

****ABSTRACT NOT FOR CITATION WITHOUT AUTHOR PERMISSION.** The title, authors, and abstract for this completion report are provided below. For a copy of the full completion report, please contact the author via e-mail at nawash.fisheries@gmail.com. Questions? Contact the GLFC via email at frp@glfc.org.

Engaging traditional indigenous knowledge and scientific analysis to examine the role of lake trout in recent declines of lake whitefish

Ryan Lauzon², Breanna Redford^{2,3}, Dr. Erin Dunlop^{3,4}, Courtney Taylor^{4,5}, Chris Davis³, Vicki Lee³, Kaitlin Almack^{6,7}, Alexander Duncan^{2,8}, Dr. Kristen Lowitt⁹

- 2 Fisheries Assessment Program, Chippewas of Nawash Unceded First Nation. 50 Farm Road, Neyaashiinigmiing, ON, Canada, N0H2T0
- 3 Upper Great Lakes Management Unit, Ontario Ministry of Natural Resources. 1450 Seventh Ave. E., Owen Sound, ON, N4K 2Z1
- 4 Aquatic Research and Monitoring Section, Ontario Ministry of Natural Resources. 2140 East Bank Drive, Trent University, Peterborough, Ontario, K9L 0G2
- 5 Environmental and Life Sciences Graduate Program, Trent University, Peterborough, Ontario, K9L 0G2
- 6 Provincial Services Division, Ontario Ministry of Natural Resources, 2nd Flr N, 300 Water St, K9J 3C7, Peterborough, Ontario
- 7 The Nature Conservancy, 4245 North Fairfax Drive, Arlington, Virginia 22203-1606, United States.
- 8 Doctor of Philosophy in Oceans and Fisheries Graduate Degree Program, University of British Columbia, Vancouver, British Columbia, V6T 1Z4
- 9 School of Environmental Studies, Queen's University. 99 University Ave, Kingston, Ontario, K7L 3N6

March 2025

ABSTRACT:

In the 1940's lake trout (*Salvelinus namaycush*) populations collapsed in Lake Huron, largely attributed to overfishing, sea lamprey predation, and habitat degradation. In the 1970's efforts began to rehabilitate lake trout in Lake Huron through stocking by various organizations, including the Ontario Ministry of Natural Resources (OMNR). Over the last 20 years Lake Huron's ecosystem has undergone substantial change, including a reduction in offshore productivity, collapse of some important prey resources, transformation of the benthic food web, and the collapse of lake whitefish (*Coregonus clupeaformis*) populations. A perceived correlation between increasing lake trout populations and declining lake whitefish numbers prompted commercial and Indigenous fishers to question whether interactions between the species might be the cause of the lake whitefish declines. Lake whitefish are a key cultural, economic and food fish for the Saugeen Ojibway Nation (SON). SON and the OMNR agreed to work together on two objectives: (1) examine evidence of lake trout predation on lake whitefish; and (2) evaluate potential for resource competition between lake trout and lake whitefish. We used a two-eyed seeing approach in which SON knowledge and Western science were used to complete the objectives. Diet analysis through stable isotopes and stomach contents revealed regional differences. We described regional diets from stomach contents using an index of relative importance and diet biomass proportions, and we determined the Schoener diet overlap index between lake trout and lake whitefish, as well as several other fish species. We found that invasive species dominated the diets of lake trout throughout all basins of Lake Huron. There was some limited predation of lake whitefish by lake trout, particularly in the central main basin. Lake whitefish diets were dominated by dreissenid mussels in the southern main basin and by

round goby (*Neogobius melanostomus*) in the central main basin. Stable isotope analysis revealed that overall, lake whitefish had broader niches and more diverse diets than lake trout, especially in northern Lake Huron. Though lake trout fed at higher trophic levels, lake whitefish were infrequently encountered in lake trout stomachs. The data suggests that competition with—or predation by—lake trout is not the major cause of lake-wide declines of lake whitefish, however there is some regional variation. Although SON knowledge from interviews and mapping indicated a variety of forage fish within the diets of lake trout, there were some regional differences observed. In the central main basin, a higher occurrence of predation on lake whitefish by lake trout was observed when compared to those in Georgian Bay. Lake whitefish diets had changed over recent times from largely *Diporeia* and insects, with some small fish, to a diet dominated by dreissenid mussels. While SON members noted concerns related to predation of lake whitefish by lake trout, they did not express the same concerns about competition for food between the two species. Competition for habitat was more commonly documented and indicated as a cause for concern from the interviews and maps. Both species occupy much of the same habitat with some seasonal and regional variation. Lake trout were noted as having an increasing distribution and abundance over time, while the opposite was true for lake whitefish. Some of the knowledge holders attributed the inverse relationship between the two species to habitat competition. The knowledge collected from both Indigenous knowledge holders and Western science have been shared with SON membership and are an important source of information for the OMNR and SON leadership in decisions about lake trout and lake whitefish stewardship in upcoming discussions.