two Rivers-based company remains in business.

Semi-diesel and gasoline engines gradually replaced steam engines in the commercial fishing industry (Jensen, 2007). In 1903, 101 gasoline fishing boats participated in the American Great Lakes fishing industry (Alexander, 1904; Bogue, 2000). By 1917, gasoline-powered vessels accounted for nearly 60% of the industry's active fishing vessels (Bogue, 2000; Radcliffe, 1919). Unlike steam, small internal combustion engines did not require a dedicated engineer, enabling gillnet tugs to fish with smaller crews and at lower costs. Smaller in size compared to coal-burning steam engines, semi-diesel and gasoline engines allowed for more workspace and storage areas (McCullough, 1989). In 1939, Ontario conservationists estimated that gasoline engines enabled crews of six persons to fish up to 60,000 yards of gillnet, more than five times the fishing capacity of a three-person crew traveling by sail or oar (McCullough, 1989; Toner, 1939).

By the early twentieth century, the physical construction of fish tugs evolved to provide fishers with protection from the environmental elements. The average fish tug measured between 25 and 30 feet in length. Early designs included canvas coverings supported by steel hoops that were attached to the sides of the tug, providing protection from the wind, rain, sun, and spray. As gillnet fishers traveled farther from shore, a permanently enclosed cabin design was adopted with open forward and stern decks. Cabin construction quickly progressed to include a raised pilothouse amidships over the engine room, an open stern deck, and a permanent wood superstructure completely enclosing the bow (Chiarappa, 2005; Jensen, 2007). Similarly, the trap net tug design evolved to include an enclosed forward cabin with an open midship and stern deck (Chiarappa, 2005).

Around the time of the marine gasoline engine's introduction, technological advancements also improved mechanical net lifters. Rotating drums installed on vessels' foredecks hauled gillnets over rollers mounted on the vessel's side or bow gunwales. Mechanical capstan winches installed on the foredecks, aft of the pilothouse, hauled the trap net's king line over the vessel's side.

Powered by the vessel's engine or an auxiliary engine, mechanical net lifters enabled fishers to retrieve nets from greater depths at a faster pace with less physical demand (Brenden et al., 2013; Jensen, 2007; Michigan Department of Natural Resources, 1974). Gillnet technology also continued to improve in quality and performance. Cotton replaced linen and hemp gillnets in the 1930s, followed by the introduction of multifilament nylon nets in the 1949. Synthetic gillnets offered greater durability and elasticity and demonstrated greater catch efficiency compared to organic fibers (Brenden et al., 2013).

Biological Invasions

Between 1819 and 1974, at least 34 non-native fish species, including sea lamprey, alewives, rainbow smelt, domestic common carp, zebra mussels, round gobies, and quagga mussels were introduced to the Great Lakes through intentional introduction, by passing through manmade locks and canal systems, via use as live bait, and the dumping of ballast water of cargo ships from the ocean (Archibald, 2018; Egerton, 2018). The eel-like invasive sea lamprey, first identified in Lake Ontario in 1835, spread throughout the Great Lakes region following the widening of the Welland Canal in 1919. A second invasive fish, the alewife, identified in Lake Ontario in 1873, entered the upper Great Lakes in 1921 (Egerton, 2018). Feeding on zooplankton, alewives outcompeted native fish species and disrupted the food chain. Moreover, the alewife's consumption of juvenile lake trout and lake trout eggs devastated the region's lake trout populations, interrupting spawning activities (McCullough, 1989; Crowder, 1980). By the late 1930s, the sea lamprey had established breeding populations in all five Great Lakes, feeding on larger fish, including commercially valuable trout and whitefish (Egerton, 2018). With no natural predators, sea lamprey effectively disrupted the lakes' fragile ecosystem and contributed to the collapse of multiple fish populations.

Collapsing Fisheries

Destructive invasive species, decades of commercial overfishing, and industrial water pollution resulted in significant ecological disruption and degradation to native fish stocks. Despite major advancements in fishing technologies, Lake Michigan commercial fish landings declined by 38% from 1911 to 1923 (Michigan Department of Natural Resources, 1974). The U.S. Commissioner of Fisheries' 1930 report identified a 17% decline in the total catch of the Great Lakes fisheries from 1927 to 1928, including a 24% decrease in Lake Michigan (Fielder, 1931). With increased catch efforts, Great Lakes commercial landings increased by 11% from 1929 to 1930, despite decreasing stocks (Fielder, 1932).

The collapse of commercially important fish species pushed state and federal government officials to examine the failing health of the region's fisheries and to identify the need for uniform conservation policies and fishery regulations. In 1933, the Wisconsin legislature established open and closed seasons for several species, and also imposed catch and size limits and required fishing licenses for nonresident and commercial fishers (Gjeston, 2013; Wisconsin Legislature, 1933). However, despite widespread acknowledgement of the Great Lakes' declining fish populations by government officials and industry leaders, the commercial fishing industry continued to produce fish at unsustainable levels. As nearshore, targeted fish populations dropped, technological advancements in fishing equipment allowed fishers to operate with

greater efficiency while traveling greater distances to reach deeper fishing grounds (McCullough, 1989; Smith & Snell, 1890).

Technological Responses

By the 1920s and 1930s, gillnet tugs averaged between 35 and 40 feet in length. In addition to independent craftsmen such as Henry E. Danhof and Vern Kleiner of Muskegon, Michigan and the Vincent brothers of Naubinway, Michigan, several boat-building companies began to specialize in commercial fish tug construction. These included Peterson Boat Works and Sturgeon Bay Boat Works of Sturgeon Bay, Burger Boat Company of Manitowoc, and Marinette Marine Company in Marinette. Typically fitted with marine semi-diesel engines, commercial tugs could range up to 50 miles from their home ports, but usually worked closer to home (Jensen, 2007; Chiarappa, 2005). Smaller than steam tugs, diesel-powered tugs required less manpower to operate and generally fished with only three- to four-person crews. Smaller crews and lower operating costs allowed fishers to generate greater profits.

It was at this time that the classic gillnet fish tug evolved. The signature “turtle back” design featured a completely enclosed wood superstructure from stern to bow with hatches in the sides for hauling in nets and doors in the stern for setting gear. While the cabin always included a raised pilothouse, the structure’s placement varied based on preference between amidships and the aft section. While the keel, frames, stem, and stern post were generally constructed with oak, the wood used for hull planking varied to include oak, cedar, cypress, and pine. To accommodate the weight and vibration of the diesel engine, set amidship, the hull required heavier framing and generally incorporated carvel planking. The double-ended hull design of the early Mackinaw boat gave way to two stern forms, the fantail and the raked square stern. Easier to clean, the raked square stern proved more popular among fishers, although both designs provided crews with more working space (Cochrane & Tolson, 2002; Jensen, 2007; Ratcliffe, 2009). Charles A. Vogelheim’s *Katherine V* (built in 1928) and William Sellman’s *Bob S* (built in 1935) are representative examples of the region’s later wooden gillnet fish tug designs.

The fully enclosed fish tugs protected crew members from poor weather conditions and freezing lake waters and enabled operations to continue later into the winter season when fish market prices increased due to lack of supply (Cochrane & Tolson, 2002; Jensen, 2007; Ratcliffe, 2009). Fishers who expected to fish year-round required vessels with reinforced hulls. Gillnet fish tugs constructed for fishing in northern Lake Michigan and Lake Superior waters were built with heavier frames and planking compared to Lake Erie tugs (Gilmore, 2007). The wooden hulls of tugs operating in northern waters were typically sheathed in quarter-inch steel sheets (Jensen, 2007). Protecting the tugs’ hulls from degradation and ice damage, the steel reinforcements allowed gillnetters to tend their nets when the freezing conditions of the Great Lakes’ waters inhibited most harvest operations in wooden boats. The addition of steel sheathing to the vessels’ hulls proved immensely effective as demonstrated by the gillnet tugs’ widespread use as icebreakers during winter months when ice floes and freezing lake conditions prevented commercial fishers from leaving their harbors. Utilizing the power of the vessels’ direct reversing diesel engines, fish tug captains worked to clear their harbors by driving the tug on top of the ice and allowing the weight of the vessel to break through the frozen surface (Chiarappa,

2005; Gilmore, 2007; Jensen, 2007). Fish tug crews sometimes worked for days to clear miles of ice in an effort to resume fishing operations (*Presque Isle County Advance*, 1931a, 1931b).

The first steel-hulled gillnet tugs were introduced to the Great Lakes in the early 1930s. Leathem D. Smith Shipbuilding Company of Sturgeon Bay constructed one of the earliest examples, *Jean R*, in 1930 for Otto P. Rodal of Frankfort, Michigan. Welded by Reuben Dickenson under the supervision of Fred Peterson, *Jean R* measured 51 feet in length with a breadth of 13 feet and a hull depth of 6.5 feet (*The Fisherman*, 1946, 1982; Bowling Green State University, 2021).

Unlike the round-bottomed or “soft-chined” hull of the classic wood gillnet tug, which gave the vessels a strong tendency to roll, steel tug hulls featured a hard chine and wide, square stern that provided greater stability. Slightly larger than their wooden counterparts, steel fish tugs averaged between 40 and 50 feet in length and maintained the turtleback design with a wood or steel superstructure extending from the bow to stern, completely enclosing the tug’s working decks (Gilmore, 2007). Boatbuilders and fishers lauded steel tugs for their improved durability and minimal maintenance requirements. *The Fisherman* magazine praised the “superiority of steel over wood” in fish tugs, stating that “with ordinary care a steel hull should last indefinitely; welded seams insure [sic] perfect joints in hull plates and reduce leakage to a minimum” (*The Fisherman*, 1931). Throughout the 1930s, fish tug producers such as J. B. Lund’s Sons of Cheboygan, Michigan and Burger Boat Company of Manitowoc began producing standardized steel hulls with insulated, custom-designed steel cabins (*The Fisherman*, 1931, 1937).

When the United States entered World War II in December 1941, many companies halted their construction of commercial fishing vessels and dedicated their resources and manpower toward the war effort. With concerns of nation-wide food shortages, the United States government recognized the importance of Great Lakes fisheries. Commercial fishers received draft exemptions, although several chose to enlist. During the war, fish prices increased across the nation as the demand for Great Lakes fish soared. Despite the commercial fishing industry operating at maximum harvest intensity, commercial harvests only increased marginally during the 1940s and early 1950s due to the lakes’ depleted fish stocks, pollution, and ecological imbalances (Brenden et al., 2013).

The United States’ participation in World War II directly impacted the physical development of the Great Lakes commercial fishing fleets. Encouraged by national lumber shortages, Great Lakes fish tug production centered around steel-hull vessels. Scientific innovations made during the war were adapted to develop fishing-based technology and sold commercially. By the 1950s, fish tugs were regularly equipped with depth sounders and fathometers, as well as radio telephones for shore-to-ship communications (Brenden et al., 2013). In 1949, multifilament nylon gill nets were introduced to American markets. Compared to linen and cotton, the synthetic material offered greater durability and elasticity with decreased visibility to fish. Primarily used to harvest lake trout and cisco, multifilament nets caught more fish than either linen or cotton nets (McCullough, 1989; Muncy, 1960; Pycha, 1962).

By the end of World War II, the destruction caused by invasive sea lamprey populations grew increasingly obvious as commercial fisheries produced smaller and smaller yields. From 1955 to 1965, the total harvest of all commercial species declined from 12 million to 7 million pounds (Szylyan, 2005). The 1954 Convention on Great Lakes Fisheries was one of the first

intergovernmental cooperation treaties between the United States and Canada concerning the health and sustainability of the fisheries. The binational Great Lakes Fisheries Commission formed under the convention was established to combat the destructive sea lamprey invasion in the upper lakes that decimated valuable fish stocks, including whitefish and lake trout, as well as to conduct research and provide recommendations for state organizations concerning the conservation and management of Great Lakes fisheries (Great Lakes Fishery Commission, 2023a). The U.S. Fish and Wildlife Service employed a variety of methods to control lamprey populations including lampricides, electrical weirs, migration barriers, and traps (Szylyan, 2005; Great Lakes Fishery Commission, 2023b).

As sea lamprey populations decimated the lakes' predatory fish stocks, invasive alewife populations surged. In the 1960s, ecological imbalances and fluctuations in water temperatures fueled massive alewife die-offs in Lake Michigan and directly impacted the state's tourism and recreational industries. During the summer of 1967, an estimated 200 million pounds of dead alewife washed ashore on Lake Michigan's coast, costing Wisconsin millions of dollars in lost tourism revenue (Irwin, 1967). Encouraged by the U.S. Bureau of Commercial Fisheries, Great Lakes commercial fishers harvested a combined total yield of 41.9 million pounds of alewife in 1967 (National Marine Fisheries Service, 1971).

State Legislation and the Rise of the Sport Fishing Industry

The Wisconsin Department of Natural Resources (WDNR) approached the collapse of the state's target commercial fish populations by following the lead of the Michigan Department of Natural Resources (MDNR), directed by Howard Tanner, and turned its attention to enhancing the state's recreational fishery (Szylyan, 2005). Tanner believed that the allocation of most Great Lakes fish populations for the purpose of "extensive commercial exploitation" no longer served as a viable resource management practice. Instead, Tanner (2019) advocated that the state's waters "be managed first for the benefit of the recreational fishermen." In 1964, MDNR began the state's first Pacific salmon stocking program with one million eggs provided by the Oregon Fish Commission. In the spring of 1966, approximately 750,000 jack coho salmon were released into Michigan waters (Szylyan, 2005; Tody & Tanner, 1966). Feeding primarily on invasive alewives, the coho grew quickly in both physical size and population, while simultaneously reducing the alewife population. Wildly successful, the salmon stocking program (focusing first on coho, then later shifting to rainbow trout and brown trout) drew recreational anglers from all over the region, boosting Michigan's shoreline tourism and leading to the development of the Great Lakes charter boat industry.

Established in 1967, WDNR enacted a series of measures aimed at limiting commercial fishing activities and rehabilitating Great Lakes fisheries for the purpose of recreational fishing. The same year, Wisconsin legislature passed a limited entry policy, effectively capping the number of available commercial licenses and limiting entry into the fishery to prevent further overfishing (Ebener et al., 2008). The development of the sport fishing industry promised economic growth at a local, state, and national level. Retailers and fishing gear manufacturers such as Shakespeare and Heddon, both of Michigan, profited greatly from the sale of boats, outboard motors, and fishing tackle while the tourism industry thrived with improvements to marinas, lodging, public campgrounds, retail, and dining facilities. The Great Lakes charter boat industry

began to develop in the late 1960s and, encouraged by advertisements featured in national sports magazines and television segments, grew steadily through the 1970s (Szylyan, 2005). The number of active charter boat captains in Wisconsin increased from 98 in 1973 to 450 by 1984 (Kuehn et al., 2005).

By 1970, MDNR enacted the Zone Management Plan, which established state regulations over the location and depth in which commercial fishers operated, the species of fish harvested, and the types of fishing gear permitted for use. The Zone Management Plan specifically enacted strict limitations on the use of gillnets in areas designated for stock rehabilitation and sport fishing. In an attempt to reduce levels of non-target species mortality, MDNR banned the use of all small-mesh gillnets within Michigan's jurisdictional Great Lakes waters, followed by a ban on all large-mesh gillnets in 1974 (Brege & Kevern, 1987; Szylyan, 2005). Similarly, by 1984, the Ohio Department of Natural Resources also enacted a ban on gillnets in the commercial fishing industry (Lloyd & Mullen, 1990).

Wisconsin, however, continued the use of large-mesh gillnets. In 1971, the Lake Superior Commercial Fishing Board established Wisconsin's first individual transferrable quota (ITQ) system by issuing fishers individual quotas for lake trout harvested in Lake Superior. In 1983, the Lake Michigan Commercial Fishing Board instituted quotas for yellow perch and chub for Lake Michigan fishers (Anderson & Leal, 1995). Under Wisconsin's ITQ system, fishers' individual quotas are determined based on a percentage of harvest yields from previous years. The Natural Resource Board, a seven-member, governor-appointed panel that determines state policies for WDNR, establishes the total allowable catch limit for the year. From the total allowable catch, the state's commercial fishing boards allocate the appropriate quotas to each state-licensed fishing enterprise. With WDNR and state commercial fishing board approval, ITQs may be purchased, sold, leased, or inherited among state-licensed commercial fishers (Anderson & Leal, 1995). In 1995, 21 Lake Superior and 127 Lake Michigan licenses were active; by 2022, the number had fallen to 10 Lake Superior licenses and 65 Lake Michigan licenses (Anderson & Leal, 1995; Eat Wisconsin Fish, 2023).

Continuation of Indigenous Fishing

Among those impacted by the state's legislative changes were Wisconsin's Indigenous communities. With the passage of the 1924 Indian Citizenship Act (43 Stat. 253 [Pub. L. 68-175]) and the 1953 House Resolution No. 108, 83rd Congress, an act "to make the Indians within the territorial limits of the United States subject to the same laws and entitled to the same privileges and responsibilities as are applicable to other citizens of the United States," Wisconsin's Indigenous populations were stripped of their fishing rights, previously guaranteed under the federal 1831 Treaty of Washington (7 Stat. 342), 1837 Treaty with the Chippewa (7 Stat. 536), and 1842 Treaty of La Pointe (7 Stat. 591). In consequence, Wisconsin's new fishery legislation required tribal fishers operating their own commercial outfits to purchase a state-issued commercial license and adhere to all state fishing regulations (People v. Chosa, 1930). Those who could not afford to compete in the increasingly mechanized industry often found themselves relegated to wage and workhand positions in Euro-American fishing companies.

It was not until the 1970s that the state and federal governments began to recognize the legitimacy of the original federal treaties, exempting tribal fishing communities from WDNR

regulations. In *LAC Courte Orielles Band of Lake Superior Chippewa Indians v. Voigt* (1983), the United States Court of Appeals determined that the tribes who signed the treaties of 1837 and 1842 reserved the right to fish, hunt, and obtain resources outside of reservation confines within the regions of Wisconsin, Michigan, and Minnesota previously ceded.

In a series of lower court decisions, including *People v. Jondreau* (1971) and *People v. LeBlanc* (1976), the Michigan Supreme Court acknowledged the existence of treaty fishing rights in Lake Superior waters, within the confines of the Keweenaw Bay Indian Community Reservation and the Bay Mills Indian Community Reservation, respectively. However, in *United States v. Michigan* (1979), U.S. District Court Judge Noel Fox later determined that the Bay Mills, Sault Ste. Marie, and Grand Traverse Band of Ottawa and Chippewa tribal communities all retained the right to fish, both commercially and for subsistence, in the 1836 treaty-ceded territories of lakes Huron, Michigan, and Superior, free of state regulation and restriction. In 1981, the Bay Mills Indian Community, Sault Ste. Marie Tribe of Chippewa Indians, and the Grand Traverse Band of Ottawa and Chippewa Indians established the Chippewa/Ottawa Treaty Fishery Management Authority to manage tribal members' commercial and subsistence fishing activities in waters ceded in the 1836 treaty (Brenden et al., 2013). As of 2022, Wisconsin maintains tribal commercial licenses for 10 large boats and 20 small boats in Wisconsin waters of Lake Superior. There are no current tribal commercial fisheries in the Wisconsin waters of Lake Michigan.

Chapter 4: Commercial Fishing in Manitowoc County, Wisconsin

Location-based case studies, rather than the more general commercial fishing history above, offer a different route to understanding the importance of fishing to individuals and communities at the local level. The following sections examine the commercial fishing cultural landscape for specific counties and cities within the WSCNMS region.

Manitowoc County, located in east Wisconsin, encompasses 34 miles of shoreline on Lake Michigan. The area boasts an abundance of natural springs, streams, inland lakes, and rivers, including the Manitowoc Watersheds and the Twin Door Kewaunee Watersheds. Prior to European introduction, the area was inhabited by multiple Indigenous tribes, who used the land for subsistence fishing, hunting, and gathering (Falge, 1976). Perhaps the earliest historical mention of fishing in Manitowoc County comes from the account of Colonel Abraham Edwards' canoe travels from Detroit to Chicago in 1818.

On our passage, although we frequently landed, we did not meet with a white man—we were, however, informed one was trading with the Indians at Milwaukee. At Twin Rivers, Manitowoc, Sheboygan, and Milwaukee, the shore of the lake was lined with Indians—near Manitowoc many were out in canoes spearing white fish (Edwards, 1868).

Manitowoc County's earliest commercial fishing activities began at site of seasonal Indigenous fish camps called "Neshotah," meaning "Twin Rivers." The natural harbor formed by the convergence of the Mishicott (East Twin) and Neshoto (West Twin) rivers, along with the area's wide, sandy beaches and abundant fish, provided optimal conditions for spearfishing (Gagnon, 1969). In 1836, Jacob W. Conroe (c. 1807–1864), originally of Middlebury, Vermont and the county's first white resident, purchased several hundred acres of land in the Manitowoc Rapids area. After erecting the area's first sawmill, Conroe commissioned Captain Joseph L. Edwards, a carpenter from Jersey City, New Jersey, as the area's first boatbuilder to construct two scows to transport lumber down river to the Manitowoc River mouth where it was then loaded onto vessels for shipment (Falge, 1976; Ancestry, 2022a, 2022b). Historians credit Edwards with establishing the county's first commercial fishery in 1837. In their first seine net set, Edwards, his thirteen-year-old son, Henry, Jacob Conroe, and Perry P. Smith of New York harvested ten barrels of whitefish, as well as trout, sturgeon, perch, and chubs (Gagnon, 1969; *Manitowoc Pilot*, 1892). Captain Edwards constructed a fish shanty on the beach of Two Rivers, where he preserved fish and rendered fish oil from his harvests. Edwards would go on to build Manitowoc County's first schooner, the 60-ton *Citizen* in 1847 (*Manitowoc Pilot*, 1892; Plumb, 1948).

In 1838, J. P. Clarke, a Detroit merchant originally from New York, launched a fishing venture along Two Rivers' coastline (Krejcarek, 1969; Plumb, 1904). Clarke and Edwards joined forces to form J. P. Clarke & Company and established seining locations at several places, including Two Rivers and Whitefish Bay. Headquartered in Detroit, the company primarily harvested whitefish and the occasional lake trout. The company carried out all fishing operations from boats with seine nets, ranging in length from 660 to 2,640 feet. Crews used windlasses to lift the nets (Plumb, 1904). The company employed mainly French Canadian men from Montréal, Trois-

Rivières, and other areas within the St. Lawrence Lowlands to harvest fish and local Indigenous people to process the fish before its shipment by the schooner *Gazelle* to commercial markets in Detroit (Plumb, 1904, 1948; Gagnon, 1969). In 1838, a barrel of salted fish sold for \$12.00 in Detroit. The company's annual harvest in early years reportedly averaged about 2,000 barrels or 400,000 pounds of fish (Plumb, 1948; Gagnon, 1969).

The fishing business took shape at the onset of the multi-year economic depression that began in 1837. While area property values plummeted and many settlers left the mid-lake region, commercial fishing expanded. J.P. Clark's brother, Isaac, took over the Two Rivers operations in 1842 and ran the company profitably until 1853 (Plumb, 1904). French Canadian trader Andrew Vieau, Sr. described Two Rivers in 1843 as "a small fishing village of some eight or ten houses, with perhaps 25 inhabitants" (Thwaites, 1888).

Commercial Fishing in Two Rivers, Hika, and Manitowoc City

Many of Two Rivers' earliest fishers immigrated from Canada. Louis LeClair of St. Francis, Canada moved his family to Two Rivers via New York State in the fall of 1846 (Falge, 1976). Adolph Fountain arrived in 1847 followed by Joseph Gagnon and the Allie family in 1848 (Falge, 1976; Mansfield, 1899). Gilbert Louiseau of Montréal and the LaFond family immigrated to Two Rivers in 1852 (*Two Rivers Reporter*, 1913a, 1913b). Frank Vaudreuil moved to Two Rivers from Canada with his wife Percilla and seven children in 1856 (Falge, 1976). The U.S. federal census of 1850 states that the 45 men employed in the commercial fishing industry included 15 Americans, 16 French Canadians, three Germans, and nine immigrants from elsewhere in Europe (FamilySearch, 2022c). By 1856, the town of Two Rivers had a growing population of nearly 1,200, comprised largely of Americans, but with a significant number of German and French Canadian immigrants (*Manitowoc Tribune*, 1856).

The French Canadian fishers settled along the east bank of the Mishicot (East Twin) River, forming what is now called the Rogers Street Fishing Village. The influx of fishers also boosted the Two Rivers lumber industry as the new settlers required wood supplies and carpentry skills for the construction of their homes and fishing boats. Commercial fisher Joseph Gagnon constructed his residence at 1608 East Street in 1855. Another early settler of Two Rivers, John Batias LaFond, moved to the area with his sons Alfred, Joseph, Frank, Michel, and John, Jr., from St. Joseph, Quebec in 1849 and later built a home at 1105 16th Street in 1858 (McArthur, 1985).

The LeClairs are one of Two Rivers' most influential fishing families. Louis Clair Houde (1790–1847) was born in Canada to Augustin Houde and Therese Geneviève Martel. At some time in the early 1800s, Louis legally changed his name to Louis LeClair (Genealogy Society of Two Creeks, 2022). LeClair married Marie Rouillard in Nicolet, Quebec in 1818 and fathered 10 children, including his son, Charles. Charles LeClair (1824–1900) was born in St. Francis, Quebec, and moved to New York with his family in 1845 at the age of 19. The following year, the family moved to Two Rivers. Louis LeClair found employment at the shingle mills and later moved to north Mishicott in Manitowoc County. After purchasing land and building a homestead in Mishicott, Charles LeClair sold his property and returned to Two Rivers in 1844, where he worked in the lumber industry for several years. In 1868, at the age of 42, Charles began fishing and introduced the pound net to Manitowoc County; he operated the pound net

from a 28-foot schooner and rowboat to harvest whitefish, trout, and perch (*Manitowoc Herald-Times*, 1936; Falge, 1976; Rhines, 2003; Two Rivers Historical Society, 1966). LeClair built his home in 1868 at 1515 East Street and later sold the property to Frank LaFond, Sr. in the 1870s. In 1873, Charles LeClair and his family moved to Seymour Township in Outagamie County and established a farm. The LeClair family returned to Two Rivers in 1884, purchasing a 40-acre farm on the east side of the river. Charles re-entered the commercial fishing industry, teaching the trade to his three sons, Charles Jr. (1858–1936), David (1871–1958), and Nelson (1877–1966; *Manitowoc Herald-Times*, 1936; Falge, 1976; Two Rivers Historical Society, 1966).

In 1897, brothers Charles Jr. and David formed a partnership operating a pound net rig at Twin River Point in Two Creeks Bay (*Manitowoc Herald-Times*, 1936; Two Rivers Historical Society, 1966). Later, Charles Jr. opened his own pound net fishery, Charles LeClair and Co., fishing at Twin River Point. Charles Jr. worked with his sons, Edward J. (1882–1965), Albert O., (1886–1966), Frank J. (1888–1974), Norman E., (1889–1914), Joseph F. (1898–1981), and Wilbur, until his retirement from the industry in 1918 (*Manitowoc Herald-Times*, 1936). David entered into partnership with Nelson, forming the LeClair Brothers Fishery. The LeClair family continued to operate the LeClair Brothers Fishery for generations, training the male family members from boyhood to mend nets, build fish boxes, and run the boats.

The LaFonds probably constituted Two River's largest fishing family. Born in St. Joseph, Quebec, John Batist LaFond (1812–1888) traveled to Two Rivers in 1849. Encouraged by the area's fisheries potential, LaFond moved his wife, Celestina, and his five sons, John Jr., Michel (also spelled Mitchell), Godfrey, Frank, and Alfred from Canada to Two Rivers in 1852. John B. involved his sons in the commercial fishing industry from an early age, harvesting whitefish with gill nets. Michel (1837–1914) joined his father fishing at 15 years old, working from a Mackinaw boat. LaFond joined the Wisconsin Volunteer Infantry in 1865, but later rejoined the Two Rivers fishing industry, where he continued fishing with his sons, harvesting trout with gillnets deployed from a Mackinaw boat (Falge, 1976; *Two Rivers Reporter*, 1913a, 1913b). In 1876, Michel built his home at 1111 16th Street, next door to his father's home, but later moved to 1012 20th Street (McArthur, 1985).

Michel LaFond developed a successful fishing business, LaFond Fisheries, acquiring numerous boats and properties. In 1900, LaFond built a 25 x 30-foot wood-shingled fishing station at 2000 Rogers Street. The building provided protection for his fishing rigs from weather damage. A 9 x 10-foot smoke house attached to the structure enabled the company to process their catch. In 1913, Michel sold LaFond Fisheries to his son (Falge, 1976; *Two Rivers Reporter*, 1913a, 1913b).

In addition to homes and boats, commercial fishers also constructed their own barrels, necessary for shipping their salted harvests to distant ports, and occasionally other wood products, such as shingles, to supplement their incomes during the winter months. In an article published in the *Two Rivers Chronicle*, William Johannes recounts the construction of fish barrels in 1849:

It was a custom or practice among fishermen to engage in making shingles and fish barrels or fish packages to increase the income derived from their nets. Shingles in those days were all hand-made, as were also the staves used in making fish barrels...

Each shingle was split from a block of pine, called a bolt, and was shaved and trimmed into shape by the deft use of hatchet and draw-knife. Staves for fish barrels were made in the same way. Of course, the bolts from which shingles and staves were made had to be of the very choicest timber... In those early days shingles and fish barrels were made in little shanties scattered along the banks of each river (Johannes, 1905).

Early French Canadian settlers, such as Louis Gauthier and Eli Niquette, established Two Rivers' earliest cooperages, building barrels for commercial fishers as well as the town's other trade industries (Falge, 1976; McArthur, 1985). In 1863, Niquette constructed a cooperage shop located at 1718 East Street (current day 1914 30th Street), the foundation of which still exists (McArthur, 1985).

By the late 1800s, Two Rivers boasted the Great Lakes' largest Mackinaw fishing fleet. Family enterprises, such as those of the LaClairs, LaFonds, Vaudreuil, Gagnons, and Allies used the vessels to fish pound and gillnets out of the Two Rivers port (Krejcarek, 1969). The Mackinaw's open deck, wood hull, and sail-powered design left fishers highly dependent on weather conditions and limited offshore fishing. However, they were inexpensive to build, maintain, and operate. The height of standard Mackinaw boat masts prevented passage under the 17th Street Bridge, forcing many fishers to moor their vessels south of the bridge. However, fishers occasionally modified the vessel's design to suit their needs. Eugene Allie's clinker-built Mackinaw featured two masts, a jib sail, and claimed to be the fastest boat in the port; its removable mast allowed the vessel to moor upriver, past the 17th Street Bridge (McArthur, 1985).

The city of Manitowoc also served as a fishing center for Manitowoc County, although to a much smaller degree compared to Two Rivers. Located 83 miles north of Milwaukee and seven miles southwest of Two Rivers, the area of Manitowoc boasted a natural harbor and dense pine forests. Founded at the mouth of the Manitowoc River in 1836, the settlement of Manitowoc centered around the lumber and fishing industries. Like Two Rivers, the area developed slowly until the late 1840s. Among the first settlers in Manitowoc were Norwegian immigrants who established themselves within the shipbuilding industry. Some came by the St. Lawrence River and the Great Lakes to join the lumber industry as sawyers (ship carpenters) and skilled woodworkers, and others came to engage in the maritime industry as lake captains and sailors. Swells of German, Bohemian, Polish, and Irish immigrants continued to arrive by steamship. By 1850, the population of Manitowoc County surpassed 3,700 people (Gagnon, 1969).

In the 1850s, Manitowoc County fishers began to fish gillnets from Mackinaw boats. Newspaper accounts reported that the amount of salted fish exported through the port of Two Rivers in 1851 was valued at \$16,198 (Krejcarek, 1969). Operating at a much smaller scale, the port of Manitowoc exported 1,820 half barrels of salted fish in 1855 at the cost of \$4.50 each, with a total value of \$8,190 (Graham, 1857). By 1859, salted whitefish and trout sold in Two Rivers for \$5.00 per barrel (Gagnon, 1969). With the expansion of the county's commercial fishing, new business began to produce and supply fishing gear and technology. Companies such as J. E. Platt & Company supplied outfits with gillnet twine, fish barrels, and fish traps, while the H. Burger Shipyard, established in 1863, constructed 20- to 30-foot wood Mackinaw boats for local fishers (Burger Boat Company, 2021; Manitowoc County Herald, 1850). Girls as young as eight years old found employment in knitting fish nets (Smith & Snell, 1890). Urban Niquette (1833–

1898), a French Canadian immigrant who served as Two Rivers' postmaster, also operated a business as a fish dealer, purchasing fish from local fishers and shipping the harvests to distant markets such as Detroit or New York (*Manitowoc Pilot*, 1898). In a 1966 interview with the Two Rivers Historical Society, Nelson LeClair, a local commercial fisher, recalled Two Rivers' fish dealer operations:

My folks would do business with Niquette. He would order from Chicago and hand it to you without money. Mann Brothers operated the same way. We had a farm with butter and vegetables, etc. and people who worked for Mann wanted to buy those things but had no money—so they bartered (Two Rivers Historical Society, 1966).

Manitowoc County's early fish trade relied exclusively on schooners. Salted whitefish and trout packaged in barrels traveled across Lake Michigan on vessels such as the 60-ton schooner *Solomon Juneau* (built in 1834) and the 24-ton *Liberty* commanded by Captain Guvles. Other schooners that frequented the ports of Two Rivers and Manitowoc include *E. Henderson*, *Wenonah*, *Manitowoc*, *Citizen*, *Columbia*, *Memee*, and *Eliza* (Plumb, 1949). Fishers began making their own wooden shipping boxes and shipping their fish via railway (McArthur, 1985; *Two Rivers Reporter*, 1928). In 1874, railway operations began to freight fish to Chicago, allowing fishers to ship their fish fresh, packed in ice (McArthur, 1985).

In 1861, with the introduction of Charles LeClair's pound net to Manitowoc County, Wisconsin legislature introduced regulations requiring fishers to lay claim to their pound fishing grounds by marking the area with a post or monument to identify their occupation of the area. Fishers were also required to record their name, date, and location in the Manitowoc County Register of Deeds' Fish Claims Book. According to local historian Eugene Krejcarek's analysis of the Manitowoc County Fish Claims Book, 50 entries were made describing the location and descriptions of pound net fisheries between 1864 and 1866. Names on the list included David and Anna Smoke, Jacob Conroe, J. V. Edwards, J. P. Clark, F. Levenhagen, T. Harrington, S. Denis, A. Lamén, Perry P. Smith, A. Wooster, C. Bates, G. Eggers, and C. Schochs (Gagnon, 1969; Krejcarek, 1969). Pleased with the large lifts of 40 to 75 barrels of fish a day afforded by the pound nets, the *Manitowoc Pilot* (1864) reported "two or three weeks more of such a 'run' will make them indifferent to the price of gold." At least 35 pound nets were in operation in 1865, a figure that peaked at between 50 and 60 in 1881 (Smith & Snell, 1890).

Set and tended by crews of at least two, pound nets varied in size from 26 to 48 feet in depth. Crews typically set their nets as early as May 5th and removed them as late as mid-October (Smith & Snell, 1890). At some point in the early 1900s, Nelson LeClair constructed what he claimed was the first steam-powered pile driver in the Great Lakes commercial fishing industry. LeClair acquired a second-hand boiler and engine, which he then fashioned onto a scow he purchased at the cost of \$3,000 (Two Rivers Historical Society, 1966).

Less vulnerable to loss than gillnets, the stationary pound nets were much more expensive to replace when damaged. Manitowoc fisher Oliver Pilong incurred thousands of dollars in damages when a passing vessel ran over his nets, shredding the mesh to pieces in the summer of 1875 (*Manitowoc County Chronicle*, 1875a). Similarly, Two Rivers fishers David Smoke and Gottlieb Damler lost two sets of pound nets to suspected arson when their net shed burned in

December 1868. Although insured for \$1,800, Smoke and Damler valued the pound nets at over \$3,000 (*Manitowoc Pilot*, 1868).

In August of 1868, the *Manitowoc Pilot* acknowledged the significance of Manitowoc County's commercial fishing industry, stating "from a point seven or eight miles north of Two Rivers south to this place there are no less than one hundred men, who with their families, are dependent on this branch of industry for a livelihood" (Krejcarek, 1969). The 1868 Manitowoc City Directory identified nine commercial fishers and 27 individuals involved in the shipbuilding industry (Edwards & Co., 1868). Similarly, the U.S. federal census of 1870 lists eight commercial fishers employed in Manitowoc and 40 in Two Rivers. Of the 40 Two Rivers fishers, 26 were born in Canada and six were born in Germany (Family Search, 2022d).

In the early 1870s, Manitowoc County's commercial fishers acknowledged a decline in local fish stocks. In response, many fishers adopted new and more efficient fishing methods, while others chose to leave Manitowoc for areas with healthier fisheries. Members of the LaFond family travelled to the east shore of Lake Michigan to continue their fishing season in the summer of 1875 (*Manitowoc County Chronicle*, 1875b). Similarly, in 1882, C. Endress of Manitowoc moved his operations to Whitefish Point, Lake Superior (*Manitowoc Lake Shore Times*, 1882).

Declines in Lake Michigan's nearshore fishing led fishers to travel farther offshore to deeper waters, an adaptation facilitated by steam-powered vessels. Steam tugs fished out of Two Rivers and Manitowoc as early as 1870. The gillnet steamer *Marion* operated out of Two Rivers from 1872–1879. In 1874, Joseph Gagnon's sons, Joseph (1842–1896), Jonas (1846–1915), and Peter J. (1849–1917), commissioned Two Rivers' first steam-powered tug, *M. A. Gagnon* (Find A Grave, 2022; *Two Rivers Reporter*, 1915, 1917; McArthur, 1985). Named in honor of the men's mother, Marie Ann (Boisvert) Gagnon, the vessel was constructed by two Danish shipbuilders, Jasper Hanson and Hans M. Scove, in their shipyard on the east side of Two Rivers and was later towed to Richards Iron Works of Manitowoc and fitted with a steam engine, rudder, and other gear (*Two Rivers Chronicle*, 1907). Launched on July 22, 1874, less than nine weeks following the tug's commission, *M. A. Gagnon* operated out of Two Rivers port as a gillnet and general towing tug (Gagnon, 1969; Wisconsin Shipwrecks, 2023d). Jonas acted as the tug's captain, while Peter served as the engineer and Joseph tended the gillnets (Mansfield, 1899; *Manitowoc Pilot*, 1881, 1882; *Two Rivers Reporter*, 1914). The Gagnon brothers operated *M. A. Gagnon* for nine years before selling the vessel to the U.S. Army Corps of Engineers' dredge department in 1883 for \$2,500 (Wisconsin Shipwrecks, 2023d; *Two Rivers Reporter*, 1914; U.S. Army Corps of Engineers, 1883). Under federal ownership, the tug was renamed *Dione* (U.S. Army Corps of Engineers, 1883). The 76-foot *Bertha Endress* fished out of Manitowoc for one season in 1883 before moving north to Lake Superior. The Chicago steamer *Boss* also fished out of Manitowoc County for one season in 1884 before drifting offshore during a storm and sinking (Smith & Snell, 1890).

In 1885, 300 of Two Rivers' population of 2,100 directly relied on the region's commercial fishery. In comparison, Manitowoc's 8,000-person population entertained a much smaller fishing industry (Smith & Snell, 1890). Additionally, a small yet productive fishing center was established at the village of Hika in 1884. Settled largely by German immigrants, Hika, previously named Centerville, is currently part of the Town of Cleveland. Less than 2 square

miles in size with 1.5 miles of shoreline, Hika is located roughly 11 miles north of Sheboygan and 12 miles south of Manitowoc (Falge, 1976). In 1885, six fishers operated one of Manitowoc County's eight pound net fisheries (Smith & Snell, 1890). In total, commercial fishing in Manitowoc County employed 70 persons in 1885, including 3 shoremen, and maintained a fleet of 21 gillnet boats, 12 pound net boats, nine pile drivers (barges for driving piles), and one small skiff. A federal review of the area's harvest equipment found that Manitowoc County retained 1,383 gillnets, 20 pound nets, two seines, three fyke nets, 80,000 feet of set line, and one cast net, estimated at a combined value of \$20,400. In 1885, the area's total harvest consisted of 29,200 pounds of fresh whitefish, 2,000 pounds of salt whitefish, 240,000 pounds of fresh trout, 42,700 pounds of salt trout, 1,400 pounds of fresh pike, 2,800 pounds of fresh sturgeon, 5,125 pounds of fresh herring (*Coregonus artedi*, also called cisco, a relative of chubs and lake whitefish), 500 pounds of salt herring, and 3,300 pounds of perch and other fish, amounting to a total value of \$13,200 (Smith & Snell, 1890).

Manitowoc County's commercial fishing began to mechanize after 1870, a trend that continued into the 20th century. Gas-powered vessels slowly replaced steam fish tugs from the 1910s through the 1920s. In 1909, commercial fisherman Fred Wilke commissioned the 48-foot, 24 horsepower, gas-powered fish tug *Clara S* from the Burger Boat Company of Manitowoc. Similarly, John LaFond purchased the 40-foot, gas-powered *Lorena* from Burger Boat Company in 1912 and owned the 33-foot, gas-powered *Sunrise* in 1913 (*Blue Book of American Shipping*, 1913; Hadland & Mackreth, 2018). By 1924, the Two Rivers fishing fleet included at least nine gas-powered vessels, including Fred Wilke's *A.W.*, Mitchel LaFond's *Claud L*, Walter Alice's *Gervase A*, Frank Lonzo's *Howard L*, Bernard P. Nehring's *Margaret*, Manville LaFond's *Monitor*, Norman Allie's *Reindeer*, Fred Chapek's *Water Lilly*, and *Clara S*, which Henry LaFond acquired from Fred Wilke (Bureau of Navigation, 1925). With the conversion of Mackinaws to gas power, more fishers gained the ability to moor their vessels beyond the 17th Street Bridge, and demand for Two Rivers river frontage increased (McArthur, 1985).

However, steam-powered vessels persisted within the Two Rivers fishing fleet into the early 20th century. In 1918, John L. Monka (1867–1945) of Two Rivers acquired the 61-foot steam tug, *Henry Gust* (Wisconsin Shipwrecks, 2023e; *Manitowoc Herald-Times*, 1945). Henry Gust of the Jones Island fishing village of Milwaukee commissioned the Milwaukee Shipyard Company to construct the wooden steam screw-powered fish tug in 1893 (Bureau of Navigation, 1894). After rebuilding the boat at the Sturgeon Bay Shipyards of Sturgeon Bay, Wisconsin, Monka fished the steam tug with gillnets out of Two Rivers with the help of his brother, Frank M. Monka (1870–1955), Henry “Butch” LaFond (1873–1941), and Urban Gagnon (1882–1930; *Manitowoc Herald-Times*, 1942, 1955; *Manitowoc Herald News*, 1930). The crew operated the vessel from a dock in the West Twin River, west of the Washington Street Bridge (*Manitowoc Herald News*, 1930).

With the Kahlenberg Brothers' development of the semi-diesel marine engine, Manitowoc County's fisheries reached their production peak in the 1920s and 1930s. In 1914, the 43-foot fish tug *Karlsruhe*, owned by Arthur J. Luebke of Two Rivers, was equipped with the first manufactured Kahlenberg oil engine, a 50–60 horsepower two-cylinder (Hadland & Mackreth, 2018; Gagnon, 1969). The local fleet continued to expand throughout the first half of the 20th century with the acquisition of diesel-powered fish tugs, such as Everett LaFond's *Bon Jour*,

Henry LaFond's *Faithful*, Rawley Fish Company's 55-foot *Badger*, and Hugo W. Heller's *G. H. Heller* (Hadland & Mackreth, 2018). In 1934, the *Wausau Daily Herald* described the Two Rivers fishing fleet:

Fishermen, whose families were engaged in the industry when Two Rivers was a tiny hamlet, have kept pace with the times—just like the motorist who prides in owning a new car. In this era of 'oil burners' boat building has been revolutionized. Some like fan-tail stern boats. Another firm owns a craft with only portholes for a view into the deep blue. They're all the last word in design as well as in seaworthiness, and a radical departure from the early mackinaws that blotted the waterfront nearly a century ago (Wausau Daily Herald, 1934).

In 1945, the U.S. Treasury Department's annual list *Merchant Vessels of the United States* included 13 fishing vessels operating out of Two Rivers. The fishing fleet consisted of nine diesel-powered vessels, including John Allie & Sons' *John V. Allie*, Walter J. Allie's *Allie Brothers*, Norbert Frasch's *Buccaneer*, Joseph Gates' *Merleen*, Everett LaFond's *Mercury*, Manville LaFond's *Manville L*, Edward LeClair's *Le Clair Bros.*, Rawley Fish Company's *Amity*, and Adolph Ruzek's *Ranger*, as well as four gasoline-powered tugs, including Joseph O. Grenier's *Geraldine*, Everett LaFond's *Dude Fisherman*, and William Taddy's *Norine V* and *Two Brothers* (Bureau of Navigation, 1945).

Burger Fishing Tugs

Although the city of Manitowoc was home to relatively few fishers, the city's shipbuilders contributed significantly to Great Lakes commercial fisheries in the WSCNMS region and beyond. Perhaps most notable for commercial fishing vessels is the Burger Boat Company. Henry B. Brauburger (1839–1907) (also spelled Browburger), son of Simon and Margretta Brauburger, immigrated to New York from Bad-Homberg-Ober-Erlinbach, Deutschland in 1854 at the age of seven (Ancestry, 2021). Once in America, the Brauburger family shortened their name to "Burger" (also spelled Berger). Around 1870, the Burger family moved to Milwaukee where Henry, at the age of 18, began an apprenticeship as a shipbuilder at the Wolf & Davidson Shipyard. Henry Burger moved to Manitowoc in 1863 and established the H. Burger Shipyard, producing 20- to 30-foot wood Mackinaw boats for local commercial fishers. In the early 1870s, Henry joined in partnership with Greenleaf S. Rand (1830–1885), the owner of another Manitowoc shipyard. The men consolidated their companies to form the Green-Rand, Burger Shipyard. Together, Burger and Rand produced sailing ships such as the 208-foot schooner *J. I. Case* and the 138-foot barge schooner *City of Manitowoc* (Burger Boat Company, 2021; The Manitowoc Company, 2002; Bowling Green State University, 2019a; Bureau of Navigation, 1885). Following Rand's death in 1885, Henry entered a second partnership with his nephew, George B. Burger (1852–1911), establishing the Burger and Burger Shipyard. In 1887, the Burgers expanded their company, purchasing the only dry dock in Manitowoc, from which they provided ship repairs and construction (Burger Boat Company, 2021).

Over the next decade, the Burger and Burger Shipyard gained fame for their quality and craftsmanship, producing dozens of notable vessels, such as the three-masted, 81-foot schooner *Lizzie Metzner*; the 171-foot steamer *Petoskey*; the 201-foot ferry *Indiana* for the Goodrich Transportation Company; and the last fully-rigged schooner constructed on the Great Lakes, the

146-foot *Cora A* (Bureau of Navigation, 1902). In 1893, Burger and Burger constructed the 55-foot fish tug *Julia C. Hammel* for E. Hammel, Sr. of Two Rivers. The company also produced the 55-foot steam-powered fish tug *Alphard* for Peter Schroeder of Two Rivers (Colton, 2021).

In 1902, Henry and George Burger retired from the shipbuilding business, selling the Burger and Burger Shipyard for \$110,000 to Elias Gunnel, William Geer, and John West, all of Chicago, who immediately formed the Manitowoc Dry Dock Company (The Manitowoc Company, 2002). However, the Burger family name continued to thrive in the boatbuilding industry. In 1892, George Burger's brother, Henry B. Burger, Jr. (1863–1914), formed his own company, the Henry B. Burger Shipyard, located directly across the Manitowoc River from the original Burger and Burger Shipyard. Henry Burger, Jr. constructed small sailing boats and commercial fishing vessels. In the early 1900s, Burger began building gas- and diesel-powered vessels, fitted with Kahlenberg engines. In 1909, H. B. Burger completed the 48-foot, diesel-powered fish tug *Clara*, equipped with a 24 horsepower Kahlenberg engine, for Fred Wilke of Two Rivers (Colton, 2021). With time, Burger began to construct larger wooden vessels, and by the 1910s, the company developed a reputation for building custom motor yachts. Following Henry Jr.'s death in 1914, his four children, Henry C., George M., Walter W., and Caroline G., assumed control of the shipyard and incorporated the business as the Burger Boat Company.

During World War I, the Burger Boat Company fulfilled multiple government defense contracts, including 13 wooden tugs for the U.S. Army Emergency Fleet Corps, a 110-foot submarine chaser, and minesweepers (*Grant County Herald*, 1919; Burger Boat Company, 2021; *Lancaster Teller*, 1919; *Stevens Point Gazette*, 1917). After the war, the company returned to producing luxury cruising and sailing craft for the recreational market, but also continued to fulfill government contracts for entities such as the U.S. Shipping Board (Burger Boat Company, 2021; *Sheboygan Press*, 1920). In the 1930s, the Burger Boat Company adapted the electric arc welding method to shipbuilding and began producing steel gillnet fish tugs such as the 52-foot *Smith Bros.* in 1936 for the Smith Bros. firm of Port Washington and the 50-foot *Bossler Brothers* in 1937 for John Bossler and Sons Company, also of Port Washington (*The Fisherman*, 1936, 1937; Burger Boat Company, 2021). In 1938, the company also produced the United States' first all-welded steel auxiliary ketch, the 75-foot *Tamaris* for Ralph T. Firedmann of Milwaukee (Bureau of Navigation, 1939).

During World War II, the Burger Boat Company built six 136-foot minesweepers powered by twin 600 hp diesel engines, two 110-foot sub-chasers, four 136-foot patrol craft, and two 165-foot ocean-going rescue tugs (*Marshfield News-Herald*, 1945; *Capital Times*, 1941a, 1941b; *Wisconsin State Journal*, 1941; *Daily Tribune*, 1941). With the end of the war, Burger returned to producing recreational sailing and commercial fishing vessels. The Burger Boat Company's first post-war contract was for the construction of the 50-foot steel hull gillnet fish tug *Richard E* for the Eichler Fish Company of Kenosha. From the beginning of *Richard E*'s construction in June 1944 until December 31, 1946, the Burger shipyard maintained a minimum of two active gillnet tug construction projects at any given time. Over the 30-month period, the company produced 25 steel fish tugs, most with a standard hull design and custom superstructures built to the owner's specifications (*The Fisherman*, 1947).

In 1959, the Burger family reorganized the company. Henry E. Burger, son of Henry C., became president, Elias Gunnell II replaced George M. Burger as vice president, and Caroline G. remained the company's treasurer and secretary. From the 1960s through the 1980s, the Burger Boat Company developed a national reputation for producing luxury aluminum motor yachts and collaborating with celebrated naval architects including Sparkman and Stephens, J.B. Hargrave, C. Raymond Hunt, and Donald O'Keefe (*The Fisherman*, 1947). Henry E. Burger sold the Burger Boat Company in the fall of 1986 to John McMillian, who later sold the company to United Shipbuilders of America in April 1989. Unfortunately, in November 1990, the Burger Boat Company closed in response to financial hardship. Businessmen David Ross and Jim Ruffolo purchased the company's assets in 1993 and reopened the shipyard, maintaining the company's original name. As of 2022, the Burger Boat Company of Manitowoc continues to produce custom yachts and commercial vessels (*The Fisherman*, 1947).

Responding to Declining Fish Stocks

Manitowoc County's fishing heyday continued into the 1930s. However, introduction of the invasive sea lamprey, coupled with pollution and overfishing devastated western Lake Michigan whitefish and trout populations. In response, Two Rivers fishers focused on harvesting a greater number of chubs and perch. However, as fish populations continued to decrease, Manitowoc County fishers felt even greater pressure from the introduction of Wisconsin's 1933 commercial fishing regulations requiring state harvesting licenses, size limits, and bag limits (Gjestson, 2013; Wisconsin Legislature, 1933). Diminishing harvests and falling profits plagued the area's industry. Resentment toward the Wisconsin Conservation Department escalated among fishers as state conservation wardens enforced the new regulations through gear and harvest seizures and fines.

Animosity between Manitowoc County fishers and the Wisconsin Conservation Department continued to grow as fishers resisted the newly imposed regulations and the presence of state game wardens increased within daily fishing operations. One example occurred on December 3, 1947, when Wisconsin conservation officer Donald Euers of the conservation enforcement vessel *Barney Devine* attempted to board Joseph F. LeClair's fish tug *Susie-Q* to inspect the crew's nets. According to newspaper reports from that day, "the tug *Susie-Q* attempted to ram the *Barney Devine* as the wardens were lifting LeClair's nets for an examination." As the LeClair tug pulled away, Euers grabbed hold of *Susie-Q*'s pilothouse railings and held on for several hours as LeClair piloted the vessel east, farther offshore into Lake Michigan. Every time Euers attempted to gain access to the tug's interior through a window, LeClair fended the warden off with a gaff hook. LeClair eventually allowed Euers entrance to the tug as icicles began to form on his body. Upon their return to the fish docks, law enforcement officers detained LeClair and his crew, charging the men with "obstructing the seizure of evidence of alleged commercial fishing violations" and eventually convicting the crew of fishing with illegal nets (*Appleton Post-Crescent*, 1947; *Sheboygan Press*, 1947; *Leader-Telegram*, 1947; Rhines, 2003).

Unable to sustain profitable operations, many fishers left the industry. From 1923 to 1946, the Two Rivers fishing community decreased from 43 to just 18 operating outfits (Wright Directory Company, 1923). Shortly after the enforcement of Wisconsin's 2 5/8-inch mesh regulation, Frank Monka and Urban Gagnon ended their commercial fishing careers (*Manitowoc Herald*

News, 1930). Monka retired his steam tug, *Henry Gust*, docking the vessel in the Two Rivers port. On June 27, 1935, under tow to another location, *Henry Gust* began to take on water. Monka made the decision to intentionally burn and sink the vessel. Today, *Henry Gust*'s partially intact hull, as well as the vessel's machinery, boilers, and propeller, rests in 80 feet of water, three miles off the coast of Twin Rivers Point (Wisconsin Shipwrecks, 2023f; *Manitowoc Herald News*, 1930).

Joseph F. LeClair, son of Charles LeClair, Jr., continued the family pound net fishing tradition throughout the first half of the 20th century. The invasive sea lamprey, however, devastated Two Rivers' whitefish and trout populations, forcing fishers to target other species. In 1947, Joseph LeClair converted his pound net operations to gillnet by purchasing the 38-foot gillnet fish tug *Susie-Q*. Fitted with a 120 horsepower diesel engine, *Susie-Q* enabled LeClair to travel farther offshore to deeper water to harvest chubs (Rhines, 2003; Bureau of Navigation, 1948). The tug's steel hull allowed the vessel to serve as an icebreaker and extended the crew's fishing season into the winter. Joseph's son, Daniel "Pete" LeClair, began fishing with his father in 1944 at the age of 12. Following Joseph's retirement from commercial fishing in 1950, Pete purchased the fish tug and established the Susie-Q Fish Company, which he operated with the help of his brother, Paul (*Manitowoc Herald-Times*, 2011). In 1956, 14 commercial fishing operations remained active in Manitowoc County.

Beginning in the early 1950s, invasive alewife further disrupted Lake Michigan's ecosystem and damaged the local fisheries. In response, the Susie-Q Fish Company purchased the 50-foot steel trawler *Avis J*, and in May 1962, the Susie-Q Fish Company received approval from the Wisconsin Conservation Department to trawl offshore of the East Twin River for three days, harvesting alewife to sell to local mink farms (Bowling Green State University, 2019b; *Manitowoc Herald-Times*, 1962). LeClair's experimental trawling proved wildly successful. Although efficient, traditional trawling methods posed serious hazards to fishers. As crews hauled heavy nets filled with smelt over the tug's gunnels, uneven weight distribution paired with rolling seas increased the risk of vessels capsizing. Acknowledging these dangers, Pete LeClair developed and patented a stern ramp trawler in the 1960s. The mechanism design allowed fishers to pull trawls on deck via a ramp rather than lifting them over the side, improving the vessel's operational stability (*Manitowoc Herald-Times*, 2010).

In 1964, Pete LeClair worked with Captain William Kunesh and the Wisconsin Small Business Advisory Council to organize and establish the Peninsula Processing Corporation in Sturgeon Bay for the purpose of processing alewife into meal for swine and poultry feed, oil for paints and varnishes, and soluble B-complex poultry feed additives. According to a newspaper article published by the *Manitowoc Herald-Times* in March 1964, the Wisconsin Small Business Advisory Council expected the new processing plant to generate considerable employment opportunities, stating "Peninsula Processing is expected to create at least 15 jobs by the end of the year and afford employment to 108 fishermen. Eighteen of these will be with trawlers and 90 will use nets. The trawlers are expected to work 12 hours a day while the netmen put in 10 hours daily for 110 days. Combined they will be the equivalent of 71 persons employed full time" (*Manitowoc Herald-Times*, 1964). Several Sturgeon Bay vessels harvested alewife to supply Peninsula Processing as well as three Two Rivers fish tugs, including Pete LeClair's *Susie-Q* and *Avis J* and Pete's cousin Charles LeClair's 48-foot *Morning Star* (Rhines, 2003; Bureau of

Navigation, 1965). The *Manitowoc Herald-Times* reported that between 1965 and 1980, Two Rivers' alewife harvest "was so productive they had to load the fish off the boats with a conveyer belt into semi-trailers" (Rhines, 2003). By 1980, alewife constituted the primary catch of Two Rivers' four remaining fishing operations, Susie-Q Fish Company, Art Swaer and Sons, Frank LeClair and Sons, and the Kulpa Family (Rooney, 1980). The Susie-Q Fish Company produced approximately 10 million pounds of alewife per year during its peak (Koberstein, 1979).

During the 1960s and 1970s, the commercial harvest of alewife in Two Rivers proved mutually beneficial for both commercial and sport fishing industries. In a 1999 newspaper interview, Pete LeClair recalled the early days of alewife fishing: "When the sports fishing was the best was when we caught alewives on the beach. Sports fishing helped us and we helped them bring tourists into the area. Lots of people came here and charter fished and we had smelt fries on the side." However, as sport fishing lobbyist groups formed, such as the Northeastern Wisconsin Great Lakes Sport Fisherman in 1974, the relationship between Two Rivers commercial and sport fishers rapidly deteriorated. The Northeastern Wisconsin Great Lakes Sport Fisherman successfully advocated for state limits on commercial alewife harvests, arguing that large alewife populations were needed to sustain Lake Michigan's game fish, such as salmon (Rentmeester, 1999).

Pollution, not overfishing or competition, ended the alewife fishery at Two Rivers. In 1979, the U.S. Food and Drug Administration issued new regulations lowering the amount of acceptable polychlorinated biphenyls (PCBs) from 5 to 2 ppm. At the time, the PCB levels of alewife harvested in Two Rivers ranged between 2.4 and 3.5 ppm. Upon hearing the Food and Drug Administration's ruling, Pete LeClair told the *Manitowoc Herald-Times* "We're all done. Today is our last day. We're going to sell the boats" (Koberstein, 1979). However, the LeClair family once again adapted their fishing practices and business model to remain active within the commercial fishing industry. In December 1981, Pete LeClair opened the Susie-Q Fish Market (*Manitowoc Herald-Times*, 1981). Located at 1810 East Street, the market featured two smokehouses. By 1989, the LeClair company employed 25 persons, operated two commercial licenses and four vessels, and held a permit to harvest 80,000 pounds of chub per year (Bestul, 1989; *Sheboygan Press*, 1989).

The Susie-Q Fish Company continued to adapt their harvest strategies based on changing regulations, fish stocks, and market conditions. Throughout the late 1980s and 1990s, the LeClair family trawled for smelt, harvesting fish seven to eight miles from shore at depths between 100 and 300 feet depending on the season (Kahlert, 1986; Rentmeester, 1999). They also used trap nets for many years to harvest lake whitefish. By 1999, Susie-Q Fish Company was the only fishing operation in Wisconsin harvesting Lake Michigan smelt. In 2000, due to a decrease in the smelt population (on which lake whitefish feed), the LeClairs took part in a Wisconsin Sea Grant funded experimental program to use trawling to catch lake whitefish. The company also worked with Wisconsin Sea Grant, allowing fisheries specialist Dr. Titus Seilheimer to study the catch and bycatch while using the trawling method.

In 2022, the Susie-Q Fish Company, now owned by Pete LeClair's sons, Mike and Paul G., is Manitowoc County's last commercial fishing business. The LeClair crews primarily harvest whitefish and purchase a variety of other fish species such as trout, perch, and bluefin from

dealers around the Great Lakes. The Susie-Q Fish Market continues to run in its original location. The company operates six smokehouses and produces smoked chubs, salmon, trout, whitefish, herring, and carp products, which are sold throughout the Midwest including to Supreme Lobster in Chicago.

Chapter 5: Commercial Fishing in Sheboygan County, Wisconsin

Located roughly 30 miles south of Manitowoc and 50 miles north of Milwaukee, Sheboygan, in Sheboygan County, is situated on the western shore of Lake Michigan at the mouth of the Sheboygan River. The 81-mile-long Sheboygan River flows through Fond du Lac, Sheboygan, Calumet, and Manitowoc counties, discharging into Lake Michigan. Tribal communities, including the Menominee, Ojibwe, Sacs, Foxes, Pottawatomi, and Ho-Chunk, inhabited the area prior to 17th-century French exploration (Western Historical Company, 1881a).

The earliest Euro-American records of fishing activity come from the travels of Colonel Abraham Edwards of Detroit, who witnessed Indigenous peoples spearfishing along the shores of present-day Sheboygan during his journey from Green Bay to Chicago in 1818 (Edwards, 1868). Later, Judge Morgan Lewis Martin described his experience while sailing along the Wisconsin coast in 1833 during an exploratory tour as a member of the legislative council of Michigan Territory:

On Sheboygan river, four miles above the mouth, there was an Indian village. We found a net spread near the mouth of the river, and in it two fine fish which we appropriated without ceremony. Next morning, an Indian from the village overtook us and supplied us with dried and smoked whitefish, which we found quite palatable (Thwaites, 1888).

Sheboygan's earliest white settlements centered around lumber and fishing. In 1834, William Paine of Chicago and Colonel Oliver C. Crocker constructed the first sawmill on the Sheboygan River, nearly three miles from the mouth, and harvested white pine from the area's dense forests (Gaffron, 1909). The following year, the men began to erect a dam across the Sheboygan River, at an area later known as the "Ormssbee Mill." A local Indigenous tribe objected to the project's construction, arguing that the dam would obstruct fish from migrating upriver. However, the project continued shortly after (Zillier, 1912).

Although the land was officially platted in 1835, the financial crash of 1837 halted immigration and land settlement in Sheboygan (Gaffron, 1909). Three miles south of Sheboygan, a few fishers developed seasonal cabins along the Lake Michigan shoreline at the mouth of the Black River. David Wilson (1802–1851) of New York first arrived in the area in 1840 and was later joined by James and Leonard Osgood in 1849 and Joseph Fairchilds in 1850. The men harvested whitefish, trout, and perch from Mackinaw boats, which they salted and shipped aboard passing schooners and steamers for sale in Cleveland and Detroit at the price of \$6.00 a barrel (Zillier, 1912; Gaffron, 1909). Around 1846, the village of Wilson, named after David Wilson, officially separated from the town of Sheboygan. The commercial fishing community continued to expand across the Sheboygan County lakeshore. The 1850 U.S. census recorded 55 men employed as fishermen within the connecting towns of Holland and Wilson, 39 of whom were born in the United States while the rest hailed from Canada, Germany, England, and Ireland (FamilySearch, 2022e). Local newspapers reported the success of Wilson's gillnet industry and large seasonal harvests of whitefish (*Sheboygan Mercury*, 1850a).

Fishing large nets from open-decked Mackinaw boats proved dangerous. In July 1850, 20-year-old Orrin and 16-year-old Ira Osgood, two of James Osgood's sons, drowned a mile offshore

while returning from their fishing grounds (*Sheboygan Mercury*, 1850b). Less than a year later, in April 1851, David Wilson, the town's founder, drowned with a fellow fisherman when their vessel capsized in a gale. The men's deaths devastated the Wilson community (*Sheboygan Mercury*, 1851). However, the Wilson commercial fishing industry continued to thrive until local impacts of overfishing forced fishers to move their operations. By 1860, only 13 fishers remained in the township (FamilySearch, 2022f). The Wilson family moved their gillnet operations to Sheboygan in the 1870s and soon left the commercial fishing business altogether (*Sheboygan Press*, 1927; FamilySearch, 2022g).

Sheboygan's early fishing industry developed slowly. Colonel John Maynard and Henry H. Conklin constructed the town's first pier in 1841 at the foot of Center Street, extending north of the mouth of the Sheboygan River (Klein, 2022). By 1842, only a handful of families resided within Sheboygan, most of whom settled from the eastern and surrounding states, including the William Ashby family of New York, the John Glass family of Illinois, the David Wilson family of New York, the Stephen Wolverton family of Pennsylvania, and Wentworth Barrow of Vermont (Wisconsin Historical Society, 1894; Western Historical Company, 1881a). Describing Sheboygan's early development, a 1909 article published in the *Sheboygan County Historical Review* stated "There was nothing like a store here until 1843, when the mail carrier brought from Milwaukee what each felt to be his needs. The only thing that people had to send away were fish and lumber" (Gaffron, 1909).

As the county's early industries developed, the Sheboygan community turned their attention toward expanding the area's infrastructure. Increased lake traffic required proper harbor facilities. The presence of a sandbar at the mouth of the Sheboygan River prevented large vessels from entering the harbor. In 1845, James Fransworth, with the financial support of Henry Newberry of the Detroit Newberry shipping family, extended the town's pier to 80 feet in length, enabling ships to dock and unload passengers and cargo without first transferring to a smaller vessel (Klein, 2022). From 1845 to 1850, Sheboygan experienced a large influx in immigration, largely from Germany. In 1845, 1,417 immigrants arrived at the port of Sheboygan. In 1848, nearly 6,200 persons arrived by vessel (Western Historical Company, 1881). Many immigrants chose to settle in Sheboygan while others moved farther west to Minnesota and Iowa (*Sheboygan Mercury*, 1850c). The county's population of 227 persons in 1842 ballooned to 8,370 persons in 1850 (Chapman, 1855). By 1845, at least four commercial fishers operated out of the port of Sheboygan, including Edmund Weed of New York, Andrew J. Hisk of New York, John Fergeson of New York, and John Glass of Illinois (Western Historical Company, 1881a). In October 1850, the *Sheboygan Mercury* reported that fishers exported 77 barrels of fish through the Port of Sheboygan during the month of September (*Sheboygan Mercury*, 1850c; Western Historical Company, 1881a).

In 1852, the Wisconsin legislature passed a bill authorizing the village and County of Sheboygan to borrow \$10,000 and \$20,000, respectively, to finance the dredging and construction of a harbor. The federal government contributed an additional \$30,000 (*Daily Free Democrat*, 1852). Dredging activities began immediately, and by 1854, the Sheboygan harbor featured two parallel piers spaced 175 feet apart extending lakeward by 1,000 feet. With more efficient harbor facilities, Sheboygan's fisheries exports increased. Local newspapers reported that Sheboygan exported 531 half-barrels of fish in September and 500 half-barrels in December of 1854

(*Weekly Wisconsin*, 1854). Sheboygan's commercial fisheries benefited from the incorporation of the Sheboygan & Mississippi Railroad (later Sheboygan & Fond du Lac Railroad Company) in 1852. The railway lines extended 78 miles through the Wisconsin towns of St. Marie, Princeton, Brooklyn, Ripon, and Riverdale and enabled fishers to ship their harvests to more inland markets (Western Historical Company, 1880; Joerns Brothers, 1902).

Johann Lutz, Jr., one of Sheboygan County's earliest fishermen, entered the industry in 1850 at the age of 21. Johann immigrated to Milwaukee with his two older siblings, Josephine and Joseph in 1847 from Grünmettstetten, Germany. Two years later, Johann moved to Sheboygan County, where he entered the commercial fishing industry deploying seine nets in the Sheboygan River. Johann established himself in a small fishing village, approximately seven miles south of Sheboygan called Pine Grove (current day Kohler-Andrae State Park). Lutz harvested sturgeon, whitefish, lake trout, and perch alongside Sheboygan County's early settlers, including David Wilson, Joseph Fairchild, Gilbert Smith, and Nicholas Stone. Lutz eventually upgraded his operations with the purchase of a Mackinaw boat, allowing him to travel offshore in Lake Michigan. As a father of 13 children, Johann began to teach his sons the commercial fishing trade, training them aboard his Mackinaw (Lutz, 2021).

In 1873, Lutz commissioned Robert Grey of Sheboygan to construct the 45-foot steam tug *Maggie Lutz*, named for Johann's daughter. In October 1873, Johann's eldest son, Joseph (1855–1873) drowned in a fishing accident aboard *Maggie Lutz*, prompting Johann to sell the fish tug to the Wilson Brothers fishing operation (*Sheboygan Press*, 1926). Shortly after, Johann commissioned the larger steam tug *J. Sheriff* on which he trained his second son, Theodore C. Lutz. In 1875, Theodore moved to St. Joseph, Michigan and acquired the steam tug *R. Davis*, before moving his family and company to Escanaba, Michigan in 1878 (Lutz, 2021).

Another influential fisherman, Frederick Koehn (1811–1894) was born in Lenzerselge No. 3, Bradenburg, Germany, and gained experience as a deckhand and captain on the River Elbe before moving to Sheboygan in 1853. Working at odd jobs, Koehn saved enough money to construct fishing nets and begin fishing the Sheboygan River. After acquiring a boat, he moved his operations to the Lake Michigan shore. In 1861, Koehn began smoking whitefish, first selling to the local market, and later shipping his product to Chicago, Cincinnati, and Pittsburgh. In 1873 he constructed the 48-foot steam-powered fish tug *Hoffnung*, from which he fished gillnets (Western Historical Company, 1881a). By 1881, Koehn established himself as a prominent fish merchant, employing six fishers and harvesting an annual catch of 200,000 pounds (Western Historical Company, 1881a). Koehn purchased the 70-foot steam tug *Frederick Koehn* in 1886, and commissioned Rieboldt and Wolter shipyard of Sheboygan to construct the 61-foot steam tug *Hoffnung Bros.* in 1890 (Bureau of Navigation, 1896). On March 5th, 1892, Frederick Koehn, Sr. and his sons, Fred and Henry Koehn, organized the Frederick Koehn, Sr. Fish Company. At its peak operations, the company operated two steam tugs and employed 45 men to harvest and smoke the catch (Zillier, 1912; Wisconsin Historical Society, 1894).

By the early 1880s, Goodrich Transportation Company steamers traveling the Wisconsin coast made daily stops to pick up cargoes of fish at Sheboygan (Western Historical Company, 1881a). The 1885 report of the Commissioner of Fish and Fisheries identified 92 men employed in the city's fishing industry, operating 5 fishing steamers, 9 gillnet tugs, 27 pound net boats, 8 pile

drivers, and 43 sail and row boats. Overall, Sheboygan's fishers owned 2,028 gillnets, 38 pound nets, and 4,100 set line hooks and harvested 358,420 pounds of blue fin, 50,200 pounds of whitefish, 406,515 pounds of trout, 3,000 pounds of pickerel, 13,050 pounds of sturgeon, and 31,550 pounds of herring (Smith & Snell, 1890). Sail-powered vessels, such as E. Sonnemann and Company's *Smuggler* and Adam Schraut's *Alberdin*, harvested monthly catches averaging 9,000 and 4,000 pounds, respectively, using gillnets (Western Historical Company, 1881a). Fisherman Alvin Warner shipped an average of 10,000 pounds per month (Western Historical Company, 1881a). Steam-powered gillnet tugs, such as Peter Feagan and Albert Fairchild's *Maggie Lutz*, landed about 9,000 pounds of fish per month (Western Historical Company, 1881a). In contrast, Ole M. Ellison, an immigrant fisherman from Norway, fished exclusively hooks from his fishing smack and caught about 3,000 pounds of fish per month (Western Historical Company, 1881a).

Although Sheboygan fishers shipped most of their fish to larger cities like Chicago, the local markets also consumed a sizable portion of the catch. The Schwarz Fish Company was organized in 1912 by brothers Herman Schwarz, Sr. and William Schwarz. In the company's early beginnings, the Schwarz brothers smoked chubs brought to the docks along the Sheboygan River with smokers they had purchased from the Fred Koehn Fish Company and peddled their products to local grocery stores and saloons (Mueller, 1979). In 1924, the men opened a brick and mortar business at 3028 South 9th Street, where the company continues to operate today as a wholesale processor and distributor, supplying Wisconsin and northern Illinois with fresh and processed fish harvested from the Great Lakes and imported from the Atlantic and Pacific oceans. In 1953, under ownership of Herman Sr.'s son, Marcel Schwarz, the Schwarz Fish Company opened a retail store at 828 Riverfront Drive in Sheboygan, selling a variety of smoked, frozen, and fresh fish (Schwarz Fish Company, 2022).

Despite growing local harvests, the failing health of Lake Michigan's fisheries prompted the Wisconsin Fish Commission to invest in the construction of a hatchery at Sheboygan in 1912. Built by Boyd Construction Company of St. Paul, Wisconsin, the hatchery building measured 35 x 83 feet and consisted of two floors, with spawning tanks on the first floor (*Sheboygan Press*, 1911a, 1912). In 1917, the hatchery produced and distributed 18,286,000 lake trout fry, 3,300,000 whitefish fry, and 2,743,125 chub fry (Wisconsin Conservation Commission, 1918). By 1929, hatchery production decreased, producing and distributing a total of 11,000,000 lake trout fry (Wisconsin Conservation Commission, 1930).

Commercial fishing at Sheboygan also influenced the area's shipbuilding industry. Throughout the latter half of the 19th century, several shipyards operated along the Sheboygan River, including Blinn and Sonson, Dennis and Peter Beaupre, and Stoakes and Loklin. In 1885, Joseph Wolter and August Rieboldt, former employees of the Wolf and Davidson shipyard of Milwaukee, established the Rieboldt and Wolters shipyard in Sheboygan (Dippel, 2021; Usher, 1914). In addition to producing cargo ships, such as the 374-ton *John Schroeder* and the 2,083-ton cargo ship *Helena*, the Rieboldt and Wolter shipyard also launched numerous small sail and steam-powered fishing craft, including the 55-foot *H. M. Van Ells*, the 42-foot *Welcome*, the 61-foot *Hoffnung Bros.*, the 54-foot *Two Brothers*, the 52-foot *Gunderson Bros.*, and the 61-foot *P. Reckinger* (Blindauer, 2005; Colton, 2022). When Rieboldt and Wolter moved their operations

to Sturgeon Bay in 1896, Sheboygan's shipbuilding industry quickly dwindled (Dippel, 2021; Usher, 1914).

Commercial fishing continued to prosper at Sheboygan as the city moved into the 20th century. Fishers erected clapboard fish shanties, net sheds, and net reels along the northern side of the Sheboygan River and docked their vessels in front of their property (*Sheboygan Press*, 2021). In 1916, *Beeson's Marine Directory of the Northwestern Lakes* reported one sail-powered fishing vessel, John Steimle's *Charles H. Augur* and eight steam-powered fish tugs operating out of Sheboygan, including Henry Muhlenberg's 54-foot *Annie D.*, Gust Gunderson's 58-foot *Brower*, John Steimle's 52-foot *Cuckoo*, William Kaufman's 57-foot *Elizabeth G.*, Ernst Sonnemann's 59-foot *Fearless*, John Degenhardt's *Frederick Koehn*, G. Muntiga's 53-foot *Luise M.*, and E. Schneidewind and Son's steel-hull, 71-foot *Harvey* (Beeson, 1916; *Sheboygan Press*, 1911b). As with the Two Rivers fishing fleet, steam-powered vessels persisted within the Sheboygan fishing fleet well into early 1900s, although gas-powered vessels quickly gained popularity among fishers. By 1921, Sheboygan's fleet included at least five gas fish tugs, including William Peterson's 30-foot *Arctours*, F. A. Denner's 38-foot *As You Like It*, Calvin Pooler's 27-foot *Primrose*, William Wiemer's 27-foot *Promise*, and Herman Kadau's 31-foot *Sea Gull* (Beeson, 1921).

Regulations enacted in 1933 imposed license requirements, size limits, and catch limits that increased financial burdens on Wisconsin commercial fishers. In the 1940s, dwindling lake trout and whitefish populations resulting from decades of overfishing, pollution, and invasive species forced the region's fishers to harvest less profitable species, such as alewife, chubs, smelt, and perch. Unable to operate within the increasingly challenging conditions, many fishers left the industry. By 1949, only eight commercial fishing vessels operated out of the Sheboygan Harbor, including Alice Cornell's 41-foot diesel tug *Velox*, Herbert H. Ewig's 45-foot diesel tug *Ewig*, Frank Seger's 52-foot diesel tug *Ida S*, and Smith Brothers Inc.'s 48-foot diesel tug *Smith Brothers* (U.S. Army, 1952; Bureau of Navigation, 1949).

Sheboygan's small commercial fishing industry persisted into the latter 20th century. However, following decades of industrial manufacturing activity by various facilities such as Sheboygan's Die Cast Corporation, and later Tecumseh Products using hydraulic fluids, WDNR detected dangerously high levels of PCBs and polycyclic aromatic hydrocarbons, as well as heavy metals within the sediment of the Sheboygan River and harbor (Sonzogni, 1990). Additionally, Sheboygan's ballooning population created increasing amounts of urban and agricultural runoff and improper disposal of municipal waste, which led to significant contamination by fecal coliforms, phosphorus, and nitrogen in the river (U.S. Environmental Protection Agency, 2022). In 1985, the U.S. Environmental Protection Agency declared the lower 14 miles of the Sheboygan River and the Sheboygan harbor a superfund site and later an Area of Concern, prompting the state of Wisconsin to publicly advise against the consumption of all resident fish species. As of 2022, remediation and habitat restoration projects remain ongoing (Wisconsin Department of Natural Resources, 2022).

In 1968, WDNR began stocking coho salmon in the Sheboygan River, sparking the growth of Sheboygan's prosperous sport fishing industry. The Sheboygan riverfront began to transform physically with the addition of boat ramps, docking facilities, and fish cleaning stations to

accommodate the influx of recreational fishers who traveled from all over the Great Lakes to compete in fishing tournaments (O’Neil, 2000). As at Two Rivers, Sheboygan’s commercial fishers shared a tumultuous relationship with the region’s recreational fishers and sport fishing lobbyist groups such as the Northeastern Wisconsin Great Lakes Sport Fisherman over trap net restrictions, alewife harvest limits, and beliefs about who deserved to fish Lake Michigan’s waters (Rusch, 2010). In 1978, 12 charter boats and only three commercial fishing vessels operated from Sheboygan’s port (U.S. Army Corps of Engineers, 1979).

As of 2022, several commercial fishing charters, such as Sea Dog Sportfishing Charters of Sheboygan, Playin’ Hooky Charters, and Dumper Dan’s Charter Fishing and Lodging, operate out of Sheboygan harbor and target Chinook salmon, coho salmon, rainbow trout, northern pike, walleye, and bass. Mark Nelson’s Great Lakes Fish Company, located at 819 Riverfront Drive, currently remains Sheboygan’s last commercial fishing operation, operating the diesel fish tugs *William G* and the 37-foot *J.B. Nelson*.

Chapter 6: Commercial Fishing in Port Washington/Ozaukee County, Wisconsin

Located 27 miles north of Milwaukee along the western shore of Lake Michigan, Port Washington of Ozaukee County boasts a rich history of commercial fishing and maritime activity. Founded on the mouth of Sauk Creek, Port Washington was founded in 1835 and later incorporated as a village in 1848. When Euro-American settlers first arrived at the area, they met numerous Potawatomi, Sauk, Chippewa, Menominee, and Fox tribal communities (Western Historical Company, 1881b).

The village of Port Washington developed slowly. After abandoning the town in 1837, General Wooster Harrison, a major landowner of the area, returned to Port Washington in 1843 (Western Historical Company, 1881b). Records of commercial fishing in Port Washington area waters begin at this time. The town lacked a natural harbor, and those who fished for subsistence employed barbed hooks and seine nets. In 1870, local officials began dredging and construction improvements to Port Washington's harbor, financed with \$15,000 in funds appropriated by the Wisconsin legislature, \$15,000 in funds from the local government, and more than \$180,000 in federal monies (Plumb, 1911; Western Historical Company, 1881b). The resulting harbor featured two east and west piers, 200 feet apart, that extended 800 feet from the shore, and a channel measuring 180 feet long and 13 feet deep (Western Historical Company, 1881b). The enlarged harbor facilitated Port Washington's industrial growth, allowing for more efficient maritime shipping activities and the start of the area's commercial fishing operations. The completion of the Milwaukee, Lake Shore and Western Railway in 1873 further complemented the county's industrial growth, providing manufacturers and fishers with inland shipping routes (Western Historical Company, 1881b).

Historians credit Sam Curray and Frank Delles as Port Washington's earliest commercial fishers and the men responsible for the introduction of pound nets to the area in 1865 (Port Washington Historical Society, n.d.; Smith & Snell, 1890). The Ozaukee County pound net fishery peaked in 1870 when crews operated 18 pound nets. In 1884, the village's pound net harvest consisted primarily of trout and was valued at \$1,800. Fishers shipped about 20% of their harvests to Chicago. By 1885, only four nets remained in operation with two fishing crews producing a harvest valued at \$925. In the early 1870s, Port Washington fishers began to employ gillnets, measuring 45 fathoms long and 20 meshes deep, to harvest whitefish (Smith & Snell, 1890). By the late 1870s, fishers harvested and exported trout, whitefish, and perch, generating an annual revenue of \$15,000 to \$20,000 (Western Historical Company, 1881b). In 1879, Port Washington fishers exported a total of 2,150 packages of fish (Western Historical Company, 1881b). However, the following year, the gillnet fishing industry also declined sharply (Smith & Snell, 1890).

The 1885 report of the Commissioner of Fish and Fisheries identified 11 men employed in Ozaukee County's commercial fishing industry, operating a fleet of seven boats valued at \$335. Overall, Port Washington's fishers owned four pound nets, 70 gillnets, one seine, and several gangs of set lines, each fishing with 1,000 hooks. During the 1885 season, fishers produced

5,500 pounds of whitefish, 30,000 pounds of lake trout, 2,000 pounds of pike and pickerel, and 1,500 pounds of sturgeon, valued in total at \$1,500 (Smith & Snell, 1890). *Krause's Directory of Ozaukee County 1900* identified 12 men active in Port Washington's fishing industry (Krause, 1900).

Port Washington's commercial fishing persisted and slowly grew as new families moved to the area and entered the industry. The 1923 *Ozaukee County Directory* includes 28 fishermen and 2 fish dealers (Wisconsin USGenWeb, 2022).

As the area's maritime community developed, fishing families such as the Ewigs, Smiths, and Van Ells significantly influenced the physical development of Port Washington's commercial fisheries landscape. Herman Ewig (1840–unknown) immigrated from Stettin, Germany to the Jones Island fishing village in Milwaukee in 1882 with his wife, five children, and brother, August Ewig. Skilled Baltic fishermen, Herman and August formed a partnership and entered the Great Lakes commercial fishery the same year and soon acquired their first steam-powered tug, the 59-foot *Hannah Sullivan* (Ewig Bros. Fish Company, Inc., 2022; Port Washington Historical Society, n. d.; Bureau of Navigation, 1899). In 1894, the Ewig families relocated to Port Washington and eventually purchased the 70-foot steam tug *Herbert*, changing the vessel's name to *H. Ewig* (Ewig Bros. Fish Company, Inc., 2022; Bureau of Navigation, 1916). Herman's sons, Emil and Gustav, fished the tug out of Port Washington until Emil's death in 1924, at which time Emil's son, Oscar, took over and joined in partnership with Gustav's sons, Herbert and Elmer, forming H. Ewig and Sons. The company operated a small net shed and 100 feet of dockage on the south bank of the west pier before relocating to Sheboygan in the 1930s (Ewig Bros. Fish Company, Inc., 2022; U.S. Congress, 1921; Port Washington Historical Society, n.d.).

Henry, George, and Jacob Van Ells immigrated from Holland to the Jones Island fishing village in the 1850s. The men entered the commercial fishing industry, working for local fishing firms (Port Washington Historical Society, n.d.). George Van Ells purchased the 25-ton *Maria B.M.* in 1880 and relocated to Port Washington sometime in the 1880s (Port Washington Historical Society, n.d.; Beeson, 1890). Henry and Jacob Van Ells moved to the area in 1890. The men trained their sons and nephews to work on fish tugs, sharing their cultural and technical knowledge of vessel operation and net management. The Van Ells Fisheries Company, later renamed H. Van Ells and Sons, continued to expand their operations, purchasing 100 feet of dockage at the west end of the west pier, and constructed a small net shed (U.S. Congress, 1921). In 1917, the firm commissioned Burger Boat Company to construct the 60-foot steam tug *H. Van Ells* (Bureau of Navigation, 1918). Unfortunately, a major flood of Sauk Creek in 1924 inflicted considerable damage to the Van Ells' dock and net shed, as well as several other fish shanties and processing buildings. The family's last remaining fisherman, Captain Andrew Van Ells, retired from the fishing industry in 1930 (Port Washington Historical Society, n.d.; Smith, 2011).

The most influential fishing family in Port Washington's fishing history are the Smiths. William Smith settled in Amsterdam, Wisconsin in 1848, where he and his son, Gilbert, began to harvest whitefish using a 100-foot seine. In 1896, Gilbert's son, Delos Smith, moved to Port Washington and continued the fishing tradition, forming the company Smith Bros. Fishery (Port Washington Historical Society, n.d.). The firm purchased dockage and established a shanty on the west pier.

In 1924, the firm opened a retail market at 100 North Franklin Street, where they sold a portion of their harvests. In 1926, Evelyn Smith began selling fried fish sandwiches, a product that became so popular among the people of Port Washington, the family later decided to open a restaurant (Port Washington Historical Society, 2018). Smith Bros. has operated a wide variety of fishing vessels over its long history. The Burger Boat Company built the majority of the company's vessels, including two wood-hull, diesel-powered tugs, the 38-foot *Theodore J. Blong* and the 45-foot *Hope Smith*. In the 1940s, the company ordered steel-hulled tugs from the Burger yard, including the 42-foot *Mackenzie May*, 42-foot *Lester H. Smith*, and 52-foot *Smith Bros* (Hadland & Mackreth, 2018).

By the 1930s, a dramatic collapse of Lake Michigan's historic commercial fish stocks led many fishers to move operations to Lake Superior or leave the industry all together. Port Washington's fishing fleet slowly dwindled in size. However, despite declines, the Smith family continued to thrive, expanding their markets both locally and nationally. In 1934, the Smith family opened the Smith Bros. Fish Shanty restaurant in Port Washington. Additional locations opened in Waleria, California in 1948 and Los Angeles in 1951.

By 1998, only two commercial fishing vessels operated out of Port Washington, the Smith Bros. steel-hulled fish tug *Oliver H. Smith* and Leif Weborg's steel-hulled, 42-foot *Linda E. Weborg* and his crew fished exclusively for the Smith Bros. Fishery, harvesting an average of 1,000 chubs a day at \$0.75 a pound. On December 11, 1998, *Linda E* and a three-man crew were reported lost 12 miles off the coast of Port Washington while heading back to shore with 1,000 pounds of chub (*Milwaukee Magazine*, 2008). Investigations reveal that an integrated tug barge owned by the Coastwise Trading Company, a subsidiary of Amoco Oil, unintentionally rammed and sank *Linda E* while en route to Whiting, Indiana. Following the *Linda E* disaster, the Smith family sold their commercial properties and holdings, effectively marking the end of Port Washington's commercial fishing industry. However, the city's fishing heritage remains. Each year, thousands of visitors travel to Port Washington to celebrate "Fish Day," an annual event created by Smith Bros. in 1964 as "the world's largest one day fish fry" (Gnerre, 2014). Built at Manitowoc by the Burger Boat Company in 1937, the *Linda E* shipwreck is an irreplaceable example of the continuing influence of fish and fisheries at WSCNMS, featured within the context of the site's extensive commercial fisheries cultural landscape.

The Wisconsin Shipwreck Coast National Marine Sanctuary protects a nationally significant collection of historic shipwrecks, but as the example of the *Linda E* above and so many others included in this case study demonstrate, the value and significance of these shipwrecks goes far beyond just their physical properties as archaeological sites on the bottom of the lake. Examining the sanctuary's past through the lens of the MCL approach reveals the deep influences of commercial fishing, shaping individuals through shipbuilding and businesses and successes and losses and regulations...This history, and the cognitive landscape of the sanctuary, is where shipwrecks like the *Linda E* ultimately find their meaning and importance to local sanctuary communities.

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