

Lake trout: to release or not release

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Lake trout is king when it comes to sport fishing in Lake Superior, where it makes up the bulk of recreational fish harvest. Though not as well respected in the lower Great Lakes, lake trout generally can be caught if anglers don't catch any salmon or steelhead, making it the essential backup fish. During the middle part of the 20th century, lake trout went extinct in the four lower Great Lakes and nearly so in Lake Superior. Excessive commercial fishing and the invasive parasitic sea lamprey were to blame. Due to great efforts by natural resource agencies, wild lake trout populations recovered in Lake Superior during the late 1990s, which is a rare fishery management success story. Until recently, lake trout in all of the other Great Lakes originated from hatcheries, however there have been signs of increasing natural reproduction in Lake Huron and Lake Michigan with rising numbers of wild fish.

Recreational fishing for lake trout in the Great Lakes is mostly done with a boat outfitted with downriggers. However, some anglers also fish lake trout using hand lines (bobbing or jigging), planer board, dipsy divers, or wire-lining (a pole fished off the stern with a weighted wire line). With the exception of bobbing or jigging, the boat is trolled. As you know, releasing some of what you catch is a common practice in fishing and this also holds true for lake trout. Anglers by nature will release fish depending on various motivations--whether it is pragmatic or altruistic. Natural resource agencies often manage lake trout with length limits which requires anglers to throw back some fish that are caught to protect the population by making sure enough fish spawn to maintain sustainability. Fisheries managers need to know how many fish die as a result of being

harvested as well as from the stress of being captured and released (hooking mortality). Having accurate estimates of total fish deaths from fishing (harvest and hooking mortality) is vital to insure population models that generate lake trout safe harvest quotas are accurate.

Prior to this year, the only estimate of hooking mortality available was based on a single study conducted in the mid-1980s in Lakes Superior, Huron, and Michigan. That study found about 15% of caught and released lake trout die. Due to concerns about the accuracy of that estimate, Michigan DNR researchers conducted an intensive tagging study between 2010 and 2015 in Lakes Superior and Huron to estimate hooking mortality of lake trout. The study design was to tag and release lake trout in two study groups: a treatment group comprising fish caught and released by actual recreational boat-anglers and a control group of fish caught and released from Great Lakes commercial trap nets. Hooking mortality was estimated from the difference in subsequent tag return rates between the two study groups. This study relied on anglers and commercial fishers catching and reporting tagged lake trout, so a \$10 reward was offered as an incentive to maximize returns.

For the treatment group, experienced lake trout anglers with the ‘right stuff’ were recruited at two major Michigan fishing ports: Marquette in Lake Superior and Alpena in Lake Huron. These research anglers employed typical fishing methods used in the Great Lakes to catch, tag and then release lake trout in support of the study. Each research angler underwent detailed training from researchers to ensure no bias in study results. Many details were recorded in the study including: fish length, depth of capture,

incidence of bloating, presence of gulls during release, fishing method, where the fish was hooked, play time, handling time, and surface water temperature when released.

From 2010 to 2013, about 2,300 lake trout were tagged by research anglers and 1,800 control lake trout were tagged by the MIDNR in Lake Superior. In Lake Huron, 934 lake trout were tagged by recreational anglers and 1,670 control lake trout were tagged by the MIDNR. Tag returns accumulated through 2016 were high for both angler-tagged (762 tags) and control (981 tags) groups in Lake Superior. Lake Huron tag returns were very low with the angler-tagged group only getting back only 51 tags and only 306 control group tags were reported. Analyses indicated that surface temperature at time of release was the major factor affecting survival of angler-released lake trout. Generally, it was found that survival of angler-tagged lake trout declined with increasing surface temperature of the water the fish was released in. The culprit is the great difference in water temperature between where the lake trout is caught versus where it is released. Overall, hooking mortality was estimated to be at least 43% when surface temperature exceeded 50°F and was about 15% when surface temperature was 50°F or colder in Lake Superior.

A big surprise finding was that researchers did not measure a significant difference in survival rates between fish that were bloated versus non-bloated when tagged and released by research anglers. The only exception was a lower survival of bloated fish released when gulls were present. It seems counterintuitive that a released bloated lake trout has the same survival rate as a fish that was not bloated. There are a few potential explanations for this. First, lake trout gas bladders are connected to their stomach and they have the ability to expel gas through their mouth. In fact, some of the

research anglers in this study observed lake trout burping out bubbles before descending. Another explanation is that the process of a lake trout being hooked at great depth, then dragged up through the water column, and more importantly--being placed in warmer, sub-optimal water temperatures when released. This event is traumatic to the fish and compromises the fish's condition and ability to recover. Furthermore, it is important to realize that these results would seem to indicate that there is no benefit to venting or deflation of the lake trout's gas bladder.

It is important here to contrast the biology of lake trout from other fishes. Although a relative of salmon and trout, lake trout is not actually a trout but is a char. Chars live in northern latitudes and are by nature a cold water species (it includes brook trout and Arctic char). The chars therefore are very sensitive to warm water temperatures. Unfortunately, most of the lake trout fishing on the Great Lakes occurs during the months when surface water temperatures are too warm. At least 40% of angled lake trout that are returned to the water will not survive. So a key take home message from this study is that lake trout are not a suitable fish for catch and release fishing and resource agencies have adapted their management to get away from regulations that promote catch and release of this species.