Lake Simcoe Fish Community Objectives

(Objectifs envisagé pour la communauté de poissons du lac Simcoe)

Image generously provided by: Curtis Atwater

Ontario

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Introduction

Healthy ecosystems, including healthy aquatic communities, provide significant social and economic benefits. Currently, aquatic communities and habitats in Lake Simcoe and its watershed are stressed by degraded water quality (primarily phosphorus), contaminants (such as pharmaceuticals), pathogens, invasive species and climate change. Unsustainable land uses such as agricultural intensification, urbanization (including industrial and residential development), recreation, peat and water extraction are also stressors on Lake Simcoe and its watershed (SciAC 2008). The health of the coldwater fish community[1] is an important indicator of ecosystem health due to its sensitivity of key native species such as lake trout to water quality changes. Lake Simcoe is the most intensively fished inland lake in Ontario (next to the Great Lakes). It is both ecologically and economically distinct from many other lakes in the province. It is widely renowned for its world class lake trout, lake whitefish, yellow perch and smallmouth bass fisheries[2]. Maintaining this fishery and restoring its coldwater fish community is not only dependent on improved water quality and the protection of habitat but also on sound and strategic fisheries management.

This document provides a common goal and a comprehensive set of objectives to enhance and guide the collective efforts to manage the fish community and fisheries resources of Lake Simcoe and its watershed. The focus of this document is on Lake Simcoe and its tributaries; however, it is also applicable to Lake Couchiching, where appropriate, as their fish communities and watersheds are connected.

[1] Fish community refers holistically to the assemblage of all fishes within a given system and in some cases also refers to the socio-economic benefits they provide

[2] Fishery refers specifically to the act of fishing whether for commercial or recreational purposes

Introduction

Des écosystèmes sains, ce qui comprend des communautés aquatiques en bonne santé, apportent d'importants avantages sociaux et économiques. Les communautés et habitats aquatiques du lac Simcoe et de son bassin hydrographique sont perturbés par la dégradation des eaux (principalement par le phosphore), des polluants (p. ex., des produits pharmaceutiques), des agents pathogènes, des espèces envahissantes et le changement climatique. Des utilisations non durables des sols, telles que l'intensification de l'agriculture, l'urbanisation (dont les lotissements industriels et résidentiels), les loisirs, l'extraction de tourbe et le prélèvement d'eau sont également des contraintes exercées sur le lac Simcoe et son bassin hydrographique (Comité scientifique consultatif du lac Simcoe, 2008). L'état de santé de la communauté[3] de poissons d'eau froide est un important indicateur de l'état de santé de l'écosystème, parce que les espèces indigènes clés comme le touladi sont sensibles aux changements que subissent les eaux où elles évoluent. Le lac Simcoe est celui des lacs intérieurs de l'Ontario où la pêche est la plus intensive. (Il n'est surpassé à cet égard que par les Grands Lacs.) Il est distinct, sur les plans écologique et économique, de nombreux autres lacs ontariens. Il est très réputé pour l'excellence de sa pêche[4] au touladi, au grand corégone, à la perchaude et à l'achigan à petite bouche. Pour préserver cette pêche et reconstituer la communauté de poissons d'eau froide du lac, il importe non seulement d'améliorer la qualité de l'eau et de protéger les habitats, mais aussi de gérer les pêches de manière judicieuse et stratégique.

Sont proposés, dans le présent document, un but global et un ensemble d'objectifs visant à renforcer et à guider les efforts déployés pour gérer la communauté de poissons et les pêches du lac Simcoe et de son bassin hydrographique. Les objectifs se rapportent principalement au lac Simcoe et à ses affluents, mais peuvent aussi s'appliquer au lac Couchiching lorsque cela est pertinent, car les populations de poissons et les bassins hydrographiques des deux lacs sont reliés.

[3] S'entend de l'ensemble des poissons au sein d'un milieu donné et peut, dans certains cas, s'entendre aussi des avantages socioéconomiques qu'apportent ces poissons.
[4] S'entend aussi bien de la pêche commerciale que de la pêche de loisir.

Draft Fish Community Goal

A fish community that is reflective of and contributes to a healthy/restored Lake Simcoe ecosystem where socio-economic and cultural benefits of the fishery are realized now and into the future; where management actions are complimentary and strive for an ecological balance of self-sustaining native species; where natural fish habitats and species biodiversity are protected and maintained, and; degraded habitats and lost elements of the fish community are restored.

But envisagé pour la communauté de poissons

Avoir une communauté de poissons caractéristique d'un écosystème rétabli et qui contribue à le garder en bonne santé, où les avantages socioéconomiques et culturels des pêches sont obtenus aujourd'hui et pourront l'être demain, où les mesures de gestion se complètent et visent à créer un milieu écologique où peuvent évoluer harmonieusement les espèces indigènes capables de se repeupler naturellement, où les habitats naturels et la biodiversité piscicole sont protégés et maintenus, et où sont rétablis les habitats qui étaient dégradés et les éléments de la communauté de poissons qui avaient disparu.

1.0 Background

Lake Simcoe is located adjacent to the Greater Toronto Area and within an hour's drive of the city of Toronto. It provides some of the most sought after angling opportunities in Ontario in all four seasons; however, it is best known for its winter ice fishery. It draws an estimated 1 million angler hours per year and is the most southern natural lake trout lake in Canada. In 1995, the Lake Simcoe fishery generated an estimated $112 million dollars in revenue. As of 2007, there were 49 native fish species known to inhabit Lake Simcoe proper with an additional 11 native fish species that reside in its watershed. These, combined with the addition of the non-native species that have established populations, form the entire Lake Simcoe fish community addressed in this document.

Given the Lake's proximity to the urbanized landscape of southern Ontario, anthropogenic impacts have taken their toll on this provincially significant resource. Elevated phosphorus levels, water quality and quantity, invasive species, climate change, habitat loss and intense angler effort combine to influence the composition and function of Lake Simcoe's fish communities and the aquatic ecosystem.

The status of the Lake Simcoe coldwater fish community has been the subject of long term monitoring by the Ontario Ministry of Natural Resources' (OMNR) Lake Simcoe Fisheries Assessment Unit and the focus of research programs given their role as ecological indicators of the environmental health of the entire Lake Simcoe ecosystem and their socio-economic importance.

Degradation of coldwater fish habitat caused primarily by excess phosphorus loading has been identified as the primary factor in the decline of natural recruitment[5] of native lake trout, and possibly of lake whitefish and lake herring (cisco). Generally, the 1960s, 70s, 80s and 90s each saw a dramatic decline in the relative abundance of a different coldwater fish species (first lake trout in the 60s, then lake whitefish, followed by lake herring and finally, the introduced rainbow smelt in the 90s).

Through significant government, non-government, and community efforts, the health of Lake Simcoe and its watershed has improved. Recently, natural recruitment of lake trout has been observed, which coincides with improvements in water quality. Since 2002, wild lake trout have been observed during field surveys and multiple age classes of wild, naturally produced lake trout have been documented. These observations indicate that some naturally reproduced fish are surviving to adulthood — something that has not occurred in Lake Simcoe for over 20 years. Although this does not indicate a recovery of lake trout, it is a positive step towards re-establishing a self-sustaining lake trout population and coldwater fish community. Furthermore, lake trout are not the only member of the coldwater fish community showing positive signs of potential recovery; lake whitefish and lake herring (cisco) have also produced sizeable year classes in recent years.

[5] Recruitment refers to a fish population's ability to reproduce and survive to adulthood naturally.

The warmwater fish community of Lake Simcoe is characterized by sport fish such as smallmouth bass, largemouth bass, panfish (pumpkinseed, bluegill, rock bass and black crappie), and coarsefish (common white sucker, bowfin, common carp, channel catfish and brown bullhead), as well as small-bodied fish such as *Cyprinids* or minnows. The warmwater fish community also includes coolwater fish species such as yellow perch, northern pike, and walleye that transition between traditional warm and cold water habitats for various life functions/stages. Although the warmwater fish community is stressed by factors such as shoreline modification and habitat loss, these species are generally less sensitive to the effects of eutrophication compared to coldwater fish species.

The warmwater fish community of Lake Simcoe supports a significant portion of the annual angling effort on the Lake. Yellow perch is one of the most popular species harvested in the recreational fishery, both in the open-water and the winter fisheries. Generally, the catch of yellow perch has steadily increased over time, consistent with the increase in angling effort. Lake Simcoe has long been recognized for its quality smallmouth bass fishery, and is a preferred destination for those anglers seeking trophy sized smallmouth. Other warmwater species are targeted to a lesser degree. There is a significant commercial baitfish industry that focuses on the emerald shiner population.

There are numerous tributaries throughout the watershed which flow into Lake Simcoe. These tributaries provide a fundamental link to spawning and nursery habitats for many fish species, such as yellow perch, bass, northern pike, muskellunge, walleye, and emerald shiners. The tributaries found within the Lake Simcoe watershed also provide essential habitat for stream resident populations of coldwater species such as brook trout. Significant stressors such as land use change, water level fluctuation, and overexploitation have also impacted the tributaries and their fish populations. However, the persistence of a species such as the brook trout in portions of Lake Simcoe's tributaries is an indicator of high quality coldwater environments. In addition, these tributaries are also home to a diverse warmwater fish community with abundant minnow populations.

For a more detailed description of Lake Simcoe's fish community, fisheries and fisheries management over time please see the accompanying background document entitled: "Lake Simcoe's Fish Community Objectives: Background Document".

2.0 Fisheries Management

The fish community and fisheries of Lake Simcoe are cooperatively managed by provincial and federal government agencies, along with the local Lake Simcoe Region Conservation Authority (LSRCA) and stewardship and stakeholder organizations. Management of the fisheries resources of Lake Simcoe is the responsibility of the OMNR's Aurora and Midhurst District Managers. Fisheries and Oceans Canada in partnership with the LSRCA have responsibility for protecting fish habitat within the

watershed. OMNR managers receive fisheries management advice and recommendations from two Lake Simcoe fisheries committees.

The Lake Simcoe Fisheries Management Committee (LSFMC) is a government committee that serves to bring science, policy makers and operational staff together to review information and provide advice to fisheries managers on issues faced by the Lake Simcoe ecosystem and its fisheries. It provides a forum where issues affecting the lake can be identified and reviewed to ensure the long term sustainability of Lake Simcoe's fisheries and aquatic resources.

The Lake Simcoe Fisheries Stakeholder Committee (LSFSC) is an external committee comprised of individuals representing a broad range of fisheries interests from stakeholder organizations, aboriginal communities, individual ice hut operators, and local environmental organizations. The Committee provides advice and recommendations to the Midhurst and Aurora District Managers of the OMNR on the management of the fisheries resources of Lake Simcoe, Lake Couchiching and their watersheds. The Committee also takes an active role in promoting fisheries stewardship within the watershed to improve the health of the fish communities.

3.0 Guiding Principles

A number of provincial policies provide fisheries management guidance. These documents are the result of fisheries science, management knowledge and experience, as well as significant public and stakeholder consultation. They include OMNR's Strategic Plan for Ontario Fisheries (SPOF II): An Aquatic Ecosystem Approach to Managing Fisheries (OMNR 1992), Our Sustainable Future (OMNR 2005a), Protecting what Sustains Us: Ontario's Biodiversity Strategy (OMNR 2005b), An Ecological Framework for Fisheries Management in Ontario (OMNR 2005c) and Fisheries and Oceans Canada's (DFO) Policy for the Management of Fish Habitat (DFO 1986). In addition, the Lake Simcoe Protection Plan (OMOE 2009) provides a foundation and direction for ecosystem and fisheries management within the Lake Simcoe watershed. A summary of these guiding principles are adapted below:

- Fisheries management must consider the fish community and its functions within the whole ecosystem; this principle recognizes that all species and their habitats are interrelated
- Management decisions need to consider probable implications for the entire food web (such as the predator/prey balance)
- Protection and restoration of fish habitat is critical - without habitat there will be no fish community or fisheries to manage
- There is a limit to any natural resource and the socio-economic benefits that it can provide for present and future generations
- Naturally reproducing fish communities based on native fish populations and healthy ecosystems provide predictable and sustainable benefits with minimal long-term cost to society

- Sustainable fisheries based on naturally reproducing fish communities can only be ensured by effectively managing human activities (i.e. development and exploitation) as a part of the ecosystem
- Stocked fish may be necessary to continue progress in maintaining and restoring the biological integrity and genetic diversity of the Lake Simcoe fish communities and for supporting spawning populations of species needing rehabilitation
- Good management is based upon the best available scientific knowledge, including Aboriginal traditional knowledge, incorporated into an adaptive management approach
- Our ability to manage fish communities is limited, due to incomplete knowledge, the existence of uncertainty, and because Lake Simcoe is continuously affected by influences which are beyond our control
- Aboriginal peoples and a wide range of stakeholders, as well as the general public will participate in fisheries management decisions
- Rare and endangered native species add to the biodiversity of a fish community and should be protected in recognition of their ecological significance and intrinsic value
- The impacts of invasive species and climate change are serious threats to biodiversity and the fisheries resource; therefore, management actions need to be taken to ensure that ecosystems and fish populations are resilient enough to withstand adverse effects from such threats
- The social, ecological, economic, and cultural benefits and impacts of management decisions should all be considered in the decision making process

4.0 Objectives

For the purpose of this document, the entire fish community has been separated into three functional units based on food web interactions, species distribution and habitat requirements. These functional units consist of the **coldwater fish community**, dominated by fish species that require deep cold summer habitat; the **warmwater fish community** encompassing all other fish species, including coolwater species that inhabit the warmer, nearshore areas of Lake Simcoe during summer; and the **tributary fish community** that inhabit the tributaries within the watershed. There is a recognition that a number of species bridge more than one functional unit for one or more components of their life histories (e.g., walleye that forage in the summer in the deep cold waters for lake herring, feed in shallow weedy areas at night and enter tributaries during early spring to spawn).

4.1 General Objectives

Given that Lake Simcoe's fish communities provide social and economic benefits as well as ecological services, we have a responsibility to:

> *Manage Lake Simcoe's aquatic and fish communities and associated fisheries within the context of its watershed ecosystem*

Ensure that a multi-agency approach to water quality monitoring provides for the consideration of contaminants, toxic substances and pharmaceuticals in the Lake Simcoe watershed, allowing for harvest opportunities of fish that are safe for human consumption

Ensure that all fisheries management decisions consider the impacts and implications of the interconnected nature of fish communities and associated food webs

Manage for native, self-sustaining fish populations

Prevent further loss of native fish species (e.g. lake trout, lake herring, burbot)

Restore, where appropriate, native extirpated components of the Lake Simcoe fish community (e.g. muskellunge and lake sturgeon) through habitat improvements and rehabilitation stocking

Promote the recovery of "at risk" fish species, especially those that are considered threatened or endangered (e.g. redside dace)

Prevent new non-native species and disease introductions from occurring and limit the impacts and spread of established invasive species and disease

Conserve, protect and restore all fish habitat, with special emphasis on natural, riparian, littoral zone, coastal and riverine wetland, spawning and nursery habitats

Manage fisheries resources and angling opportunities sustainably to ensure benefits now and into the future

Improve the quality and amount of winter and summer fishing access to the lake and prevent further loss

Promote the benefits of maintaining and providing shore fishing opportunities

Maintain the angling opportunities presently offered by the Lake Simcoe fish communities

4.2 Coldwater Fish Community and Fishery Objectives

The coldwater fish community and its habitat have experienced the cumulative impacts from the vast majority of the key stressors acting on the Lake Simcoe watershed. The native species comprising the coldwater fish community (lake trout, lake whitefish, lake herring, and burbot) require cold, well oxygenated summer habitat. Excessive phosphorus loading has led to a process known as eutrophication, where high levels of

dissolved oxygen are consumed. This leads to a loss of coldwater fish habitat for certain species residing in the hypolimnion due to severe oxygen depletion during the summer months when the lake is stratified. Sediment loading can also have major negative effects upon coldwater fish habitat, as siltation can build up on spawning beds, and fill the interstitial spaces between substrates (normally where the eggs of these species are deposited until they develop). The result of eutrophication on Lake Simcoe is the inability of lake trout and other coldwater species to reproduce naturally. More recently, some positive signs of potential recovery have recently emerged in the coldwater fish community with the presence of naturally reproduced lake trout, whitefish, and herring. Recognizing this, specific fish community objectives for the coldwater fish community are:

Encourage and promote the natural reproduction of the native coldwater species of Lake Simcoe to achieve a self-sustaining coldwater fish community and fishery

Ensure that management actions do not disrupt the natural balance of the coldwater fish community food web (e.g., predator prey balance)

Manage the coldwater fish community for catch rates that provide sustainable harvest opportunities

Manage the lake herring (cisco) population as an important forage base for lake trout; and when sustainable, for a recreational fishery to allow for harvest opportunities

4.3 Warmwater Fish Community and Fishery Objectives

The warmwater fish community of Lake Simcoe provides for large, economically significant, sport fisheries focused on yellow perch and smallmouth bass. The fish species in this warmwater fish community have not been impacted by poor water quality to the same extent as the coldwater fish community and therefore have traditionally not received the same level of management or monitoring attention. Shoreline hardening, filling in of nearshore areas, and vegetation removal have caused extensive habitat loss and impacted the warmwater fish community. These activities disrupt important land-water linkages, remove habitat structure, and alter physical processes which all impact the availability of fish habitat. The objectives for the warmwater fish community are:

Actively manage the warmwater fish community, its fishery and its function within the Lake Simcoe ecosystem

Maintain the yellow perch population, ensuring it provides for quality and quantity harvest, possession, and angling opportunities attractive to local and visiting anglers

Maintain the bass populations; *continuing to manage the prominent smallmouth bass population, focusing on a fishery composed of large numbers of trophy sized fish attractive to the recreational and professional angling community*

Sustain recreational fishing opportunities for northern pike and panfish

Where appropriate, manage established non-native populations of fish (e.g., black crappie, carp, bluegill) to provide maximum recreational benefit with minimal impact to native species

Maintain Lake Simcoe's native walleye population, recognizing the limited amount of available habitat

Maintain populations of small-bodied, native prey fish for their ecological role in the fish community, as the foundation of the food web

4.4 Tributary Fish Community and Fishery Objectives

There are 35 major tributaries that flow into Lake Simcoe throughout the watershed. These tributaries provide a fundamental ecological link between Lake Simcoe's watershed (and its land uses) and the lake proper. These systems also provide critical spawning and nursery habitats for many of Lake Simcoe's fish species. All of these systems provide habitat for a diverse small-bodied fish community with some providing high quality coldwater habitat for sensitive fish species such as brook trout. The modification of tributary habitats, including stream channel alteration, in-stream obstructions (i.e. dams and barriers), and the removal of riparian vegetation have degraded the quality of tributary habitat around the watershed. Increases in water temperature and stormwater runoff as well as reduced groundwater inputs have all taken their toll on the tributary habitats and fish communities of Lake Simcoe. The following objectives should be the focus of management efforts:

Identify, protect and restore tributary habitats of the Lake Simcoe watershed that support critical life history functions including important spawning and nursery habitat

Where appropriate, look for opportunities to remove or modify barriers to fish migration to improve connectivity, habitat quality and access to additional spawning habitats

Maintain remaining brook trout populations, protect coldwater tributary habitat and, where feasible, restore historic coldwater tributary habitats

Habitat improvements should be sought to improve and expand the amount of available river spawning habitat in support of such species as walleye and muskellunge where appropriate

5.0 Science & Monitoring

Lake Simcoe is one of the most intensively monitored lakes in the province. OMNR's Lake Simcoe Fisheries Assessment Unit has been collecting long term data on the fish communities and fisheries of Lake Simcoe since the early 1960's. Lake Simcoe and its watershed have also been the focus of past and present government and academic research. It continues to be monitored by OMNR, the Ministry of the Environment and the Lake Simcoe Region Conservation Authority. Combined, this information furthers our understanding of how the fish communities of Lake Simcoe function within the lake's watershed ecosystem. In order to enhance our understanding and management of Lake Simcoe and its fisheries resources, key objectives are to:

Maintain long term monitoring programs that track the health of the Lake Simcoe fish community, including its populations and fisheries

Continue research to improve our understanding of how the Lake Simcoe ecosystem functions with reference to the ecological factors, stressors and species interactions that sustain, threaten and govern its fish communities

Continue to collaborate and work within a multi-agency/organization approach in the collection and assimilation of physical, chemical and biological information in support of improving our management of Lake Simcoe's fish communities and fisheries

6.0 How This Document Will Be Used

This document will strategically guide OMNR's fisheries management decision making into the foreseeable future. It will also inform other agencies and organizations who have a role to play in fisheries or fish habitat management in the Lake Simcoe watershed. The document and its objectives should also be used to direct fisheries related stewardship activities. Most importantly however, it should be used by all levels of government to make informed decisions about planning, permitting and implementation of development activities within the Lake Simcoe watershed.

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