



SMALL FRY & BIG CATCHES

The Great Lakes Fishery

By Brandon Schroeder and Dan O'Keefe

For as long as people have lived, explored, and settled in Michigan, fishing has provided a critical source of food, commerce, social development, and recreation. Located at the heart of the Great Lakes, Michigan is rich in fisheries history and heritage. The act of fishing from our “freshwater seas,” has shaped—and will continue to shape—the economy, ecology, and social landscape of the state.



(Photo courtesy of Pixabay.)



A Saginaw Bay fisherman scooping fish from a trap net. (Photo courtesy of Michigan Sea Grant.)



A painting of Native Americans fishing from canoes in St. Marys River at Sault Ste. Marie. (Photo courtesy of the C. Patrick Labadie Collection, Alpena County George Fletcher Public Library.)

Michigan's more than 3,200 miles of coastline boast active recreational boat launches; charter boat fishing fleets greeting customers; tribal nations and communities harvesting from traditional fishing grounds; and commercial fishing vessels off-loading their catches. Those Great Lakes fishing traditions are deeply rooted in Michigan's history.

Glaciers retreating around 9,000 years ago revealed the Laurentian Great Lakes of Huron, Ontario, Michigan, Erie, and Superior as we know them today. Recognizable even from space, the five lakes represent the largest freshwater system in the world—covering 94,000 square miles and containing about 20 percent of the planet's surface freshwater. Roughly 180 species of fish currently inhabit the Great Lakes region and contribute to a diverse and dynamic ecosystem. In fact, each of the lakes has its own varying ecological identity.

In addition to food and fun, fishing provides Great Lakes community economies with \$4 billion to \$7 billion annually. Today, an estimated 1.8 million anglers fish Great Lakes waters recreationally, and more than 40 million pounds of fish are harvested commercially each year.

Dynamic Great Lakes

There have been many diverse uses of the Great Lakes. Prior to European arrival, seasonal movements of fish into shallow waters in the upper Great Lakes guided Indigenous subsistence and settlement patterns. Fall-spawning lake trout and a cisco fish species that congregated in large

numbers were harvested, smoked, and stored for winter.

Emerging after winter, spring-spawning fish such as lake sturgeon and suckers were easily harvested in rivers, which replenished food supplies. Fish from the lakes provided a vital food source for the health and well-being of Anishinaabe communities.

Europeans observed and duplicated Anishinaabe fishing seasons and harvesting techniques, which expanded their explorations into the region. Larger-scale commercial fishing efforts emerged in the early 1800s, and by 1826, the first shipments of salted whitefish and lake trout were sent to markets in the eastern United States.

Commercial fishing operations continued to expand. By the late 1880s, commercial harvests peaked at more than 146 million pounds—tripling the total Great Lakes harvest in less than 20 years.

Fishing vessels and docks appeared in nearly every coastal community. For many settlements—such as Fishtown in Leland, Michigan—fishing became a primary identity for which they are still known today. Similarly, many Michigan islands—including Beaver Island, Mackinac Island, and the Charity Islands of Saginaw Bay—became major hubs for fishing, packing, and shipping to feed a growing nation.

During the early twentieth century, catch quantity began to decline, but fishing remained important. Advancements in boats, nets, and packing and shipping methods allowed for expanded fisheries efforts—and greater competition and sometimes conflict among users of the Great Lakes. Though Michigan's first commercial fishing licenses date back to 1865, it was not



Fisherman John Anderson stands in a harvest of lake herring, or cisco, in northern Lake Michigan in 1942. (Photo courtesy of the West Shore Fishing Museum.)

until the early 1900s that the state began regulating catches, seasons, and gear.

During World War II, commercial fishing was declared an essential service, and Michigan's commercial fishermen—and related fishing industry workers—were exempt from the war draft. In 1942, Michigan issued 1,000 licenses to support the crucial wartime industry.

Spears, Weirs, Nets, and More

Historically, Anishinaabek fished utilizing spears, hooks, and gorges made of copper, bone, and antler. Nets, harpoons, and weirs were used to corral and contain fish. By about 800 C.E., Indigenous groups utilized gill nets and fished from canoes to harvest fall-spawning lake trout and whitefish. Those species, along with the practice of fishing, continue to be culturally important to Anishinaabek living in the Great Lakes region today.

Early fishing activities were conducted largely near shores and river or stream mouths, where people could easily spear, trap, or net fish. Rapid advancements in technology allowed them to venture farther offshore in pursuit of fish—first by wading and using canoes, later by utilizing rowing boats and wind-powered vessels, and finally by employing vessels powered by steam and gas engines.

Wooden Mackinaw boats were common in the upper Great Lakes during the late eighteenth century and much of the nineteenth. The versatile vessels had an open design and required only a small crew, who often fished using gill net and pond—or pound—nets. The *Edith Jane*, built around 1890, is one example of a Michigan Mackinaw boat and is on display in St. Ignace, Michigan.

Great Lakes gill net tugboats—nicknamed “turtle back” tugs due to their enclosed designs—allowed fishermen to fish even in cold and icy weather. A design unique to the Great Lakes, the now-engine-powered vessels were made of wood and then later steel. Earlier wood models were also sometimes sheathed in steel to protect the hull from ice damage.



That boat design and gill net gear became recognizable across the Great Lakes region and dominated fishing activities through the late nineteenth and early twentieth centuries, with a fishing fleet once numbering more than 900 vessels. The Besser Museum for Northeast Michigan exhibits one such gill net tug, *Katherine V*, which was built in 1928 and fished Lake Huron waters until 1970. The *Evelyn S.*, on display at the Michigan Maritime Museum in South Haven, is another example of a wooden gill net tug and was built in 1939 to harvest Lake Michigan's waters. The boat style is still in limited use by Michigan tribal fisheries today.

Trap net boats eventually eclipsed gill net tugs since they offered larger, open-deck designs. Introduced to Lake Huron in 1928, deepwater trap nets allowed fishermen to catch lake whitefish in the summer months. A trap net consists of a large, box-shaped net “trap” with long lead lines to funnel fish toward it. The fish remain alive in the trap pot until retrieved, allowing for them to be sorted by size and species. The ability to live release non-target or subsize fish was particularly important when management agencies moved to manage sustainable harvests among shared commercial and recreational stakeholders.

Changing Environment

The many ways that people have interacted with the Great Lakes have resulted in significant ecological change over time, which can be described through the lens of Great Lakes fish, fish populations, and ecosystems.

Centuries ago, abundant fish and fewer people meant little in the way of risk for



The Jensen commercial fishing gill net tug *Elsie J.* bucking ice in South Haven Harbor, c. 1948. (Photo courtesy of the Michigan Maritime Museum Collection.)



A large harvest of herring, or cisco, on the commercial Lake Erie fishing boat *Earl Bess*. (Photo courtesy of the Great Lakes Fishery Commission Collection.)

over-harvesting and environmental impacts. By the 1800s, efforts to commercialize Great Lakes fishing increased as the fur industry waned. Through the early 1900s, fish harvests remained high but began to level off around 120 million pounds per year by 1925.

Over the next few decades, Great Lakes fisheries harvests collapsed, and some cisco species, such as the deepwater cisco, became extinct. Lake sturgeon harvests dropped from 3.8 million pounds in 1879 to 14,000 pounds in 1911. Currently a threatened species in Michigan, lake sturgeon populations are at less than 1 percent of their historic abundance.

The 1800s through the mid-1950s were times of rapid population growth and exploitation, which resulted in significant ecological degradation. Logging in the 1800s caused erosion and warmed rivers, making them less habitable—most notably resulting in the eradication of Arctic grayling in Michigan's rivers. Wetland loss negatively affected spawning and nursery areas for species such as perch and pike, and the construction of dams disconnected Great Lakes fish from their inland-river spawning and nursery habitats.

Habitat and water quality were also affected by changing landscapes, urbanization, and expanding industrialization. Wastewater and pollutant discharges resulted in significant water-quality degradation and river fires—not only the infamous 1969 Cuyahoga River fire in Ohio but also the Rouge River fire in Michigan.

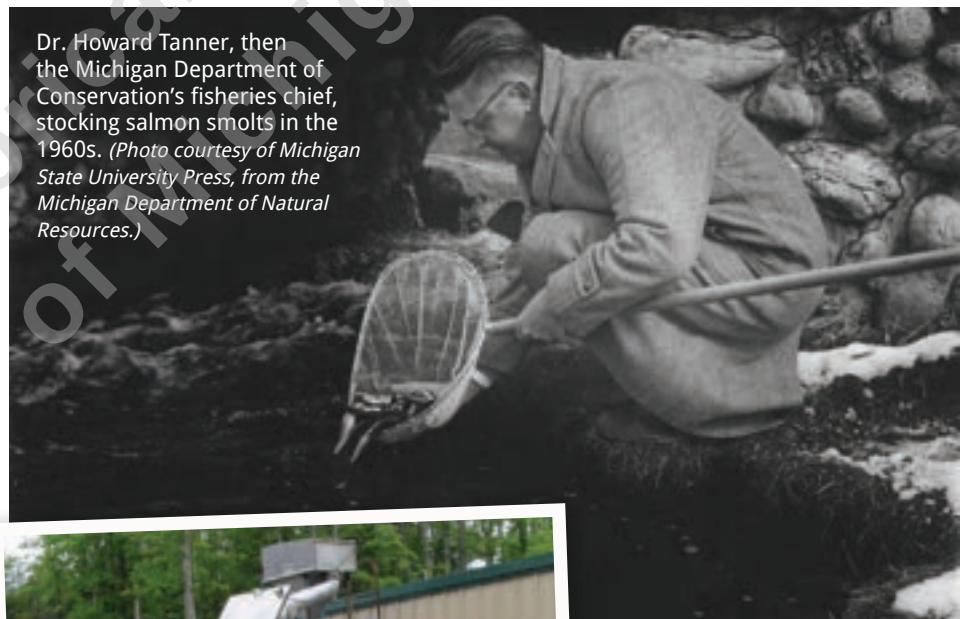
Improvements and New Challenges

Eventually, collective state, tribal, and federal efforts and investments made progress

The History of Earth Day

The first Earth Day stemmed from growing concern for the environment in the 1960s, influenced by the publication of Rachel Carson's *Silent Spring* and catastrophes such as the Cuyahoga River fire. Many Michiganders fought to better protect the environment during that decade. In 1965, the United Auto Workers called on its members to fight for clean air and water—later calling on automobile manufacturers to curb car emissions. Other Michiganders involved in those early efforts included U.S. Senator Philip A. Hart, who helped Pictured Rocks become the first nationally protected lakeshore in 1966, and U.S. Representative John Dingell, who participated in drafting the National Environmental Protection Act.

The first Earth Day was held on April 22, 1970, after U.S. Senator Gaylord Nelson, a Democrat from Wisconsin, called for a national teach-in at college campuses to educate students and the wider public on the problems facing the environment. Since the University of Michigan was not scheduled to be in session on April 22, students there held the first Earth Day teach-in on March 11, 1970, which became a model for colleges across the nation. In 2020, Earth Day will celebrate its fiftieth anniversary.



Dr. Howard Tanner, then the Michigan Department of Conservation's fisheries chief, stocking salmon smolts in the 1960s. (Photo courtesy of Michigan State University Press, from the Michigan Department of Natural Resources.)



A Department of Natural Resources truck dispatched from the Oden State Fish Hatchery is responsible for planting fish in Michigan's waters. (Photo courtesy of Michigan Sea Grant.)

Which Fish, Where?

Like people, fish also have their favorite places to hang out in the Great Lakes:

Nearshore fish communities include species such as yellow perch, walleye, lake sturgeon, smallmouth bass, northern pike, many species of suckers, and more. Some nearshore species—including suckers, sturgeon, and walleye—migrate into rivers each spring, while others—like pike and perch—utilize coastal wetlands for reproduction and nursery areas.

Lake trout dominated **offshore fisheries** as the primary top predator, but those fisheries also were home to many species of ciscoes, including lake herring (cisco), lake whitefish, and bloaters. Introduced species, such as stocked salmon or invasive sea lampreys and alewives, also play part in the offshore fishery.

Deepwater fish such as lake trout and lake whitefish move in from the deep each fall to spawn in shoals. The seasonal movements of many deepwater fish into shallow waters, coastal wetlands, and rivers for spawning not only connect diverse Great Lakes habitats but also offer people the opportunity to accessibly harvest fish.



Top to bottom:
Lake sturgeon,
whitefish, and
lake trout.
(Photos courtesy of
Michigan Sea Grant.)



A commercial trap net fishery worker sorting fish. (Photo courtesy of Michigan Sea Grant.)

toward addressing water quality, habitat issues, and native species restorations. Notable federal efforts included the Clean Water Act of 1972, the Wetlands Protection Act of 1979, and native species restoration projects by the U.S. Fish and Wildlife Service.

Despite those improvements, invasive species have profoundly affected Great Lakes ecosystems by disrupting food webs and outcompeting native species. Unlike chemical and physical pollutants, biological invaders, once established, are largely impossible to eradicate from a system as immense as the Great Lakes.

The Great Lakes have seen several waves of invasions over the past century. For example, rainbow smelt were accidentally introduced in 1912 after escaping from Benzie County's Crystal Lake, where they had been stocked. The invading smelt competed

with other plankton-feeding ciscoes—likely factoring into cisco declines at that time. Smelt eventually led to new commercial and recreational fishing opportunities and became a food item for predatory fish.

Sea lamprey and alewife invasions beginning in the 1920s were arguably the most pivotal ecosystem-changing event of the Great Lakes. Both of the Atlantic Ocean species entered the lakes through the Erie and Welland Canals.

Sea lampreys are parasitic fish that can effectively kill up to 40 pounds of fish during their lifetimes. Their predation on lake trout effectively collapsed an already-struggling population. In the 1950s, researchers at the U.S. Geological Survey Hammond Bay Biological Station in Northeast Michigan pioneered lamprey biology and control efforts. In 1957, those efforts led to the discovery of a chemical lampricide that is still used today. Sea lamprey control has been declared a great ecological success for the lakes.

Meanwhile, without predation from lake trout, invading alewives thrived and overpopulated. They regularly experienced large die-off events, resulting in enormous numbers washing up and rotting on Great Lakes beaches. Dr. Howard Tanner, the Michigan Department of Conservation's fisheries chief during the 1960s, led an ambitious effort to stock salmon—providing predatory control for alewives.

Recreational Fishing

As early as the 1920s, recreational fishing interests in Michigan emerged. Anglers from the Northport area developed sport trolling methods to catch lake trout in the deeper waters of northern Lake Michigan. But it was the introduction and stocking of Pacific

Researcher Vernon C. Applegate at the Ocqueoc Lake sea lamprey lab in 1947. (Photo courtesy of the Great Lakes Fishery Commission Collection.)





Recreational anglers gather in rivers to catch salmon returning from open water during the 1960s. (Photo courtesy of the Great Lakes Fishery Commission Collection.)

salmon—coho and chinook in 1967—that spawned broad public enthusiasm.

People flocked to river mouths to catch salmon returning from open water, marking another pivotal turning point for Great Lakes ecosystems. In 1970, the Michigan Charter Boat Association was formed around a growing service industry in which people hired captains and used their boats and gear to fish on the big lakes.

Recreational fishing flourished while many commercial operations were effectively driven out of business—creating conflict and even hostility among users over fishing rights and the allocation of fish. During those social shifts, tribal nations continued to fish commercially in Michigan under court-recognized treaty fishing rights from 1836 and 1842.

During the mid- to late twentieth century, Michigan's Department of Conservation—now the Department of Natural Resources—began a purposeful transition from a largely commercial fishery to the more public recreational one recognizable today. The state agency strictly regulated commercial fishing by curbing fishing zones, banning gill nets, limiting licenses, and setting quotas. It also restricted many fish such as salmon, lake trout, and walleye for recreational fishing only.

Fisheries research and management also began to move into an era of adaptation and collaboration. The binational Great Lakes Fishery Commission was established in 1955 to coordinate sea lamprey control efforts and currently facilitates coordination and cooperation among state, provincial, and tribal agencies surrounding shared fishery issues and joint management efforts.

A Lens to the Future

A new wave of invader species in the 1980s—such as zebra mussels, round gobies, and spiny water fleas—arrived in ballast waters aboard large international freighters, bringing new challenges to the Great Lakes region. Those smaller organisms created food web disruptions at the lowest end of the web, wreaking ecological havoc all the way up the chain to the largest chinook salmon.

As recreational fishing expands in popularity, the management of diverse species and fishing values will become more important. In addition to monitoring food-web and predator-prey interactions, habitat restoration efforts factor into management efforts. Further, the allocation of fish harvests is key for the remaining commercial and subsistence fisheries that now coexist with the sport fishery.

Diverse social values, changing ecosystems, and new technologies continue to shape how people interact with the Great Lakes fishery. Science and research, along with management and harvest regulations, are ever more important in addressing the sustainable management of available fish.

Furthermore, issues such as protecting water quality, preventing invasive species, and conserving and restoring habitats are among the future concerns for Great Lakes fisheries. For example, concerns about the possible invasion of bighead and silver carp are prompted by knowledge and reflections of how disruptive past species invasions have been for Great Lakes ecosystems.

The specifics of such concerns may look slightly different today—yet are so very similar to the issues and environmental challenges endured and addressed during Michigan's past. 🐟

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A fisherman using a dip net to harvest smolt from a pond net on the west shore of Green Bay in Menominee Township. (Photo courtesy of West Shore Fishing Museum.)