FISH HEALTH IN THE GREAT LAKES AND UPPER ST. LAWRENCE RIVER

REPORT ON STAKEHOLDER CONSULTATIONS

Prepared by Lawrence Gunther
President of Blue Fish Canada

July 2019

INTRODUCTION

Early in 2017, the author of this report received an invitation to help bring together organizations and individuals with an interest in water quality issues. The purpose was to identify priorities and plan outreach and communications to advance those priorities. Two meetings were held in 2017 – People's Great Lake Summits – and included 86 participants representing nongovernment organizations, academics, and university students.

During both of the People's Great Lakes Summits, water quality issues were identified and addressed according to their existing support, and those issues that required increased public awareness and collaborative efforts. The topic of fish health was raised, but since all water quality issues can impact fish health, it was unclear under which category the subject of fish health best fit. In the end, the participants and organizers agreed to recognize fish health as a topic worthy of further exploration.

We know that the health of our Great Lakes and Upper St. Lawrence River ecosystem as a whole is being impacted by numerous issues: the decline in wetlands, climate change, severe weather and flooding, open pen aquiculture, the presence of endocrine disruptors, micro plastics, storm water runoff, raw and treated sewage, road salt, invasive species, etc. But there is a great deal that we don't know about how these and other issues are impacting the overall health of fish, their habitat, and the health of other life forms that depend on healthy and strong fish populations.

The following fish health themes were identified during, and subsequent to, the People's Great Lakes Summits:

- Fish health and the socio-economic sustainability of shoreline communities;
- Stakeholder identification and their unique connections to fish health;
- Research already underway and that is required;
- Relevant local, traditional, and indigenous knowledge;
- Collaboration opportunities between recreational anglers, indigenous fishers, citizen scientists, researchers, governments, business, and conservation groups;
- Sources of support for required fish health research; and,
- Links between fish health and water quality and other watershed issues.

Fish health may be one of the least understood and hardest to measure issues. Challenges with documenting fish health include:

- Fish mobility and their transitory use of less than 10% of any given water body at any one time;
- Fish are difficult and expensive to observe and track;
- Fish are commonly perceived as healthy and abundant until overwhelming evidence suggests otherwise;
- The term "fish" is applied loosely to both individual fish as well as fish groups;
- The definition of fish is broad and poorly understood;
- Fish do not share the same status as other more iconic terrestrial animals; and,
- Certain fish species are perceived as invasive, unwanted, and destructive

The report of the People's Great Lakes Summit identified fish health as a topic that required further exploration through a consultation process, with a view towards the possible establishment of an independent Fish Health Network. As one of the volunteer organizers and Summit participants, and as the president of Blue Fish Canada, a Canadian charity dedicated to the future of fish health, water quality, and the tradition of fishing, I agreed to take the lead on the consultation process.

Accordingly, consultations with stakeholders were conducted to learn about the state of fish health throughout the Great Lakes and Upper St. Lawrence River. Topics included: required and current fish health research; the funding of such research; the dissemination and application of research findings; and, involvement of stakeholders in the formulation, execution and application of fish health research. The consultations also explored the feasibility and utility of establishing a Fish Health Network and how such a network could assist future research initiatives. The findings of this research need a communication plan. Given the interests of

citizen scientists, recreational anglers, and indigenous fishers, mechanisms for receiving their advice and support are needed. This research and input is intended to contribute to a greater understanding of fish health and how it can be improved throughout the Great Lakes basin and upper St. Lawrence River. The consultations also explored the feasibility and utility of establishing a Fish Health Network, and how such a network could: assist future research initiatives and the communication of research findings; provide greater opportunity for citizen scientists such as recreational anglers and indigenous fishers to advise and support fish health research; and, contribute to a greater understanding of fish health and how it can be improved throughout the Great Lakes basin and upper St. Lawrence River.

Commercial fishers were not included in this consultation process as there are several formal stakeholder engagement forums that focus on commercial fishing. Similarly, fisheries management, fish culture, and fish stocking were also not covered in these consultations as these topics are already well represented in other on-going stakeholder engagement

Steps taken in the preparation of this report included:

- Preparing consultation questions and a list of stakeholders to be consulted;
- Sharing a preliminary draft report of the consultation findings with those involved with steering the project;
- Sharing the draft consultation findings with the stakeholders interviewed; and,
- Following up with stakeholders to secure their comments on the draft report.

The next step entails distributing this report more broadly to seek advice and support for the recommendations put forward by those consulted. This could begin with the establishment of a Great Lakes and Upper St. Lawrence River Fish Health Network. Such a network could then act on the recommendations captured in this report on such issues as: supporting and promoting fish health research; engaging recreational anglers, indigenous fishers, and other citizen scientists to support fish health research; and, the gathering, sharing and integration of local, traditional, and indigenous knowledge specific to fish health.

BACKGROUND

The Great Lakes make up the largest freshwater system in the world based on their total surface area measuring 244,106 square kilometers. The drainage basin includes a further 500,000 square kilometers of territory on both sides of the Canada / U.S. border.

COMMERCIAL FISHING: Much is known about the economic value of the commercial fisheries and the fish stocks they rely on throughout the Great Lakes. The fishery represents the largest freshwater commercial fishery in the world. Unfortunately, considerably less is known about the health of the vast majority of Great Lake basin fish species that are not commercially harvested, and their linkage to the health and sustainable harvest of those species that are of commercial value. Commercial fishers understand that the ecosystem functions as a whole, and that on-going changes to ecosystems are the norm and not the exception. At the same time, the lives, traditions, cultures, and economies of commercial fishers and their communities are directly linked to the overall health of the great lakes and upper St. Lawrence. To this end, such fishers are interested in knowing more about who conducts fish health research, how is it supported and shared, and what role commercial fishers can serve as citizen scientists and the possessors of local knowledge.

FISH CONSUMPTION: Canadian and U.S. agencies monitor persistent bio-accumulative and toxic compounds in edible portions of fish to determine potential risk to human health. While concentrations of harmful pollutants in fish have substantially declined in the past four decades, contaminants such as mercury, PCBs, dioxins, and mirex continue to exceed fish consumption criteria established to protect human health. Many new and emerging bio-accumulative contaminants that are not part of current monitoring activity are also now known to pose risks to fish and human health. Unfortunately, awareness of fish health issues and the safe consumption of fish remain poorly understood, resulting in a wide range of public responses. While some engage in the unrestricted consumption of fish harvested from the Great Lakes and Upper St. Lawrence River, others believe there are health issues associated with consuming even a single meal of such fish. Adding to this confusion are the wide range and occasionally contradictory fish consumption warnings that are posted by different governments for the same species of fish taken from the same water bodies. Support for and enhancements of long-term contaminant bio-monitoring programs are key to ensuring that current and new threats are properly documented, and clear consumption advisories are issued.

SOCIO-ECONOMIC SUSTAINABILITY: There are many millions of people whose lives and long-term socio-economic sustainability are linked directly and indirectly to the health of the Great Lakes and Upper St. Lawrence watershed. And yet, little research exists that documents and quantifies the full extent of the socio-economic relationship between people, their shoreline communities, and the health of the fish stocks that exist largely out-of-sight in the waters that define and shape the physical, functional, spiritual, and cultural nature of their lives and the communities in which they live.

RECREATIONAL ANGLERS: There are over 7 million people in Canada and 60 million in the U.S. who participate in the tradition of recreational fishing. Whether catch-and-release or selective harvesting, fishing is an activity that dates back centuries. These same anglers are connected to their waters and fisheries in profound and intimate ways that have evolved over generations of access to their chosen waters, whether private or public. These are also people who care deeply about ensuring their tradition of fishing will be carried on by future generations. To this end, recreational anglers follow harvesting regulations, assist with research projects as citizen scientists, contribute more volunteer hours to fish habitat restoration projects than all other volunteer groups combined, and are constantly observing and reporting conservation issues to experts and authorities. The annual contribution recreational fishers generate in the Great Lakes area is over C$8 billion.

INDIGENOUS FISHERS: While not subject to many of the same rules governing recreational anglers and commercial fishers, indigenous fishers seek scientific evidence to support the responsible application of their cultural and legal rights to fish. Their communities and leaders want to ensure the harvesting of fish is undertaken in a responsible manner that reflects their cultural values. There is also strong interest among indigenous fishers and their leaders in gaining knowledge about the human health impacts associated with consuming different fish species throughout the Great Lakes and Upper St. Lawrence, what is causing fish to be unsafe to consume, and what measures can indigenous communities take to improve the health of fish to ensure their long term viability. For many indigenous shoreline communities eating fish is more than a function of consuming food from the wild, but a deeply spiritual and culturally significant practice that has been carried on for many thousands of years. There is concern that the loss of the ability to safely consume wild fish represents another example of their culture being taken away by others. For the purpose of these consultations, all forms of indigenous fishing activities were considered.

TECHNOLOGY: Advances in technology have changed how fishing is conducted. These changes can result in reductions in hours of effort required to achieve fishing success, even if fish stocks are shrinking in size. There's growing awareness of the need to engage in recreational and indigenous fishing in ways that take into consideration improvements in harvesting efficiencies brought about by modern technologies.
First Nation fishers have always believed that long-term viability of wild fish stocks is essential, and that their harvesting of fish must take into consideration the ability of future fishers seven generations forward so they might also engage in the same cultural practices. Recreational anglers also feel strongly about the productivity of their traditional fishing locations and fish species, and the importance of passing on ethical fishing skills and conservation values to future generations.

Prior to industrialization and the resulting advancements in fishing technologies, the concept of human fish harvesting activity resulting in fish stock collapse was foreign. It is now apparent

to all that ensuring healthy fish stocks involves both protecting fish from external threats (pollution or habitat destruction) and exercising prudence when directly engaging in fishing related activities to ensure the sustainability of fish stocks.

PSYCHO-SOCIO IMPERATIVE: Engaging in fishing is an activity that can be traced back through archeological evidence to early hunter/gatherers. Consequently, many leading experts in the field of psychiatry believe that a contemporary child's exploration of a shoreline is just as important to the development of a child now as it was in prior millennia. Whether this explains the resurgence in interest among young people to connect to nature through fishing is difficult to prove. However, what we do know is that the act of sustainably harvesting wild organic fish grown in nature is an important symbolic gesture that confirms an individual's commitment to safeguard fish stocks and their habitat so that future generations might have the opportunity to do the same. The act of fishing does not have to necessarily conclude with the actual consumption of the fish being caught for these feelings of stewardship to emerge and evolve. This explains why catch-and-release fishing now occurs more than two-thirds of the time, according to a recent study released by Fisheries and Oceans Canada of recreational marine and freshwater fishing across Canada.

2015 RECREATIONAL FISHING SURVEY RESULTS: According to Fisheries and Oceans Canada, in 2015 more than 3.2 million adult resident and non-resident anglers obtained recreational fishing licenses and actively participated in a variety of recreational fishing activities. This number does not include youth, seniors and indigenous Canadian residents exempted from having to purchase recreational fishing licenses. In 2015, 3.2 million licensed anglers fished a total of 47 million days and caught more than 194 million fish of all species, retaining 59 million. Resident anglers in all provinces and territories caught 156 million fish of the total recreational harvest, and they retained 34% of their catch. Non-resident licensed anglers caught about 3% (roughly 6 million) of the total fish caught, and retained 21% of their catch. The accuracy of the data collected is questioned by many because of low levels of sampling and the limited resources dedicated to the collection of such data.

FISH HEALTH IMPACTS: Recreational anglers and indigenous fishers possess valuable local knowledge. They are also interested in research intended to document the health of Great Lakes and Upper St. Lawrence fish species. Those whose cultures, traditions, and economic wellbeing are linked to fish health understand that science is essential for understanding the connection between fish health, human activity, and fish habitat. Such fishers are fully aware of the effects of impacts to the resilience of Great Lakes Ecosystems, and why research is crucial for developing science-based fish management practices and conservation measures when appropriate, as well as habitat restoration or remediation programs when necessary. To this end, there are growing calls for increased science-based decision making, and an increasing mistrust of politically motivated fish management and habitat protection actions that are implemented in response to the agendas of special interest groups.

Fish Health Research: Great Lakes basin fish health is important to both commercial harvesters and the socioeconomic status of countless indigenous and non-indigenous communities. Fish health status is also an indicator of the overall health of the ecosystem. These consultations sought to identify the level and relevance of current research specific to the health and sustainability of all fish species regardless of whether or not they are of interest to the commercial freshwater fishery. Such research is essential to determine if and when conservation measures are required to ensure the long-term viability of all fish species, and to determine what actions or changes are required to protect the health of fish and fish habitat.

METHODOLOGY

The following statements were identified as priority topics for consideration during consultations with fish health stakeholders:

1. Establishing a network specific to fish health is not intended to assume responsibility for water quality monitoring and advocacy work that may or may not be linked to fish health.

2. Much research is already underway to track fish health in the Great Lakes basin and Upper St. Lawrence River with respect to the viability of commercially important fish stocks, but far less is understood about non-commercially relevant fish species.

3. Regulations governing the capture and harvest of both commercially and non-commercially relevant fish stocks by recreational anglers have existed for decades, as have advisories specific to the safe consumption of such fish species. However, the science that informs these capture regulations and consumption advisories is not well understood or trusted.

4. Understanding the broad range and expanding list of variables that impact the health of both commercially and non-commercially relevant fish stocks, and the extent to which these variables are directly and indirectly impacting those whose lives and communities depend on access to healthy fish stocks, is a growing priority for both recreational anglers and indigenous fishers.

5. Consultations on fish health are intended to ensure the long-term future of fish, fishing, and the safe consumption of fish.

The consultation process, with the goal of finalizing of a report of consultation findings and establishing a Fish Health Network, took the following seven steps:

1. A list of consultation questions was developed and refined with input from a small group of volunteers who agreed to assist with steering the consultation process (see Annex A for the list of consultation questions).

2. Following finalization of the questions, a list of potential interviewees was developed, and one-on-one interviews were conducted (see Annex B for a list of those consulted).

3. Consultation questions guided the informal one-on-one interviews with stakeholders selected to represent fish health researchers, government officials, conservation organizations, indigenous fishers and recreational anglers and their respective organizations, and other directly and indirectly related businesses.

4. A draft report of the consultation findings was shared with the volunteer steering committee, and then with the stakeholders interviewed.

5. Stakeholders were contacted a second time to seek their comments and recommendations on the draft stakeholder report.

6. A final report on stakeholder feedback will be shared more broadly to obtain advice and build support for the development of a Fish Health Network.

7. A Fish Health Network will be tasked with the following up on the recommendations put forward during this consultation process.

WHAT WE HEARD

What we heard during the consultation phase is reported according to each stakeholder group and is followed by additional horizontal issues. Each section includes recommendations. (A complete list of recommendations is attached as Annex C).

1. RESEARCHERS: There are a number of excellent researchers and research organizations that are conducting fish health research on the 175 fish species in the Great Lakes basin and Upper St. Lawrence River. Although the vast majority are irrelevant to the commercial fishery, all factor into the health of the watershed and many are highly prized by recreational anglers and indigenous fishers. Many of these operate as non-profit centres of expertise and aquariums, or are associated with institutes of higher education. All research organizations depend heavily on mobilizing volunteers such as recreational anglers and indigenous fishers as citizen scientists to catch fish and apply tags, or to report fish data such as when tagged fish are re-captured. Research often coincides with recreational catch-and-release fishing tournaments when large numbers of fish can be observed, scale samples and other data collected, and tags applied. Other data collection methods include extracting DNA from water samples, netting and stunning fish using electricity, and gathering bi-catch from commercial fishers.

What we heard:

- Non-government fish health researchers are often employed by non-profit organizations or post-secondary educational institutions. They secure most of their research funding from various levels of government, private donations, or public user fees such as with public aquariums;

- The majority of government-funded fish health research focuses mainly on the health and status of commercially valuable fish;

- Not all water quality and watershed research include the study of fish health.
  The quality of research methodology is often dependent on input from recreational anglers and indigenous fishers who possess crucial local, traditional and indigenous knowledge and experience;

Engaging citizen scientists such as recreational anglers and indigenous fishers in the execution of research is often essential to field research involving the capture and tagging of fish;

- Sharing research findings with anglers and fishers serves to both validate research findings through a form of peer review, and provides an opportunity for research to be applied by fishers on the water;

- Researchers employed, contracted or funded by public institutions are expected to maintain political neutrality in their work and to exercise judgment on how they report their findings;

- Researchers feel strongly about ensuring that sound scientific evidence is used to inform policy and program decisions such as setting harvest limits, issuing consumption advisories, when protection areas are being considered, or other conservation measures.

1.a) Recommendation**:** Establish a network to link fish health researchers with citizen scientists such as recreational anglers and indigenous fishers so researchers might draw on their local, traditional and indigenous knowledge, and their direct support with conducting field research.

1.b) Recommendation: Provide an opportunity for researchers to share methodology and research findings with citizen scientists and other researchers to serve as both an informal peer review process, and as a means for conveying knowledge.

1.c) Recommendation: Link those planning to conduct water quality and watershed research with fish health researchers to ensure they include fish health in their research methodology and facilitate the exchange of research findings between water quality and fish health researchers.

1.d) Recommendation: Ensure sufficient research is undertaken to ensure that sound science is used when establishing new or reviewing existing fish health and fish rebuilding initiatives, and related conservation measures.

2. RECREATIONAL ANGLERS: Each year, more than 7-million recreational fishers in Canada and a further 60 million in the U.S engage in recreational fishing. According to the Great Lakes Fishery Commission, Great Lakes commercial, recreational, and tribal fisheries are collectively valued by Canada and the United States at C$9 billion. and support more than 75,000 jobs. Lake whitefish, walleye and yellow perch are species of interest to commercial, indigenous and

recreational fishers, with salmon, trout, bass, pike, Muskie and many other of the over 175 fish species that reside in the Great Lakes and St. Lawrence, further contributing to making the Great Lakes and St. Lawrence a world-class recreational fishery.

Recreational fishing organizations and individual anglers understand the future of angling depends on the health and availability of fish, and that fish health is linked to both water quality and fish habitat. Anglers are keenly aware of environmental issues that impact watersheds, fish habitat, and fish health, and have successfully lobbied government to apply the revenues generated from their fishing licenses and (in the case of the U.S.) a portion of the taxes collected on the sale of fishing tackle, to fund fish health research and related conservation programs.

What we heard:

- Recreational anglers are frustrated with the lack of regulatory enforcement resources on the water, and have turned to self-policing strategies (including photographs and social media) to ensure adherence to fish capture regulations;

- Anglers apply a conservation ethic when fishing that is informed partially through government regulations, though mainly on what they have learned from their mentors and each other;

- Anglers possess minimal knowledge of the science used by government to inform both fish capture and retention regulations, and fish consumption advisories;

- Few anglers make use of fish consumption advisories as they assume this knowledge also informs fish retention regulations that emanate from the same governments;

- Anglers exchange data on fishing effort / success ratios to advise other anglers about bodies of water or fish species that should be avoided;

- Recreational anglers are frustrated in their inability to report significant citizen-science findings to government and to other researchers, and what they perceive as a disconnect between the regulations and the reality they experience on the water;

- Anglers work closely with fish health researchers by reporting catch logs and data on recaptured tagged fish, and by supporting researchers with fish tagging and monitoring during recreational fishing competitions;

- Recreational anglers have an interest in broader waterscape issues that relate to fish health;

- Many anglers want to be more involved with research work as citizen scientists, to have input on the design of such science, and to learn of the results of their efforts and that of the research overall; and,

- Recreational anglers expect and will support fish management decisions made by taking a precautionary approach based on sound science.

2.a) Recommendation: Include recreational non-commercial angling organizations in the Fish Health Network and establish tools for sharing fish health research and calls for research support.

2.b) Recommendation: Establish public communication systems for sharing fish health research findings, local knowledge, and other information concerning fish health.

2.c) Recommendation: Establish a Fish Health Network made up of researchers and stakeholders in support of fish health, recreational angling, and indigenous fisheries.

3. INDIGENOUS FISHERS: For many indigenous communities fishing is more than a means of feeding their family, it represents who they are as a people. Their connection to the fish both physically and spiritually forms a significant part of their values, traditions, and customs. Fish and fishing also represent a means for conducting important cultural ceremonies and also generating the financial means to live free of poverty. With so much fishing related history, it is important to indigenous leaders and their people that they be able to continue their connection to wild grown fish. This means access to a sustainable source of fish that are healthy and safe to consume.

What we heard:

- Due to impacts on fish health and their habitat, indigenous fishers want to know the cause of the issues that affect fish health so they might develop strategies for seeking and implementing corrective measures;

- Indigenous fishers have access to many of the same modern technologies non-indigenous people use to harvest fish, and want access to information on new ways of applying their values to these new tools essential for indigenous fishers to ensure future generations can experience their traditions and cultural practices, feed their families and earn a living;

- Indigenous fishers have extensive knowledge on issues specific to fish health and want more opportunities to share this information with those planning and conducting fish health research;

- Indigenous fishers expect that fish harvest practices and conservation measures are developed by taking a precautionary approach based on sound science; and,

- Indigenous fishers are frustrated with the lack of detailed information on what fish are safe to consume.

3.a) Recommendation: Include indigenous fishers in the Fish Health Network and establish tools for gathering and sharing fish health research findings and indigenous knowledge.

3.b) Recommendation: Establish communication systems for sharing fish health research findings and other information concerning fish health with indigenous communities.

3.c) Recommendation: Include stakeholders in the network who support indigenous fishing.

4. GOVERNMENT: Governments employ fish health researchers responsible for monitoring the health of both commercially harvested and non-commercially valuable fish species. Governments also develop policy and administer programs that directly and indirectly impact fish health. Ensuring that government gets it right (such as the implementation of marine and aquatic protection areas) includes consulting with stakeholders with local and indigenous knowledge, and their communities that depend on healthy fish stocks for their socio-economic stability. Full transparency is essential to ensure the support for proposed fish health research specific to habitat restoration, stock rebuilding, human consumption, and conservation initiatives, including the establishment of protection areas.

What we heard:

- Government researchers experience many of the same frustrations and data collection challenges that non-government researchers experience when carrying out fish health research that is required to establish science-based fish management policies and programs;

- Policy and program officials seek to consult stakeholders when developing new policies and programs, or announcing program participation opportunities. However,
- Government officials are not able to join external networks in their capacity as government representatives if those organizations are perceived to be politically motivated or engaged in advocacy.

4.a) Recommendation: Establish terms of reference for the Fish Health Network that ensure government officials can participate without fear of reprisals from their employers.

4.b) Recommendation: Implement a Fish Health Network to provide government with feedback and advice on existing and proposed government fish management and conservation initiatives and policies.

5. BUSINESS: A 2015 survey conducted for Fisheries and Oceans Canada reported resident and non-resident licensed anglers contributed C$7.9 billion to local economies. Of this amount, $5.3 billion was in the form of investments and major purchases of durable goods related to recreational fishing (such as the purchase of fishing tackle, boats, electronics, etc.), and $2.5 billion went to direct recreational fishing expenditures made during fishing trips (such as package deals, transportation, food, lodging, guide services, and supplies such as live bait and fuel). Recent research conducted on behalf of the Ontario Government determined that recreational fishing in northern Ontario contributed more to the GDP than commercial mining and forestry combined. According to the Great Lakes Fishery Commission, commercial, recreational and indigenous fisheries are collectively valued at more than C$9 billion annually, and support more than 75,000 jobs.

While recreational anglers and indigenous fishers invest in and use many of the same fishing related technologies, the response from different animal protection organizations and activists can range from protesting against recreational angling to political activism in support of increasing indigenous fishing rights. This mixed messaging erodes public trust and makes it difficult for businesses that are directly or indirectly linked to fishing. At the same time, businesses are committed to building and maintaining public trust, in spite of the wide range of conflicted messaging that is targeted at consumers of their products. Business leaders understand, however, that the success of their businesses is directly linked to fishing as a sustainable activity, whether through responsible catch-and-release fishing, which recreational anglers practice 2/3 of the time, or through the sustainable harvest of fish which is regulated using a precautionary approach based on sound science.

What we heard:

- Businesses are the first to admit that their economic success and long-term viability is directly linked to the health of fish stocks, and that negative impacts to fish stocks correlates to a decline in business;

- Businesses have an interest in knowing what fish health researchers are discovering and how those engaged in fishing are supporting and responding to the research;

- Businesses often fund conservation measures and research, and support awareness raising initiatives intended to safeguard fish stocks and fish habitat;

- Businesses promote responsible practices to maintain and build the public's trust that fishing is a sustainable activity;

- Businesses support fish management decisions made using a precautionary approach based on sound science; and,

- Businesses are interested in doing more to support fish health research and to create incentives for anglers and fishers to become more involved as citizen scientists.

5.a) Recommendation: Open participation in the Fish Health Network to business leaders that support fishing and who have an interest in supporting fish health research and promoting fish health conservation.

6. **CONSERVATION:** Most all recreational angling organizations and indigenous fishing self-governance models include conservation measures to ensure sustainability, and to support scientific research activities focused on fish health. Federal, provincial, and state governments undertake research to inform their fish management regulations and fish consumption advisories. Externally, universities and other NGO's routinely conduct research on the status of fish stocks and issues impacting fish health. Conversely, not all foundations fund fish health research tied to recreational angling and indigenous fishing. Often, conservation organizations and foundations focus on water quality and wetland issues, and the variables threatening the extinction of various flora and fauna.

What we heard:

- Recreational anglers and indigenous fishers want to see conservation organizations and foundations more open to funding research that is specific to the long-term viability of important fish species, and identifying underlying issues associated with the consumption of such fish by humans.

- Conservation organizations are often incentified to promote precautionary approaches, even if insufficient evidence exists to justify the measures;

- Assessing fish health is not always included when conservation organizations and foundations investigate water quality and other related environmental issues; and,

- Conservation measures and fish management regulations should reflect sound scientific research and should not be driven by political or economic agendas.

6.a) Recommendation: Include conservation group stakeholders in the Fish Health Network interested in fish health, fish consumption and the linkage between fish and the socio-economic sustainability of communities;

6.b) Recommendation: Establish inter-network communications to ensure relevant information is shared between the Fish Health Network and other groups interested in fishing, fish health, fish habitat or water quality.

HORIZONTAL ISSUES

7. INCLUSIVITY: The following points were raised by various stakeholders and pertain to ensuring that the voices of both recreational anglers and indigenous fishers are encouraged and heard, and that inclusive and accessible language is used to ensure their full and equal participation.

7.a) Recommendation: Include measures that ensure participation and communications among network members is inclusive, accessible, and equitable.

7.b) Recommendation: Ensure indigenous fishers and recreational anglers receive recognition and credit for their research support and input.

8. SOCIO-ECONOMIC COMMUNITY SUSTAINABILITY: The economic contributions of recreational angling and indigenous fishing to urban, rural and remote communities are significant. The passion and actions of individual anglers and fishers further contribute meaningfully to the social fabric and economic sustainability of their respective communities. The actions of both recreational anglers and indigenous fishers are also held accountable by these same communities, who have a vested interest in ensuring the long-term health of their watersheds. For this reason, recreational anglers and indigenous fishers often self-police and self-regulate, and they are supportive of a wide range of scientific-based conservation measures. However, for recreational anglers and indigenous fishers to be empowered to responsibly exercise their capture and harvesting rights, they require real-time access to information concerning the current state of their watersheds and fish health.

8.a) Recommendation: The important contributions that recreational anglers and indigenous fishers contribute to their communities should be documented and promoted.

8.b) Recommendation: Find ways for the Fish Health Network to deliver important fish health research findings to recreational anglers and indigenous fishers quickly and accessibly.

9. INDICATORS FOR ASSESSING FISH HEALTH: Understanding and measuring fish health is one of the most credible ways of determining the health of a watershed. And yet, assessing fish health can be one of the most difficult research tasks to carry out. Fish move seasonally, and their location, observation, and capture are not always easily accomplished. Both recreational anglers and indigenous fishers possess local knowledge about fish and their general health.

Scientists depend on this for conducting research. Such fishers routinely contribute their local knowledge and support with conducting field research.

9.a) Recommendation: Ensure the Fish Health Network assists other water quality research initiatives by facilitating the connection of their stakeholders to fish health researchers, recreational anglers, and indigenous fishers.

10. RESEARCH FUNDING: Before Europeans began migrating to North America, indigenous people were actively engaged in understanding and managing their natural resources to ensure sustainable yields of food necessary for the survival of their communities. They understood the consequences of over-harvesting and depletion, and the value of rotating between harvest zones to allow animal and other food sources to recover. Without doubt, their connection to nature and extensive experience and values provided indigenous people with the skills to live in balance with nature. Maintaining this balance of sustainable harvest and habitat protection underpins much of the research underway today. Today, with so many new technologies coupled with shrinking areas of unspoiled aquatic habitat and watersheds, and increased harvest pressures by greater numbers of anglers and fishers, the challenge of ensuring sufficient evidence exists to understand and manage aquatic resources grows ever greater. Fortunately, the technology required to aid science to conduct relevant research essential for ensuring appropriate conservation measures has also improved. The challenge is to properly fund such research.

10.a) Recommendation: The Fish Health Network should seek to identify and develop funding sources to support important scientific fish health research.

10.b) Recommendation: Participation in a Fish Health Network should include stakeholders with knowledge of broader issues impacting fish health, and business and community representatives whose socio-economic sustainability is linked to fish health.

11. SCIENCE-BASED PRECAUTIONARY MEASURES: Indigenous fishers, recreational anglers, shoreline communities, and related businesses are concerned that cost or time needed to conduct appropriate science may be used as an excuse to delay the science and to move forward with the adoption of protectionist measures in advance of such science being undertaken. Designating areas of watersheds as protection areas and restricting legal activities without a scientifically verified probable cause is not a precautionary measure; it is ideologically based protectionism.

11.a) Recommendation: The Fish Health Network should support researchers and other stakeholders to ensure sufficient research is conducted prior to the implementation of protectionist measures.

11.b) Recommendation: The Fish Health Network should facilitate collaboration between researchers, recreational anglers, indigenous fishers, and those officials responsible for developing and implementing conservation measures, harvest policies, and regulations that ensure adequate science supports the introduction and continuation of such initiatives.

12. CITIZEN SCIENCE: Recreational anglers and indigenous fishers believe, as do many other stakeholders, that conservation is the framework that should govern all we do when managing our watersheds. This can include many different responses from engaging in research initiatives as citizen scientists, to educating anglers and fishers how to harvest fish sustainably. Both groups of harvesters spend numerous hours on the water each year and, given their high numbers, represent the largest source of field observations sought after by scientists. Their efforts go beyond the act of fishing and include caring for watersheds directly by taking measures to limit their impacts, reporting any anomalies, and directly engaging in fish habitat restoration initiatives. Anglers and fishers are growing increasingly reliant on science to fully understand the impact of their interactions with watersheds, and keenly follow research findings that pertain to fish and fish habitat. When provided with an opportunity to contribute to watershed or fish health research, both groups have demonstrated strong interest and levels of participation.

12.a) Recommendation: The Fish Health network should enhance and strengthen the important citizen science role that recreational anglers and indigenous fishers serve in supporting fish health research.

13. TECHNOLOGY: All fishers, whether recreational or indigenous, now use many of the same technologies when engaging in the capture and/or harvest of fish whether wild or planted. Much can be learned through the sharing of best practices. Researching the application of new technologies and their impact on the health of watersheds and fish stocks needs, therefore, to be properly supported. This includes understanding how the application of both old and new fishing technologies is impacting fish stocks and watersheds. Access to this information is essential to both recreational anglers and indigenous fishers to ensure they continue to engage in fishing responsibly and sustainably.

13.a) Recommendation: The Fish Health Network should support the fishing industry to continuously build and improve conservation safeguards.

14. IMPROVING GOVERNANCE THROUGH COLLABORATION: There are those who do not agree with the tradition of recreational fishing, whether it be catch-and-release or the selective and sustainable harvest of a wild renewable resource. It is important that the views of anti-fishing advocates not be conflated with efforts intended to build and maintain public trust in the systems of governance intended to ensure fish health research and the application of research findings that inform sound policy and regulation. Ending the practice of fishing and the health of fish are separate and distinct issues. Intermixing them only serves as a barrier or

disincentive to the participation of stakeholders who do not share this anti-fishing view. To this end, it is important that those who participate in a Fish Health Network share similar values as those who fish recreationally or as an expression of their cultural rights.

14.a) Recommendation: Stakeholder participation on the Fish Health Network should include support for recreational anglers and indigenous fishers to sustainably harvest and practice catch-and-release fishing.

Recreational and indigenous fishing are legal activities participated in by a large percentage of Canadians and indigenous people. It is a tradition that dates back to first contact with North America by non-indigenous people, far longer in the lands where these settlers first originated, and by indigenous people for thousands of years prior to first contact. Harvesting wild fish is an activity that continues to forge strong linkages between people and nature, and to instill in people a deep respect and sense of responsibility for their watersheds. Little would be gained and much lost if unscientifically supported protectionist measures were implemented without science-based justification for implementing such precautions. Thus, in addition to understanding the current challenges our fish stocks are facing, we also need to gain a stronger understanding of their strengths and the positive role recreational anglers and indigenous fishers serve in maintaining such strengths.

14.b) Recommendation**:** The Fish Health Network should focus equally on understanding both the weaknesses and strengths of different non-commercial fish stocks to ensure recreational anglers and indigenous fishers can fish with confidence knowing the fish they are pursuing are being managed sustainably.

Protecting nature is the most extreme form of conservation, and one that recreational anglers and indigenous fishers are not afraid to implement – even if it means being denied access to their long-held and cherished resources. However, protection is also a practice that should not automatically be adopted as the first and best solution. Denying access means losing those who spend time observing and collecting data. It can also seriously impact communities by destroying their economies and social fabric. To this end, it is important that fish health and fish habitat conservation measures respect the rights of recreational anglers and indigenous fishers to access their waters. This can best be accomplished by using science upon which to base any such measures. Further, those responsible for overseeing fish management regulations should make it clear that they a) understand the access rights and traditions of recreational anglers and indigenous fishers; b) respect and encourage their participation; and c) use terms such as protection carefully so as not to raise concerns unnecessarily about their goals or objectives.

14.c) Recommendation: The Fish Health Network should serve to inform those who are interested in ensuring the most appropriate science-based fish management practices are in place, and to review scientific findings being used to support the implementation of measures that call for the protection of fish stocks.

15.WATERSHED RESEARCH: Numerous initiatives are underway to better document and understand watersheds. This should (but is not always the case) include understanding fish health. Without including this important element and what it means to both recreational anglers and indigenous fishers and their communities, it could happen that watershed initiatives inadvertently impact the socioeconomic viability of rural, remote, and northern communities. Watershed initiatives should, therefore, always consult both recreational anglers and indigenous fishers, and take into consideration fair and equitable access. Equitable access may not necessarily mean equal, but recognizes historic rights, traditions, and cultures that entail the capture and/or harvest of wild fish by recreational anglers and indigenous fishers. It also means we all share a common responsibility for ensuring the long-term viability of the fish stocks that we depend on.

15.a) Recommendation: The Fish Health Network should serve as an information resource and gateway to support watershed initiatives.

16.MANDATE OF A FISH HEALTH NETWORK:

The general consensus of the role of a Fish Health Network goes well beyond supporting water quality initiatives through the provision of timely and relevant fish health research findings. The primary focus would be to facilitate communications among stakeholders on matters concerning fish health in general. This includes impacts on fish health associated with, or relevant to, the capture and consumption of fish by recreational anglers and indigenous fishers. It also includes sharing relevant information about proposed fish health research initiatives intended to inform restoration measures and possible conservation regulations. It will mean ensuring sufficient flexibility to explore and discuss fish health research findings and associated policy. For this to occur, the network will need to operate independently and to serve as a safe and open forum for the discussion of research findings, conservation measures, restoration initiatives, protection measures, and other topics of relevance to fish health and those whose socio-economic welfare or cultural survival are linked to ensuring sustainable fish stocks throughout the Great Lakes basin and Upper St. Lawrence River.

16.a) Recommendation: A Fish Health Network that includes stakeholders that represent the Great Lakes basin and Upper St. Lawrence River and its tributaries should be formed.

17.TERMS OF REFERENCE FOR A FISH HEALTH NETWORK:

Should a Fish Health Network be created, it requires clear and transparent terms of reference to govern it. The goal, mission, objectives, and rules of operation need to be established.

What we heard:

- Keep the network informal. Avoid formal meetings as much as possible.

- Use the Internet to share information such as summaries and links to fish health research findings, requests for feedback, and reports of significant findings discovered by citizen scientists.
- The Fish Health Network should never be in a position where it speaks on behalf of its members. Members have the freedom to express their own opinions, but not to speak on behalf of the network.

- Membership in the Network should include stakeholders representing researchers, government, businesses, recreational anglers, indigenous fishers, and other conservation groups interested in fish health issues.
- The Network is not intended to become a database of fish health research, but a tool for facilitating communications among stakeholders.
- The Network should undertake activities designed to engage, educate and communicate with the public.

17.a) Recommendation: Use the Fish Health Network's consultation steering committee to develop and seek approval for terms of reference for the network.

17.b) Recommendation: This process should begin with identifying funding to support the implementation of a Fish Health Network.

CONCLUSION

Research priorities identified by the scientists who were consulted often mirror concerns expressed by recreational anglers, indigenous fishers, and those actively engaged in the protection of Great Lake ecosystems. While scientists possess the tools to monitor water levels, temperatures, currents, clarity, and quality, they also depend on the cooperation and assistance of these same stakeholders to aid with assessing actual fish health. Observations and input from these citizen scientists play a crucial role in understanding the status of fish health and the impact that changes to fish health populations has on both ecosystems and the socio-economic status of people whose lives and communities are linked to the health of fish stocks.

All stakeholders agreed that a system for sharing and collaborating between scientists that involves recreational anglers, indigenous fishers, and water quality experts in the design and implementation of research studies could improve fish health research. Such a collaborative system would also assist policy makers in their development and ongoing augmentation of government policies, regulations, and programs.

The fishing industry serves a market of 7-million Canadian and 60-million U.S. recreational anglers, and numerous indigenous fishers. Those industry representatives who were consulted understand that their future fortunes depend on healthy fish stocks and the public's trust that fishing is both a responsible and sustainable activity. It was pointed out that many of the fishing industry's top leaders already actively and financially support fish conservation initiatives.

Governments count on revenues generated by selling fishing licenses and on taxes generated by direct and indirect fishing-related expenditures. Many stakeholders feel governments could do more, however, to ensure the long-term viability of the resource. Recent socio-economic research has revealed the true extent of the value fishing contributes to communities and the economy as a whole, lending more reason for governments to do more to ensure the future of fish and fishing.

Some of the earliest conservation groups were founded by people who feel strongly about maintaining their ability to harvest fish sustainably from the wild. The water keeper movement was started by several recreational anglers on the Hudson River, and David Suzuki himself still claims to fish for salmon along Canada's west coast on rivers that support sustainable salmon returns. By working in partnership with recreational anglers and indigenous fishers, the conservation movement has been steadily rebuilding wild fish stocks throughout Canada and the U.S. to the point where these two countries now have more wild fish than they did in the 1970s. It is important to stakeholders that this spirit of conservation and collaboration be recognized, maintained, and enhanced.

Fishing, whether by indigenous or recreational fishers, is a practice that dates to before written records were kept. The practice of fishing continues to connect people to their environments in ways that forges a lifetime of passionate care and respect for nature. Supporting such bonds to continue in ways that are sustainable through identifying science-based best practices for

safeguarding fish health and managing the utilization of the resource are more important than ever as people increasingly move to urban centres. To this end, stakeholders believe that researching fish health cannot be properly undertaken without the involvement and support of both recreational anglers and indigenous fishers, given the historic and on-going linkage between fish and people.

Many stakeholders now believe that the number and degree of issues impacting fish health and their long-term viability are on the increase. It was difficult for stakeholders to determine whether we are only now recognizing the impacts our actions have generated, or if our actions continue to result in still more impacts. There was almost universal consensus, however, that climate change represents the most significant impact to fish health that can be traced directly to our actions.

As with most problems that have managed to gain the attention of those responsible, it is seldom just the one initial triggering issue that is found to be precipitating the decline of a specific fish species and its ecosystem. By the time a problem is recognized, many of the elements essential to fish health have already been toppled like dominoes. Stakeholders agree that undoing the problem and restoring health to an ecosystem and the fish that live therein takes a concerted multi-faceted solution. Simply adding more or different fish to the ecosystem is little more than applying a bandage – it does nothing to resolve underlying issues.

Stakeholders are also in agreement that sorting out the different issues and developing strategies for remediating fish health need to take place on many levels. To this end, it is important to stakeholders involved with a fish health issue that they are included in networks established to both identify underlying problems, and to implement appropriate solutions. It was also identified as a high priority by many stakeholders that remedial actions be based on sound science.

Most stakeholders now recognize that resolving fish health issues is often far more complex than simply managing fisheries and initiating stocking when numbers go down. Fisheries management, fish culture and fish stocking may have seemed as appropriate solutions in past, but many stakeholders now feel that the issues go far beyond managing numbers. The quality of fish, their ability to self-sustain, and preserving unique fish species historically found in different water bodies are now priorities.

Gone are the days when the health of a fish stock was measured by their number and size. Increasingly, stakeholders identified that ensuring the health of wild fish was a priority that comes before maximizing fishing opportunities. For many, knowing that they can harvest and consume fish sustainably and safely, is just as important as knowing how and which fish need to be released. Catching and releasing fish that cannot be safely eaten was identified by many as a “slippery slope”: it does nothing to ensure the long term viability of fish species, and may actually contribute to their eventual demise by removing the imperative to research and implement corrective measures.

Several stakeholders put forward the concept that fish health hinges on protecting fish from anglers and fishers. Other than in extreme circumstances, however, this approach was viewed by most stakeholders as an extraordinary measure that should be taken only when all other science-based fish restorative strategies have been implemented without achieving the desired results. While most stakeholders are open to the adoption of temporary limits or embargos required to rebuild fish stocks, they are concerned that ending the practice of angling or fishing would also remove from the environment the vast majority of those who actually care about the health of fish, leaving them open to continued neglect or abuse. It is impossible to completely separate fish and their ecosystem from the impacts of humans. Stakeholders feel that their collective effort and input are required to ensure that fish do not fall victim to further direct or indirect harm perpetrated by others who are ignorant of the harm they are inflicting, or who stand to prosper by the demise of a fish stock.

ANNEX A –CONSULTATION QUESTIONS

- Who is researching and financing efforts to track the state of fish health in the Great Lakes basin? What systems exist now for sharing this information?
- What are some of the known issues impacting fish health, and research underway or has yet to be conducted?
- What concerns do recreational anglers and indigenous fishers have over their ability to catch and/or consume Great Lakes fish?
- How is fish health research currently being implemented and funded?
- Who stands to gain from knowing more about fish health, and how can this information be better disseminated?
- What do we know about past and current impacts on fish health, and what future impacts are on the horizon?
- How are scientists currently involving recreational anglers and indigenous fishers in conducting and monitoring fish health?
- What tools currently exist for recreational anglers and indigenous fishers to convey their observations and input to fish health researchers and policy makers?
- How are current research findings being shared, and what could we be doing differently or better?
- What is the role of government in supporting or conducting fish health research, and to what purpose?
- What could be gained by creating greater opportunities for fish health researchers to share and coordinate research activities among themselves and with the broader community?
- How can fish health research support or be supported by other networks of experts concerned with the future of the Great Lakes Basin?

ANNEX B: STAKEHOLDERS

RESEARCHERS:

Dr. Steven J. Cooke
Canada Research Chair in Fish Ecology and Conservation Physiology
Director of the Institutes of Environmental Science and Integrated Science
Professor of Environmental Science and Biology
Carleton University

Dr. Stephen Lougheed
Director
Queen's University Biological Station

Dr. David P. Philipp
Sport Fish Ecology Lab
University of Illinois

Dr. Dominique Lapointe
Biologist, Fish Health Lab
St. Lawrence River Institute of Environmental Sciences

Dr. Ken G. Drouillard
Great Lakes Institute for Environmental Research
University of Windsor

Dr. Bruce Tufts
Fish Lab, Queen's University

Dr. Jeff Ridal
Executive Director
St. Lawrence River Institute of Environmental Sciences

GOVERNMENT:

Marc Gaden, PhD
Communications Director and Legislative Liaison
Great Lakes Fishery Commission

Gordon Walker
Canadian Commissioner
International Joint commission

David A. Ullrich
Past Executive Director
Great Lakes and St. Lawrence Cities Initiative

Wil Wegman
Resource Management Technician
Ontario Ministry of Natural Resources and Forestry

Colin Lake
Lead planning Biologist
Lake Ontario Management Unit
Glenora Fisheries Station

Roger Houde, P.Eng
General Manager / Secretary Treasurer
Raisin Region Conservation Authority

CONSERVATION ORGANIZATIONS:

Dr. Mark Gloutney
Director of Regional Operations - Eastern Region
Ducks Unlimited Canada

Dr. David Browne
Director of Conservation Science
Canadian Wildlife Federation

Mark Matson
Director / Lake Ontario Waterkeeper
Swim Drink Fish Canada

Lee Willbanks
Upper St. Lawrence Riverkeeper
Save the River

John Peach
Upper St. Lawrence Riverkeeper
Save the River

Nancy Goucher
Manager, Partnerships
Fresh Water Future

Meredith Brown and Patrick Nadeau
Ottawa River Keeper

Karen Cooper
RAP Lead
Upper St. Lawrence River Protection Network

RECREATIONAL FISHERS:

Chris Nielsen
President
Musky Canada Sport Fishing and Research

Taylor Ridderbusch
Great Lakes Organizer
Trout Unlimited America

John Kendell
President
Credit River Anglers Association

Silvia D'amelio
Executive Director
Trout Unlimited Canada

Jason Barnuce
Conservation Director
Ontario Bass Nation

INDIGENOUS FISHERS

Henry Lickers
Director of Environment,
Mohawk of Akwesasne
And IJC Commissioner

Norman Peters
Elder
Mohawk of Akwesasne

INDUSTRY:

Peter Lockhart
President
Canadian National Sportsman Shows

Ben Woo
Executive Director
B1 Tournament Series

Tom Brooke
Honorary Member
All Party Parliamentary Committee on the Outdoors

Mike Melnik
Managing Director
Canadian Sportfishing Industry Association

Andrew Polata
Executive Director
Canadian Sport Fishing League

Walter Oscar
Executive Director
Great Canadian Salmon Derby

ANNEX C: RECOMMENDATIONS

1.a) Establish a network to link fish health researchers with citizen scientists such as recreational anglers and indigenous fishers so researchers might draw on their local, traditional and indigenous knowledge, and their direct support with conducting field research.

1.b) Provide an opportunity for researchers to share methodology and research findings with citizen scientists and other researchers to serve as both an informal peer review process, and as a means for conveying knowledge.

1.c) Link those planning to conduct water quality and watershed research with fish health researchers to ensure they include fish health in their research methodology and facilitate the exchange of research findings between water quality and fish health researchers.

1.d) Ensure sufficient research is undertaken to ensure sound science is used when establishing new or reviewing existing fish health and fish rebuilding initiatives, and related conservation measures.

2.a) Include recreational non-commercial angling organizations in the Fish Health Network and establish tools for sharing fish health research and calls for research support.

2.b) Establish public communication systems for sharing fish health research findings, local knowledge and other information concerning fish health.

2.c) Establish a Fish Health Network made up of researchers and stakeholders in support of fish health, recreational angling and indigenous fisheries.

3.a) Include indigenous fishers in the Fish Health Network and establish tools for gathering and sharing fish health research findings and indigenous knowledge.

3.b) Establish communication systems for sharing fish health research findings and other information concerning fish health with indigenous communities.

3.c) Include stakeholders in the network who support indigenous fishing.

4.a) Establish terms of reference for the network that ensure government officials can participate without fear of reprisals from their employers.

4.b) Implement a Fish Health Network to provide government with feedback and advice on existing and proposed government fish management and conservation initiatives and policies.

5.a) Open participation in the Fish Health Network to business leaders that support fishing and who have an interest in supporting fish health research and promoting fish health conservation.

6.a) Include conservation group stakeholders in the Fish Health Network interested in fish health, fish consumption and the linkage between fish and the socio-economic sustainability of communities;

6.b) Establish inter-network communications to ensure relevant information is shared between the Fish Health Network and other groups interested in fishing, fish health, fish habitat or water quality.

7.a) Include measures that ensure participation and communications among network members is inclusive, accessible and equitable.

7.b) Ensure indigenous fishers and recreational anglers receive recognition and credit for their research support and input.

8.a) Document and promote the important contributions recreational anglers and indigenous fishers contribute to their communities.

8.b) Find ways for the Fish Health Network to deliver important fish health research findings to recreational anglers and indigenous fishers quickly and accessibly.

9.a) Ensure the Fish Health Network assists other water quality research initiatives by facilitating the connection of their stakeholders to fish health researchers, recreational anglers and indigenous fishers.

10.a) The Fish Health Network should seek to identify and develop funding sources to support important scientific fish health research;

10.b) Participation in a Fish Health Network should include stakeholders with knowledge of broader issues impacting fish health, and business and community representatives whose socio-economic sustainability is linked to fish health.

11.a) The Fish Health Network should support researchers and other stakeholders to ensure sufficient research is conducted prior to protectionist measures being implemented.

11.b) The Fish Health Network should facilitate collaborations between researchers, recreational anglers, indigenous fishers, and those officials responsible for developing and implementing conservation measures, harvest policies and regulations to ensure adequate science supports the introduction and continuation of such initiatives.

12.a) The Fish Health network should enhance and strengthen the important citizen science role recreational anglers and indigenous fishers serve in supporting fish health research.

13.a) The Network should support the fishing industry to continuously build and improve conservation safeguards.

14.a) Stakeholder participation on the Fish Health Network should include support for recreational anglers and indigenous fishers to sustainably harvest and practice catch-and-release fishing.

14.b) The Network should focus equally on understanding both the weaknesses and strengths of different non-commercial fish stocks to ensure recreational anglers and indigenous fishers can fish with confidence knowing the fish they are pursuing are being managed sustainably.

14.c) The Network should serve to inform those who are interested in ensuring the most appropriate science-based fish management practices are in place, and to review scientific findings being used to support the implementation of measures that call for the protection of fish stocks.

15.a) The Fish Health Network should serve as an information resource and gateway to support watershed initiatives.

16.a) A Fish Health Network should be formed that includes stakeholders that represent the Great Lakes basin and Upper St. Lawrence River and its tributaries.

17.a) The Fish Health Network consultation steering committee should develop and seek approval for terms of reference for the network.

17.b) This process should begin with identifying funding to support the implementation of a Fish health Network.