

Walleye Fry Stocking in Egg-Take Lakes

The Minnesota Department of Natural Resources (DNR) annually stocks approximately 270 million walleyes, representing the largest walleye-stocking program in the United States. This program is possible because over 600 million eggs are collected annually from a total of 13 different spawning runs. Lakes supporting these spawning runs represent some of the most prolific walleye fisheries in the state and the importance of assuring that hatchery operations do not have negative impacts on these fisheries has long been recognized. To compensate for egg removals, the DNR currently attempts to return at least 10% of the walleye hatch to those lakes where eggs were removed. This return rate is based on estimates of in-lake hatching rates for walleyes in Lake Winnibigoshish during the 1950s. The actual number of walleyes stocked into these lakes often exceeds 10% due to additional fry that are available after annual DNR stocking needs have been met. The effects of these compensatory stockings on the walleye fisheries in egg-take lakes have never been evaluated.

New Technology, New Insights

Until recently we were unable to evaluate the contribution of stocked fry into these systems because our sampling techniques could not effectively differentiate between the fish we stocked and the fish that were naturally reproduced in the wild. The advent of oxytetracycline (OTC) marking – a technique that leaves a harmless mark on the fish that can be seen with the aid of ultraviolet light - has now provided us with the ability to identify stocked walleyes in our samples. The results of our work with OTC marked walleye fry in Red, Leech, and Woman Lakes have indicated that system-wide hatch rates can be significantly lower than previously thought. This information has substantially challenged some of our previous beliefs regarding the magnitude of natural fry production in some of our large lakes and has offered new insight regarding the density of walleye fry capable of producing strong year-classes. Several recent strong walleye year classes have been produced in Red and Leech lakes at total fry densities of less than 500 walleye fry per littoral acre (stocked and wild fish combined). On egg-take lakes stocking densities alone are 2 to 10 times higher (1,000 to 6,200 fry per littoral acre) than total fry densities estimated from Red and Leech lakes, but the egg-take lakes do not provide similar increases in walleye catch rates when compared to Red and Leech lakes. This suggests that a certain carrying capacity exists, beyond which the addition of more fry into the system does not result in more catchable walleyes in the population. We are also concerned that intensive pressure on the forage base resulting from high walleye density could result in poor growth and high mortality of both natural and stocked walleyes; the result of which could actually be fewer catchable walleyes in the population.

New Research

Because of these concerns, the DNR will be conducting an in-depth evaluation of compensatory fry stockings on walleye populations on four egg-take lakes: Otter Tail,

Vermilion, Winnibigoshish, and Woman lakes. This evaluation will have two primary objectives: 1) quantify natural reproduction at various levels of spawning stock density and egg removal rate, and 2) identify the optimal abundance of total walleye fry (wild and stocked fish) that will maximize numbers of catchable walleyes in these lakes. Over a multi-year period, the extent of natural fry production occurring within each lake and total fry densities will be estimated using OTC marking. Using fall gill-net surveys the abundance of these year classes will be monitored over subsequent years to determine the number of walleyes that eventually reach harvestable size. This will allow us to analyze relationships between total fry density and the subsequent number of harvestable-sized walleyes available to anglers. In order to describe this relationship, we will attempt to manipulate total fry densities at pre-determined levels between 250 and 2,000 fry per littoral acre so we can identify fry densities that maximize survival, growth, and abundance and provide the most walleyes for anglers. Achieving these target fry densities will likely require adjustments of existing stocking rates. In some cases this may result in stocking rates that are lower or higher than historic rates, depending on the number of eggs collected and the projected number of wild fry expected to hatch within each lake.

Important Research for Minnesota Walleye Fisheries

Broadly, this research is important because healthy walleye populations are vital to Minnesota's tourism economy, the angling community, and the state's legacy as a national leader in fishing quality. Specifically, the research will help fisheries managers and local communities better understand the impacts of fry stockings on existing walleye populations. The information gained from this study will help provide a greater understanding of walleye population dynamics in other walleye fisheries supporting natural reproduction. This project underscores our commitment to adopt new technology and use the best available science in the quest for better information regarding Minnesota's walleye populations so that these fisheries can be better managed.

Bullet Points:

- 1. Minnesota DNR stocks approximately 270 million walleyes annually- largest program in North American. This program is possible because over 600 million eggs are collected annually from 13 spawning runs.**
- 2. To compensate for egg removals, large numbers of walleye fry are returned to these lakes. The effects of these compensatory stockings have never been evaluated.**
- 3. New technology (OTC marking) allows us to identify stocked walleyes. This technology has allowed us to better examine the effects of walleye stocking in systems where natural walleye reproduction is occurring. This technology also allows us to estimate total abundance of walleye fry in a lake.**
- 4. Initial analyses on Red and Leech lakes indicate that strong walleye year classes can be produced at total fry densities much lower than previously thought.**
- 5. Stocking rates on egg takes lakes are high but do not appear to provide similar increases in walleye catch.**
- 6. Concerns that stocking too many fish could result in poor growth and survival of both wild and stocked fry, resulting in fewer catchable walleyes in the population.**
- 7. Because of these concerns, the DNR will be conducting an in depth-evaluation of compensatory fry stockings on walleye populations on four egg take lakes: Otter Tail, Vermilion, Winnibigoshish, and Woman lakes. These lakes provide unique opportunities for this work due to their ecological characteristics and relatively large, historical data sets.**
- 8. Study will have two objectives: 1) estimate wild fry production in these lakes and 2) identify optimal abundance of total walleye fry (stocked and wild fish combined) that will maximize numbers of catchable walleyes in these lakes.**
- 9. This study continues the DNR's long history of implementing research projects that aim to improve the understanding and management of the state's fisheries. Minnesota continues to provide some of the nation's best fishing and is one of the nation's top five angling destinations.**