WHAT IS THE STATE OF GREAT LAKES TOP PREDATOR FISH?

Native and non-native fish at the top of the Great Lakes food web are maintained in part through stocking programs. Habitat alteration, invasive non-native species, changing food supply, fish harvesting, and contaminants exert negative pressures on these fish.

The Issue

- Top predator fish are important components of the Great Lakes food web and they provide food to both human and wildlife consumers. Currently, top predator fish populations are not self-sustaining in all Great Lakes and are impacted by habitat loss and alteration, non-native aquatic species, food web condition, fishing, and contaminants.

The Indicators

Native top predator fish include lake trout in Lakes Superior, Huron, Michigan and Ontario, and walleye in Lake Erie. Abundant, self-sustaining populations of lake trout or walleye are a good indication of a healthy open water ecosystem.

Non-native coho salmon, Chinook salmon, rainbow trout, and brown trout (hereafter referred to as salmonids) were introduced to the Great Lakes in the 1960s as top predator fish primarily to control populations of alewife and rainbow smelt (both non-native preyfish), and they now also provide recreational fishing opportunities. The size of the salmonid population should be maintained in balance with the food supply to ensure its continued success.

A diversity of prey species is needed to support populations of predator fish. Dominant preyfish include non-native alewife and rainbow smelt, and native species such as bloaters, lake herring, and deepwater sculpin. At high abundance, alewives and rainbow smelt indicate poor ecosystem health due to a lack of top predators and impoverished native prey species.

Additional pressures on top predator fish include parasitic attacks by sea lamprey and various effects of contaminants. Sea lamprey abundance is a direct measure of their potential to impact populations of large fish, especially lake trout. Assessment of levels of contaminants in top predator fish helps to determine the potential for adverse health or reproductive effects on fish communities and the risks to human and wildlife consumers of these fish.

The Assessment

Naturally-reproducing lake trout disappeared from most of the Great Lakes by the 1950s, primarily due to sea lamprey predation and overfishing. Today, self-sustaining populations exist in Lake Superior, and some natural reproduction occurs in Lake Huron and Lake Ontario. For all Great Lakes except Lake Superior, however, populations are maintained through annual stocking programs. Sea lamprey continue to inhibit lake trout recovery in northern Lakes Huron and Michigan. Throughout the Great Lakes, a predominately alewife diet is associated with thiamine deficiencies that inhibit survival of young lake trout.

Walleye suffered major declines in abundance in the 1960s and 1970s, primarily due to poor water quality. Improved water quality and spawning and nursery habitat quality, along with fishery management programs, led to a dramatic recovery of walleye in many areas of the Great Lakes. Populations have generally been declining from the mid-1990s to present, however.

Lake trout. Photo: Fisheries and Oceans Canada.

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Non-native salmonids in the Great Lakes have helped suppress non-native alewife and rainbow smelt populations. Although the salmonids also provide a valuable sport fishery, they potentially have negative effects including direct competition with native fish species for food and habitat, genetic alteration through hybridization, and transfer of pathogens and parasites.

Preyfish abundance in all the Great Lakes has declined since the early 1990s. In Lakes Ontario, Michigan, and Huron, the offshore preyfish community remains dominated by non-native alewives.

Sea lamprey abundances have been greatly suppressed from pre-control levels in all the Great Lakes, although their abundances are above targets in the three upper Great Lakes.

Levels of legacy contaminants such as PCBs, DDT, and mercury have declined in monitored Great Lakes lake trout and walleye since the 1970s, but they may still be high enough to impair fish-eating birds such as the bald eagle and to restrict consumption by humans.

Current Actions

U.S. and Canadian federal, state, provincial, and tribal agencies work together to conduct fish population estimates and analyze fisheries yields. This information, along with established fish community objectives for each Lake, is used to determine stocking and harvest targets for lake trout, walleye, and non-native salmonids. Effective management of commercial and sport fishery harvests contributes to increased survival of lake trout and increased abundance of walleye.

Stocking of salmon and lake trout in Lakes Michigan, Huron and Ontario has recently been reduced in recognition of significant reductions in preyfish populations.

Suppression of sea lamprey continues in all five Great Lakes through treatment of streams with lampricides and alternative control efforts.

Walleye. Photo: Fisheries and Oceans Canada.

Actions Needed

To restore a self-sustaining Great Lakes top predator fish community, the following actions are needed:

- Research to reestablish self-sustaining lake trout populations throughout the Great Lakes
- Research to determine the optimal stocking amounts of non-native salmon and prey species to support self-sustaining top predator fish communities
- Improvements to watersheds, substrate enhancement, and dam removal to help remediate impacted walleye spawning and nursery habitats
- Protection or reestablishment of native preyfish species
- Aggressive sea lamprey treatment efforts and further research in sea lamprey-prey interactions, population dynamics, and alternative control methods

For More Information

For further information related to Great Lakes top predator fish, refer to the ***State of the Great Lakes 2005*** report which, along with other Great Lakes references, can be accessed at **www.epa.gov/glnpo/solec**.

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