



U.S. Fish & Wildlife Service

Midwest Region (Great Lakes/Big Rivers)

Leadership in Conserving, Enhancing, and Restoring Aquatic Ecosystems

Lake Trout Restoration Program Thrives



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The M/V *Spencer F. Baird* was christened on Sept. 7, 2006, and began its dual mission of fisheries assessment and lake trout stocking. Because this vessel was specifically designed and built for these activities, it has some enhanced features over the old stocking vessel including better location of fish hauling tanks, increased hauling capacity, new type of oxygen system for the fish tanks, temperature control for tank water, and increased vessel speed.

Lake trout, once abundant throughout the Upper Great Lakes, were extirpated from much of their original range by the mid-twentieth century by a combination of factors including overfishing, the invasion of the sea lamprey, and, in some cases, pollution. The Fish and Wildlife Service's Midwest Region Fisheries Program — in cooperation with our partners from Federal agencies, states, tribes, academia, private organizations, and Canada — focuses on addressing the factors contributing to the decline of lake trout and restoring self-sustaining populations through stocking.

The backbone of the stocking program is the network of National Fish Hatcheries that produce lake trout. The Pendills Creek/Sullivan Creek National Fish Hatchery (NFH) complex in Brimley, Michigan, began operations in 1951. Adult brood stock of three strains (originating from different lakes or different areas of the same lake) are held at the Sullivan Creek NFH for spawning. Biologists design spawning strategies to maintain the genetic health and variability of the resulting offspring. Spawning operations are conducted each fall.

After spawning, the eggs are incubated until they reach the eyed stage — at which the eyes of the developing fish can be seen — then shipped to other hatcheries for rearing and release. Pendills Creek NFH receives eggs from Sullivan Creek and fingerlings from Jordan River NFH to raise approximately 900,000 yearling and 200,000 fall fingerling lake trout for its restoration programs.

Jordan River NFH in Elmira, Michigan, opened in 1963. In addition to raising young lake trout for release, the hatchery once held adult brood stock for fall spawning; however, all brood fish were transferred to the Pendills Creek NFH in the late 1980s so the entire hatchery could be dedicated to producing yearling lake trout from eggs from stations such as Sullivan Creek, Iron River NFH in Wisconsin, and Saratoga NFH in Wyoming. For many years, the Marquette State Fish Hatchery in Marquette, Michigan, and the Crystal Springs State Fish Hatchery in Altura, Minnesota, also supplied eggs to Jordan River NFH.



In conjunction with the yearling program, Jordan River NFH also receives extra eggs to raise approximately 1,000,000 fish to about 2 1/2 inches long for transfer to Pendills Creek NFH in the spring. This helps to maximize the production potential of the stocking program by taking advantage of the extra early rearing space available at Jordan River NFH to make up for the relatively small number of nursery tanks at Pendills Creek NFH. Jordan River NFH typically produces nearly half of the four million yearling fish released annually.

Established in 1981, Iron River NFH in Iron River, Wisconsin, has facilities for holding and spawning adult brood stock and rearing young fish for release. Iron River NFH maintains two distinct strains of lake trout and ships approximately 3 million eyed eggs to hatcheries such as Jordan River NFH, and raises approximately 1.2 million yearling trout for annual release. In addition to raising lake trout, Iron River NFH also maintains two strains of coaster brook trout brood stock with annual production levels of 1.5 million eyed eggs for restoration programs in Lake Superior.

Saratoga NFH of Saratoga, Wyoming, is the only supplier of Lewis Lake strain lake trout eggs for the Great Lakes. Ancestors of the Lewis Lake strain fish from Lake Michigan were brought to a lake in Wyoming in 1889.

Hatcheries are a critical part—but not the only part—of the Fisheries Program's overall stocking effort. Among their many activities, National Fish and Wildlife Conservation Offices in Alpena, Michigan, and Green Bay and Ashland, Wisconsin, evaluate the performance of hatchery-reared fish and provide fishery management assistance. The La Crosse Wisconsin, Fish Health Center verifies the quality of the fish produced and the health status of fish at Midwest Region hatcheries before their release.

Historically, most lake trout were released from shore locations near deepwater lake trout habitat. Whenever possible, the Fish and Wildlife Service released fish offshore using commercial car ferries and United States Coast Guard vessels. Research has suggested that releasing the lake trout offshore, directly above historically productive spawning and rearing areas—rocky reefs and shoals—would be a more effective method. Logistics didn't always allow the use of these strategies, so in the late 1980's, the

Fish and Wildlife Service acquired a confiscated shrimp trawler, and retrofitted it for offshore lake trout stocking. The *M/V Togue* stocked millions of lake trout between 1989 and 2006. Although the *M/V Togue* had served well for 17 years, its condition had been steadily deteriorating, despite significant investments in maintenance and repairs. Its replacement, the *M/V Spencer F. Baird*, was christened on Sept. 7, 2006, and began its dual mission of fisheries assessment and lake trout stocking. Because this vessel was specifically designed and built for these activities, it has some enhanced features that the *M/V Togue* did not including: better location of fish hauling tanks, increased hauling capacity, new type of oxygen system for the fish tanks, temperature control for tank water, and increased vessel speed.

Enhancements to the new lake trout stocking vessel, *M/V Spencer F. Baird*, included:

- **Location of Fish Holding Tanks:** Hauling fish in tanks mounted on top of the *Baird's* deck allows a gravity flow release, which is faster and easier on the fish than the *Togue's* vacuum pump system.
- **Capacity:** The *Baird* is capable of hauling 25 percent more fish than the *Togue*.
- **Oxygen Delivery:** Although the new oxygen concentrator system aboard the *Baird* adds an element of mechanical complexity, it negates the need to constantly exchange heavy steel oxygen bottles. Backup bottled oxygen will be held on board for emergency use.
- **Temperature Control:** The *Baird* can take on and chill fresh lake water. The only way to ensure the water aboard the *Togue* stayed cool enough during summer releases was to add large amounts of ice to distribution trucks at hatcheries and use the truck water aboard the boat.
- **Top Speed:** The *Spencer F. Baird* has a top speed of 13.5 knots and a cruising speed of about 11.4 knots, better than the *Togue's* 10 knots. Increased speed comes at a price in reduced fuel efficiency, but will reduce the number of hours required to operate the vessel and better able the crew to avoid rough weather.

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-USFWS photo by Clarice Beckner

Cory Puzach (left) and Richard Nelson of the La Crosse Fish Health Center sample hatchery lake trout as part of regular disease monitoring, a critical component of the lake trout rehabilitation program.

The Fish and Wildlife Service releases lake trout in lakes Michigan and Huron, generally in the spring when the fish are 14 to 18 months old and average between 6 and 7 inches in length. In 2007, Fish and Wildlife Service lake trout releases numbered over 5.2 million fish, with about 30 percent going to Lake Huron and 70 percent to Lake Michigan.

The stocking program in lakes Michigan and Huron has yielded good numbers of hatchery produced adult lake trout, but has not yet succeeded in establishing self-sustaining populations. The Michigan Department of Natural Resources (DNR) reported in 1999 that naturally produced lake trout have been found in surveys of Lake Huron in areas with no previous reproduction, such as Rockport and Thunder Bay.

In 2004, the U.S. Geological Survey's Great Lakes Science Center in Ann Arbor, Michigan, presented evidence of natural reproduction over a wide area of the United States side of Lake Huron from near Detour in the southeastern tip of Michigan's Upper Peninsula to as far south as AuSable Point, on the northern reaches of Saginaw Bay. Though these findings provide hope for future success, the numbers of naturally produced fish found thus far are too small to be considered self-sustaining.

In Lake Michigan, Michael J. Hansen of the National Biological Survey and the Michigan DNR's James W. Peck reported in *Lake Trout in the Great Lakes* (<http://biology.usgs.gov/s+t/noframe/m2130.htm>) that young-of-the-year sac fry have been found in spawning areas, but there has not yet been evidence that these naturally produced lake trout are surviving to recruit into the next generation. They also cited work done by the Green Bay Fishery Resources Office (FRO) which noted that naturally produced lake trout older than age-1 were found in Grand Traverse Bay, Michigan, in the late 1970s and early 1980s, but that over-fishing depleted this wild spawning population.



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Survival assessments are conducted on key sites on the Great Lakes to evaluate lake trout stocking programs.

In both lakes Michigan and Huron, further research is ongoing to determine obstacles to achieving self-sustaining populations of lake trout. Potential limiting factors include sea lamprey-related mortality, Early Mortality Syndrome, and affects by invasive species.

Lake Superior, once stocked annually, has recently been declared to have self-sustaining lake trout populations as a result of the efforts of the Fish and Wildlife Service and our partners, and 2006 saw the final planned releases of lake trout into Lake Superior by the Fish and Wildlife Service.

Knowledge gained through research is bringing about changes in hatchery production of lake trout. Strain comparison studies have indicated that the Seneca Lake Wild strain, from New York State's Seneca Lake, survive better than the Superior Marquette Domestic strain (originated from Lake Superior) in waters hosting large invasive sea lamprey populations. The Superior Marquette Domestic strain was originally the primary strain raised by hatcheries, but because of its better performance, the Seneca Lake Wild strain has been designated a priority strain for releases into Northern Lake Huron and Northern Lake Michigan. As a result of the studies, additional Seneca Lake Wild brood stock are being reared at the Sullivan Creek NFH to eventually increase production of this strain.

Facility improvements at trout hatcheries will benefit the stocking program by increasing quality and number of lake trout released.

Improvements include:

- A steel building was erected over the brood stock raceways at Sullivan Creek NFH in 2004, replacing the old tube-like "weatherport" covers and offering much greater protection against predators and an improved working environment for the staff.
- At Iron River NFH, steel buildings replaced the dome buildings covering the brood stock and production raceways in 2005.
- Pendills Creek NFH is undergoing major construction and rehabilitation of its water supply system. This project will also provide oxygen supplementation for the first time. Further development of the water resources combined with the planned construction of additional raceways will allow production increases.
- Work in 2008 at Jordan River NFH will enhance the effluent treatment system. Additionally, covering all 48 raceways dedicated to the yearling production program with buildings will provide predator exclusion, reduce fish stress due to direct exposure to sunlight, and provide added levels of disease prevention for the millions of fish cultured at the facility.

Obstacles to Lake Trout Rehabilitation:

- Sea lamprey-related mortality
- Early Mortality Syndrome resulting from a thiamine deficiency due to parental consumption of the non-native alewife, which have higher levels of thiaminase, an enzyme that breaks down thiamine
- Competition and predation by the invasive round goby
- Reduction by the invasive zebra mussel of nutrients necessary to the survival of trout prey species

The lake trout rehabilitation program has come a long way since its inception, largely as a result of improvements in physical facilities and rearing and release methods. The successful re-establishment of naturally spawning, self-sustaining populations of lake trout in Lake Superior is an achievement that the hatcheries are proud to have been a part of. Similar success in lakes Michigan and Huron has not yet been realized, but the evidence of limited natural reproduction in both lakes gives reason to be optimistic about the future.

Wayne Talo, Jordan River NFH

For additional information about the lake trout rehabilitation program in the Upper Great Lakes, contact one of the Great Lakes offices:

National Fish and Wildlife Conservation Offices (NFWCO)

Alpena NFWCO (Lake Huron) (989/356-3052)
Green Bay NFWCO (Lake Michigan) (920/866-1717)
Ashland NFWCO (Lake Superior) (715/682-6185)

National Fish Hatcheries (NFH)

Iron River NFH (715/372-8510)
or email at: dale_bast@fws.gov
Jordan River NFH (231/584-2461)
or email at: roger_gordon@fws.gov
Pendills Creek/Sullivan Creek NFH Complex (906/437-5231)
or email at: curt_friez@fws.gov

Fish Health Center (FHC)

La Crosse FHC (608/783-8431)

Sea Lamprey Control

Ludington Biological Station (231/845-6205)
Marquette Biological Station (906/226-6571)