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Long live the kings

A catch-and-release ethic and sound management are restoring strong populations of big muskies to many Wisconsin waters.

Lisa Gaumnitz



They're only one month old, but these young muskies already boast the sleek profiles of efficient predators. Muskies eat only live food throughout their lives; these fry start out on zooplankton and soon move up to small minnows. © Terry Margenau

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Half a century after anglers pulled the last of four world-record fish from Hayward area lakes, monster musky are again prowling Wisconsin waters.

Restrictive size limits, a catch-and-release ethic, and a hatchery system hitting its stride have succeeded in rebuilding musky populations that teetered on collapse due to three decades of frenzied fishing following those world-record catches in the 1950s.

“We’ve done a phenomenal job of rebuilding the population to trophy quality,” says Frank Pratt, the Department of Natural Resources fisheries biologist for Rusk and Sawyer counties for 28 years. “Thirty years ago there was virtually no such thing as a 40-inch musky in Wisconsin waters and 10 years ago there was virtually no such thing as a 50-inch musky.

“Well, we’ve broken both those size barriers -- we’ve smashed them -- and I think we’ll be back to the historical potential for world-class muskies within the decade.”

Muskies, once famed as the fish of 10,000 casts, are now being caught in Wisconsin in an average of 3,000 casts. every year for the past 13 years anglers have landed an average of 29 fish larger than 48 inches and nine muskies larger than 50 inches from Wisconsin waters.

Although the ranks of musky hunters has swollen to an estimated 360,000, nearly three times the number in the late 1950s, anglers are releasing 98 percent of the fish they catch to grow bigger and fight another day.

This turn of events, exceeding even the most optimistic expectations, is spurring an evolution in Wisconsin's approach to musky stocking. Fish biologists hope a change in the public's view of stocking will come around, too.

“Stocking is often viewed as a panacea,” says Steve AveLallemant, DNR fish expert for northern Wisconsin, “but it is only one of many management tools. The key thing to remember about any stocking is it only

addresses poor natural reproduction [in a fish population]. It doesn't do anything to address the many other reasons a fishery may be declining, including harvest.”

Stocking musky is a relatively intensive, expensive process. Costs run about \$70 per stocked fingerling that survives for 18 months in the wild. DNR research has shown that stocking can actually work against a fishery: artificially high densities of stocked fish can slow fish growth. Musky catch rates tend to be better on waters with natural reproduction that receive little or no stocking.

“We have good science on how many fish are being taken out by angling and spearing, and we have a better idea than we did about the abundance of adult fish,” AveLallemant says. “What we don't have a good handle on is how much was put there by Ma Nature, and how much was put there by stocking? The goal is not to stop stocking musky, but to stock them in a manner that's of the most benefit, biologically and financially.”

A glacial relic

Wisconsin's state fish is both a relic and a legacy of glaciers that scoured Northern America. As the last glacier receded about 12,000 years ago, the meltwater flooded lakes and rivers, creating a common highways that species in the lower Mississippi River basin traveled to repopulate the Great Lakes, upper Mississippi River and Hudson Bay basins.

Little was known about the abundance of musky in Wisconsin at the beginning of the 20th century, but they were apparently confined to lakes and streams at the headwaters of the Black, Chippewa, Flambeau and Wisconsin rivers. About 20 counties were believed to contain musky at the time. Stocking has since extended that range and muskies are now found in 711 lakes and 80 river and stream segments in 48 counties. Except for extreme southwestern Wisconsin, there is musky water in just about every part of the state.

Fish biologists now know that musky densities are very low, even in the best waters, because muskies are large top predators (world-record specimens push 70 inches and 70 pounds) that tend to choose vulnerable spawning sites, such as silted areas in shallow water where the eggs may suffocate or be disturbed by boat traffic or other human activity. Good musky waters average about one adult fish for three surface acres; that compares to up to 20 adult walleye per three surface acres in a really good walleye lake.

Absent such knowledge in the late 1800s and early 1900s, state fisheries officials and some sportsmen worried about musky populations. “Pen cannot chronicle the unspeakable butchery which took place over all the Wisconsin wilderness when the railroads first penetrated that virgin country...The merest novice might take a dozen, a score, indeed two scores of magnificent muscullunge in a day's fishing,” stated an article from the August 1901 Outing magazine reprinted in A Compendium of Musky Angling History.

In 1899, Wisconsin started to replenish lakes with musky fry, grown from eggs incubated in glass jars at Woodruff, and eventually at 18 seasonal hatcheries in northern Wisconsin. Fry, which were less than an inch long, were transported in milk cans over rutted lanes and primitive logging roads, and then released into lakes.

That practice continued until the 1940s, when techniques for rearing fish in ponds enabled Wisconsin to start raising fingerlings seven to 12 inches long at the Woodruff Hatchery and the Spooner Fish Hatchery.

Sport fishing grew in the 1940s as World War II soldiers returned home and people turned to peacetime pursuits. By 1958, an estimated 107,000 anglers were catching and keeping an estimated 47,700 muskies a year, based on a license survey.

“If it was a legal fish, it was getting harvested,” says AveLallemant. “It had to do with angler perception at the time -- it was cool to have a couple hanging on the board.”

Fisheries managers feared the annual take of musky was exceeding the fish's ability to sustain itself because so many adults were being taken out of the population, but there was little documentation to support this hunch. Few creel surveys had been done, and sampling for adult populations wasn't widespread or consistently conducted on the same lakes over time.

Catch-and-release catches on

The growing perception that musky populations were declining due to overharvest and poor spawning habitat spurred state fisheries officials to action in the late 1970s. Projections indicated that by 1990 increasing numbers of anglers and a growing musky harvest would exceed levels needed to sustain the fishery. Resource managers launched a strategic planning process to short-circuit that possibility.

The resulting musky management plan called for more restrictive harvest regulations that included raising the 30-inch minimum size limit statewide, increasing data collection, encouraging voluntary catch-and-release, and protecting spawning habitat. Increased stocking was a focal point.

“The analysis saw demand for muskies going up and supply going down. Managers felt the best way to address the matter at the time was to get into a fairly extensive stocking program for that critter,” says AveLallemant. “[The Woodruff and Spooner hatcheries] geared up to start pounding out the musky.”

In 1985, the hatchery system produced 200,000 muskies for stocking. The rule of thumb was to stock lakes at twice the annual harvest rate. Because they didn't have good information on the harvest, fisheries staff assumed the harvest rate to be one fish per acre, according to Tim Simonson, the DNR's longtime warmwater species specialist. Most lakes were getting stocked at two fish per acre, regardless of whether the lake had naturally reproducing muskies.

“That stocking rate was very high given present conditions,” Simonson says. “We know through creel surveys that the harvest is so much less -- .02 fish per acre, or 2 fish per 100 acres now.”

The stocking formula didn't anticipate the popularity of catch-and-release fishing, nor the impact it would have on reducing the harvest. “Muskies Inc. came in and said, ‘let the fish go’ – and anglers did,” says Simonson. “They were way ahead of their time.”

In the early 1980s, the projected harvest from 356 Class A, or “trophy waters,” was 38,318 fish statewide. By 1990, that total had dropped to an estimated 8,541 fish, and by 2001, only 1,987 muskies were kept.

“It's a huge change,” says Pete Maina of Hayward, who started a total catch-and-release guide service a decade ago and is well known for his musky fishing columns, books and videos. “When I started guiding at 14, we killed every single legal fish we got. Fishing was a lot tougher then. It was amazing to kill a 40-incher. I was told that was the way it was...you killed them and didn't think about it.”

DNR biologists, including many who had been active in fisheries work since the 1970s, started to see the harvest decreases brought about by the catch-and-release ethic. Population and creel surveys verified the trend. More data flooded in as DNR ramped up sampling programs in the mid-1980s to help set tribal spearing quotas for musky and walleye and to assess those fisheries.

“Catch-and-release started getting rolling among the faithful, and we knew harvest rates were declining,” AveLallemant says. “We knew too that since we started gearing up to raise muskies, the hatcheries were putting out a really good product. They were big, and survival rates were good.”

The surveys and research revealed that increasing minimum size limits helped rebuild the populations. Statewide, the size limit increased from 30 to 34 inches in 1984, and even more protective limits were set on

25 percent of musky lakes. We manage muskies lake by lake," Simonson says. "We look at biological potential, growth rates, historical information and the public's desire for higher size limits.

Managing musky by the numbers

Biologists like Frank Pratt took those changes into consideration and started to throttle back on stocking some waters that showed improved natural reproduction.

"I started downgrading some of my quotas 10 to 15 years ago," says Pratt. "When I started here in 1974 at the top of the maximum sustained yield era, we were pushing them right to the edge of extinction without pushing them over.

"We needed lots of little fish coming in because we were turning them over so quickly. In those days anglers were keeping muskies once they reached an average of five to seven years. Now it's 15 to 20 years. All a musky has to do is replace itself once in a lifetime. If a portion of your population is hanging around to 15 years, you don't need to stock that many."

Pratt discovered that whether he stocked or didn't stock, whether he put in a thousand fish or two thousand fish, the results seemed to be the same: the only real change was in the size and age structure of the population. "There's some type of feedback loop going on," he says. "This is a beast that has an innate carrying capacity."

A musky lake with good natural reproduction will have one young-of-the-year per mile -- about .25 per acre.

Many of these findings were starting to come together when the Legislative Audit Bureau (LAB) reviewed the DNR's fish propagation program in 1997. The LAB concluded DNR's system was inadequate to meet the growing demands for fishing. In response, DNR fisheries biologists recommended establishing a management framework to protect the genetic integrity of native fish, and to make stocking of musky and other species less expensive and more effective.



Fish Technician Dave Brum (left) and DNR Musky Expert Steve AveLallemant conduct a spring survey of adult muskies to estimate the population age structure. Fall surveys investigate how well that year's class of newborn fish is surviving. © Steve Heiting, Musky Hunter Magazine

In general, stocking fewer fish but larger fish has proven to be more economical than stocking lots of small fish. Only .004 percent of fry stocked shortly after hatching in the spring survive to fall, and only four percent of those survivors make it to the next year. Consequently, 588,235 fry would need to be stocked to result in one surviving musky at a cost of about \$800 per musky, according to figures from work done by University of

Wisconsin - Stevens Point professor Michael Hanson and DNR researcher Terry Margenau. Survival and cost rates for stocking fish as 10- to 12-inch-long fingerlings would require 25 fish to yield one surviving musky at a cost of \$70.75 per musky.

The new framework enters its second year this fall. Each of the 220 stocked musky waters in the state has been assigned to a specific stocking practice for 10 years based on its reproductive status. Biologists will assess the fisheries through continued surveys.

- **Category 0** waters, those in which the reproductive status is unknown, will be stocked at one or two fish per acre.
- **Category 1** waters, those lakes with self-sustaining populations will not be stocked.
- **Category 2** waters, those with some natural reproduction and some stocking, will be divided into four treatments; some won't be stocked, some will be stocked at a rate of .5 muskies per acre, some at one fish per acre, and some at two fish per acre.
- **Category 3** waters, those in which stocking is required to maintain the fishing, will be stocked at .5 per acre, one and two fish per acre.

The framework can be adapted as needed. "We will hold things constant for a period of time, then look at the results, and change it if we need to," Simonson says. He sees no real danger that musky populations in the lakes would decline -- the harvest is just not that high, the fish can live 30 years, and they have plenty of time to reproduce and "replace" themselves.

"The worst-case scenario is that people will have somewhat lower numbers but bigger muskies in a water," Simonson says. "The best-case scenario is that we'll be able to stop stocking some lakes altogether. That would be good news and a real sign of success. It would imply that something really good is happening in these waters."

Lisa Gaumnitz explains and presents fisheries and water quality issues for DNR's Water Division.