



The filter feeding of invasive mussels reduces plankton in the water and allows light to penetrate more deeply.

THE CHANGING FISHERY OF LAKE HURON

Past, present and future

The fishery of Lake Huron has undergone several transformations over the last 100 years. This summary explains some of the changes affecting the lake's food web and the fishing industry.

DAYS OF PLENTY: Early 1900s

Historically, Lake Huron has supported an important commercial fishery for both the U.S. and Canada. In the early 1900s, approximately 5 million pounds of ciscoes (chubs and lake herring), 1 million pounds of lake sturgeon, 6 million pounds of lake trout and 6 million pounds of lake whitefish were harvested annually from the lake. However, this level of fishing was not sustainable, and after many years of fishing pressure, harvests severely declined.

SEA LAMPREY AND ALEWIFE: 1940s

Lake Huron's fishery changed dramatically with the invasions of sea lamprey and alewife. Lake trout, whitefish and cisco populations in the Great Lakes plummeted as a result of lamprey-induced mortality, and alewife and rainbow smelt populations increased without predators and competition from similar fish. Unlike Lake Michigan where the fish community was dominated by alewives, smelt and alewives appeared to be equally abundant in Lake Huron.

THE GOLDEN YEARS OF SALMON: 1960s-1980s

The balance of predator and prey fish in Lake Huron began to improve in the 1960s. Chinook and coho salmon were introduced to prey upon the overly abundant alewife and smelt and to create a new sport fishery.

An increase in salmon and trout in Lake Huron resulted in two changes: declines in the alewife population; and increases in native species like slimy sculpin, burbot, troutperch, stickleback and spottail shiner. By the 1980s, a commercial fishery for chubs had recovered to about 1 million pounds per year, and lake whitefish to about 6 million pounds.

INVASIVE MUSSELS: 1980s

Throughout the mid- to late-1900s, other invasive species arrived in the Great Lakes. However, one of the more significant invasions began in the late 1980s. First zebra and after quagga mussels, arrived in the Great Lakes as hitchhikers on ocean-going ships and began spreading throughout Lake Huron as well as the other Great Lakes and inland waters. The invasive mussels are filter feeders, consuming plankton and sediment from the water column and concentrating nutrients at the bottom of the lake. As a result, the water of Lake Huron has become clearer and some types of algae have flourished, including green algae that washes up on beaches and forms muck.

The invasive mussels consume plankton that support small fish — causing ripple effects up the entire food chain. They are at least partially responsible for the precipitous drop in forage fish, which began in 2003 and continues to impact salmon and other predator fish species.

THE DECLINE OF SALMON: 1990s-2000s

Chinook salmon catches peaked in 2002, and then dropped to extremely low levels by 2008. A combination of factors led to the changes in fish populations and catches.

The Rise and Fall of Chinook

- ▶ In the 1980s and late 1990s, Chinook populations expanded and supported a vibrant charter and sport fishery on lakes Huron and Michigan.
- ▶ In 1989, salmon stocking in Lake Huron reached an all-time high of 5 million fish under the assumption that only 15 percent of Chinook salmon in the lake were from natural reproduction. Yet, natural reproduction was more successful than anticipated, and by the early 2000s, salmon populations had grown beyond a sustainable level.
- ▶ Small prey fish like the alewife struggled to survive as mussels continued depleting their food source of plankton. The salmon preyed heavily on the remaining fish, but ignored expanding populations of the bottom-dwelling invasive round goby.
- ▶ By 2004, both alewife and salmon populations had collapsed in Lake Huron. Prey fish populations such as rainbow smelt, sculpins and troutperch also plummeted, while the non-native round goby thrived alongside the spread of invasive mussels.
- ▶ With limited prey, the growth of Chinook salmon slowed, and anglers began catching fewer and thinner salmon.
- ▶ Chinook stocking was reduced in 1991, 1999 and 2006. In 2012, the Michigan Department of Natural Resources plans to eliminate Chinook stocking in the southern two-thirds of Lake Huron where harvests remain very low. However, they plan to stock about 700,000 young Chinook at three northern sites.

NATIVE SPECIES REBOUND

Today's Fishery

Since the collapse of the Chinook salmon fishery, many native fish species populations have grown. Alewives had apparently been feeding on just-hatched walleye, thus without alewife, walleye populations have been able to reach record levels within Saginaw Bay. In addition, the number of emerald shiners and bloaters have increased in the open waters of Lake Huron, and smallmouth bass and other native species seem to have benefitted from the collapse.

Fish of the new Lake Huron Ecosystem

| Offshore | Nearshore | Pier, Shore, Creek |
|----------------------|-------------------|----------------------------------|
| Walleye* ↑ | Smallmouth bass ↑ | Smallmouth bass (spring) ↑ |
| Lake trout ↑ | Northern pike* | Yellow perch |
| Lake whitefish | Freshwater drum* | Pumpkinseed & Bluegill ↑ |
| Lake herring (Cisco) | Emerald shiner | Channel catfish |
| Burbot | Channel catfish* | Common carp* ▲ |
| Atlantic salmon ↑ ▲ | Yellow perch | White sucker (spring, creeks) |
| Steelhead ↑ ▲ | Walleye* ↑ | Lake whitefish (fall) |
| Chinook salmon ↓ ▲ | | Rainbow smelt (spring, creeks) ▲ |
| Coho salmon ▲ | | Steelhead (fall, spring) ▲ |
| Brown trout ↓ ▲ | | |

▲ Non-native species, * Abundant in Saginaw Bay, ↑ Increasing in numbers, ↓ Small populations

The decline of alewives also led to improved lake trout reproduction. Nearly half of all Lake Huron's lake trout born since 2003 appear to be wild, rather than planted.

In some cases, native fish are exploiting new food sources provided by non-native species. Smallmouth bass, walleye and lake trout are now eating round gobies, and whitefish are consuming gobies and mussels. However, invasive species such as the spiny water flea and the bloody red shrimp continue to arrive and disrupt the ecosystem.

AN UNCERTAIN FUTURE

While some native species have started to gradually rebound, the future of the Lake Huron fishery remains uncertain. The numbers of two popular species remain low: Chinook salmon, which impacts charter fishing; and yellow perch, which impacts nearshore anglers.

However, populations of some fish continue to increase, especially native species, including emerald shiners, walleye, whitefish and lake trout. Most experts believe that native fish species will continue replacing the salmon-dominated fishery, and the new Lake Huron fishing landscape will be dramatically different than it was even 50 years ago.



The invasive spiny water flea often gets caught on fishing lines. This half-inch long zooplankton now consumes as much other zooplankton in Lake Huron as all the prey fish combined.

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Sources: MDNRE 2007, Fisheries Research Report 2086; Lake Huron Binational Partnership 2008-2010 Action Plan; Claramunt 2002, North American Journal of Fisheries Management; Taylor and Ferreri 1999, Great Lakes Fisheries Policy and Management; Great Lakes Fishery Commission 2009, Commercial Fish Production in the Great Lakes 1867-2006.

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